Cascade (Clackamas-Marion) District

Implementation Plan

March 2003

This implementation plan describes the management approaches and activities that the Cascade District will pursue in order to carry out the *Northwest Oregon State Forests Management Plan* and the *Western Oregon State Forests Habitat Conservation Plan (HCP)*.

The *Cascade District Implementation Plan* (and earlier drafts) guides forest management for all forest resources on the Cascade District from July 1, 2001 through June 30, 2011.

The main headings in this plan are listed below. A detailed table of contents begins on the next page.

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District Overview

Land Ownership

The Santiam State Forest contains 47,714 acres, and is located in the foothills of the Cascade Mountains in Oregon. The Santiam State Forest is managed by the Cascade District (formerly the Clackamas-Marion District, now combined with the Linn District as the Cascade District). The acreage in the Santiam State Forest is distributed between three counties, as displayed in the table below. The ownership is primarily Board of Forestry Lands (98 percent), with a small amount of Common School Forest Lands (2 percent). See the district overview map in the **Map Section** for details.

Table 5-1. Cascade District Acres, by County and Ownership

County	Board of Forestry	Common School	Total Acres
Clackamas	7,046	110	7,156
Marion	18,394	690	19,084
Linn	21,387	87	21,474
Total Acres	**46,827**	**887**	**47,714**

Forest Land Management Classification System

The FLMCS is a method of describing the management emphasis for parcels of state forest land. The management emphasis identifies the extent to which a parcel of land can be managed for a variety of forest resources. On some parcels, management may focus on a particular forest resource, and at times give a particularly sensitive resource priority over other resources on that parcel.

The framework of the forest land management classification system places all state forest lands within one of three forest land management classifications. The classifications are: (1) General Stewardship, (2) Focused Stewardship, and (3) Special Stewardship. Subclasses are assigned to the specific forest resources that require a Focused Stewardship or Special Stewardship Classification.

On General Stewardship lands, all forest resources are actively managed using integrated management strategies, techniques, and practices to meet forest management planning goals. Strategies, techniques, and practices may vary spatially and temporally.

On Focused Stewardship lands, it is necessary to carry out supplemental planning, modified management practices, or compliance with legal or contractual requirements above those required on General Stewardship lands.

Special Stewardship lands have one or more of the following characteristics:

1. A legal or contractual constraint dominates the management of the lands and precludes the integrated management of all resources.
2. One or more forest resources are present that require a level of protection that precludes the integrated management of all forest resources.
3. Lands are committed to a specific use, and management activities are limited to those that are compatible with the specific use.

The focused and special stewardship classifications can overlap. For instance, the subclasses of Aquatic and Riparian Habitat, Wildlife Habitat, and Visual can occur at the same point on the landscape. Where overlaps occur across classifications, the resource requiring the highest level of protection will determine the management approach. Because of the overlaps, if the acres shown in Table 5-2 were totaled, the total would be greater than the actual number of acres in the district. (Table 5-1 shows the actual acres in the district.) Classifications for the Santiam State Forest are shown in Table 5-2, and subclasses in Table 5-3.

Table 5-2. Cascade District Acres, by Stewardship Class and Fund

Classification	BOF	CSL	Total Acres
Special Stewardship	6,577	95	6,672
Focused Stewardship	28,113	253	28,366
General Stewardship	22,510	564	23,074

Table 5-3. Cascade District Acres, Focused and Special Stewardship Subclasses

	Focused	Special
Administrative Sites	0	7
Aquatic and Riparian Habitat	6,430	3,618
Cultural Resources	1	0
Deeds	0	0
Domestic Water Use	49	0
Easements	0	0
Energy and Minerals	0	22
Operationally Limited	N/A	1,925
Plants	85	0
Recreation	774	582
Research/Monitoring	4	20
Transmission	0	165
Visual	8,701	24
Wildlife Habitat	12,322	309

History

Most of the forest in the Santiam Canyon and the Butte Creek area was harvested between 1880 and 1930, with railroads often used to transport the timber. In the late 1930s, many of the landowners saw little value in this land, which had been heavily logged or burned by wildfire. Most landowners did not reforest the cut-over areas, leaving the land to regenerate naturally. The counties acquired these lands due to delinquent taxes, or purchased the land for a minimal amount. Soon after these transactions occurred, the state legislature passed legislation that allowed counties to turn the lands over to the state, on the condition that the counties receive a portion of the revenue from future timber sales. By the time the lands came into state ownership, much of the land was naturally regenerated. Since the Cascade District started overseeing these lands, management activities have included such projects as clearcut harvest, partial cut, precommercial thinning, reforestation, fertilization, vegetation management, stream improvement, road construction, road improvement, bridge construction and rock quarry development. Areas of clearcut harvest have been actively reforested, primarily with Douglas-fir, along with small amounts of western redcedar, noble fir, and western white pine.

Physical Elements

Geology and Soils

The geologic province of the area is the Western Cascades. The geologic history of the Western Cascades began 40 million years ago with the eruption of a chain of volcanoes just east of the Eocene shoreline. The area was tilted and folded during the middle Miocene (approximately 15 million years ago) followed by outpouring of lava. These rocks are mostly basalt and andesitic flows, volcanic breccia, tuff, and lesser amounts of other igneous rocks.

In the Santiam State Forest, most soils are productive and have few management limitations. Many of the soils on gentle to moderate slopes are easily compacted when wet. Therefore, restrictions are necessary on heavy equipment to prevent serious losses in soil productivity. Several shallow, rocky soils in the Santiam State Forest are not capable of producing timber in reasonable rotations. These soils make up a very small percentage of the forest.

Topography

The terrain in the Santiam State Forest is characterized by long, smooth, steep slopes and broad ridge crests, but rock bluffs and deeply incised stream channels are also common. Elevations range from 1,000 to 5,000 feet. Higher elevations are typically rocky, especially on very steep slopes and ridge crests.

Water

In the south block of the forest, some of the major creeks are Rock Creek, Mad Creek, Snake Creek, Sardine Creek, and Stout Creek, which all flow into the North Santiam River. Major streams in the north include Butte Creek, Abiqua Creek, Cedar Creek, and Silver Creek, which flow into the Pudding River. Gawley Creek flows into the Molalla River. The Santiam State Forest contains a few scattered wetlands smaller than 10 acres. Wetlands will be identified and management concerns addressed during the annual planning process.

There are four high elevation lakes located within the Butte Creek Basin. These lakes are popular recreation areas as well as habitat for various wildlife.

Portions of the Santiam State Forest are located within the watersheds for the cities of Salem, Stayton, Silverton, Detroit, Scotts Mills, Gates, Mill City, Mehama, and Lyons.

Climate

The Santiam State Forest has a temperate climate. Typically the late fall and winter seasons are wet. This area receives approximately 70 inches of precipitation per year. Approximately 75 percent of this precipitation occurs between November and March. The winter season is cool, but snow and freezing conditions are not common, except at higher elevations. Most winters have one or two storms that bring strong, sometimes damaging winds. Summers are somewhat dry and fairly warm. Extremely hot days are rare. Every few years, either in winter or summer, an air mass from the east side of the Cascades flows into

the area and causes abnormal temperatures. Wind can sometimes cause a significant disturbance in the forest. Strong winds can break the tops out of trees or blow down entire stands.

Biological Elements

Vegetation

The vegetation in the Santiam State Forest consists primarily of Douglas-fir stands mixed with western hemlock, western redcedar, red alder, bigleaf maple, and an occasional Pacific yew in the lower elevations. Noble fir, silver fir, western white pine, and mountain hemlock can be found in the higher elevations around the district. The understory typically consists of huckleberry, salal, ferns, vine maple, rhododendron, various herbaceous plants, and Oregon grape. Introduced weeds such as Himalayan blackberry, Scotch broom, tansy ragwort, and perennial grasses also compete with native vegetation. The salmonberry community is mostly limited to lower slopes in certain drainages such as Abiqua Creek. Beargrass and snowbrush ceanothus can be found in the higher elevations.

Cold water corydalis (*Corydalis aquae-gelidae*) is a candidate for threatened and endangered status, but is not currently proposed under the state of Oregon's Endangered Species Act. This plant is found in swampy margins of cold mountain streams and lakes. Cold water corydalis has been identified in two locations within the Butte Creek Basin.

Tansy ragwort, Scotch broom, and a variety of thistles are some of the noxious weeds determined to be present in small quantities around the district. A review of the district to assess the magnitude of this issue may be done during the implementation planning period.

Insects and Disease

Phellinus weirii is a root disease that affects Douglas-fir trees severely, and western hemlock moderately. The disease is spread when uninfected roots of a susceptible tree grow into contact with infested stumps or roots and are colonized by *Phellinus weirii*. For most of the Santiam State Forest, root disease is of moderate concern although the exact amount of the disease is unknown at this time. Recent root disease surveys in the Crabtree Basin have found high concentrations of the disease in the basin.

Most stands affected by *Phellinus weirii* are Douglas-fir stands old enough for possible harvest. Approximately 100 to 300 acres of Douglas-fir stands not old enough for commercial harvest are also affected by root disease. Management practices in all stands with root disease will be conducted in accordance with the guidance provided in *Laminated Root Rot in Western North America* (Thies and Sturrock, 1995 pg. 19-27). These management practices will be discussed in more detail in the **Management Basin Description** section.

Fish and Wildlife

The Santiam State Forest is home to diverse fish and wildlife species.

Northern Spotted Owl

Annual spotted owl surveys conducted in 2000 found 3 northern spotted owl pairs and 2 resident single owls residing on the Santiam State Forest. There are also approximately 10 pairs and 2 resident single northern spotted owl sites located within 1.2 miles of state lands.

Fish and Amphibians

As of the end of 2002, there are approximately 63 miles of fish bearing streams located on the Santiam State Forest. Approximately 78 miles of streams remain unclassified. The district has been conducting fish presence surveys to determine the beneficial use (i.e. fish bearing or not) of unclassified streams since 1995. Completed stream inventories show that several streams have cutthroat trout and a few streams have rainbow trout. The lower reaches of Rock Creek, Mad Creek, and Stout Creek support populations of wild winter steelhead. Many district streams also sustain crayfish, newts, Pacific giant salamanders, and other amphibians.

Other Wildlife Species

The forest supports diverse wildlife species associated with the various stand types, including populations of deer, elk, cougar, and bear.

Natural Disturbance

Forest fires, windstorms, landslides, floods, and insect and disease outbreaks are natural occurrences that have influenced the stands within the Santiam State Forest. In recent years fire prevention and suppression activities have kept fires that have occurred on the Santiam State Forest small. The Sardine Creek Fire of 1951 burned approximately 20,000 acres. This was the last large fire on the Santiam State Forest. This area was replanted and makes up a large portion of Green Basin. Windstorms occur somewhat frequently and in isolated patches across the district. Windstorms can interact with root disease to create patchy stands. If windstorms cause large quantities of trees to blow over, insect outbreaks of bark beetles can occur such as in 1993. Salvage logging the blown down timber after a windstorm can help keep bark beetles under control. The flood of 1996 inflicted major damage on the forest road system. Approximately 55 separate locations forest-wide experienced problems ranging from plugged culverts to landslides which required road re-location. Repairs to the road infrastructure took several years to complete and cost over $260,000.

Human Uses

Forest Management

In recent years, the Cascade District has been operating under a forest plan that included partial cutting at the rate of 2,000 to 3,000 acres per year, and clearcut harvesting at the rate of 200 acres per year. Two factors were particularly important in shaping these objectives: (1) restrictions for spotted owl circles limited the clearcut harvesting opportunities, and (2) markets were emerging for smaller-diameter sawlogs and veneer material. Another

important factor was the silvicultural need to manage some 20,000 acres of overly dense conifer stands between 40 and 70 years old.

Roads

The district's primary road network is an established system that has been in place for 50 to 60 years. It provides access for forest management activities, fire suppression, recreation and all-purpose public travel. In general, the district road network can be divided into the following categories and subcategories:

Active Use – Active use roads are those roads that are part of the permanent road system and those temporary roads that are currently in use or will be in use in the near future. These roads are usually available for use at any time of the year. Use may be continuous or intermittent. Roads in this category require active maintenance and have a full maintenance obligation under the Oregon Forest Practices Act.

Restricted Access Road — This group includes the following categories of roads closed to vehicle use. The first two categories retain the obligation for maintenance under the Oregon Forest Practices Act.

- Closed road — There is restricted access to the road for part or all of the year. This may be as simple as placing a sign or other marker at the start of the road, as might be the case in a cooperative travel management area for wildlife protection. Or, it might involve placing a semi-permanent barricade at the start of the road. This barricade can be a gate, large boulders, stumps and logs, or a trench. This strategy does not significantly alter the nature of the road, and the obligation to maintain the road remains. Road maintenance needs and sediment loads are reduced due to the elimination of traffic-related wear.

- Partially Vacated road — Partial vacation involves barricading the road and installing minor drainage structures, which might include the construction of water bars or rolling dips. This strategy is best suited for roads that will be needed again after long periods (perhaps as much as 15 to 20 years) of inactivity. Ridge-top roads or other roads where drainage and sediment issues are negligible are good candidates. The nature of the road may be altered somewhat through the addition of waterbars and other drainage structures, but the obligation to maintain the road remains. Sediment loads are reduced due to the elimination of traffic-related wear, and road maintenance needs are greatly reduced.

- Fully Vacated road — Full vacation involves removing all stream crossing structures, installing maintenance-free drainage (outsloping, water bars, rolling dips, etc.), pulling back any sidecast material, seeding grass on disturbed soil, and barricading the road. The road is effectively "put to bed." All access is prevented, and there is no maintenance obligation. Cross-drain culverts may be left in place but will not be considered as a functional drainage feature.

- Abandoned road — These roads are no longer used or maintained but have not been formally vacated to today's Forest Practices standards. These roads are generally

unavailable for use due to encroaching vegetation or road failures that prevent passage of vehicles.

Vacating roads can reduce public access. There is a special concern about access for disabled people and older users of the forest.

The Active Roads have been classified into three separate road use standards as defined in the *Forest Roads Manual* (ODF, July 2000 pg. 3-6). These standards provide guidance on how roads are constructed, improved, and maintained, and are defined below:

Low Use Standard — These are individual short spur roads designed primarily for pickups and log trucks. Low use roads generally provide access to a single harvest unit. Their use is short term and may be temporary.

Medium Use Standard — These are longer spur roads designed primarily for pickups and log trucks. Medium use roads may provide access to several harvest units. Their use is more permanent.

High Use Standard — These are longer roads designed for all types of traffic, including large equipment and recreational vehicles. High use roads are generally permanent and provide access to large areas. They are referred to as mainline roads.

There are three categories of road activities within the forest:

Construction — The building of new roads. These are primarily low use standard roads.

Improvement — Improving the quality of an existing or previously abandoned road. This may include subgrade widening, construction of turn-outs, removing roadside brush, improving the drainage system to reduce sedimentation, addition of clean surface rock, and sidecast pull back.

Closure and Vacating — Closing or putting to bed an existing road to reduce effects on the environment and reduce road maintenance expense. Road vacating will include culvert removal, waterbarring, soil stabilization, and blocking access to vehicles.

Table 5-4. Cascade District Road System

Road Use Standards	Miles
Low Use	116
Medium Use	86
High Use	88
Total Miles	**290**

Many of the high and medium use roads were originally railroad grades that were converted to rocked roads capable of handling vehicle traffic. The forest is well-roaded and, for the most part, only short spur roads and a few medium use roads will need to be constructed for harvesting purposes.

Information has been gathered about the current road condition on 90 percent of the forest's roads. The information is being used to identify areas of concern, prioritize repair activity, and plan road management activities. The following information describes the road system's condition as of May 2000.

Approximately 85 percent of the road miles are located on mid-slopes. This is a result of the long slopes common in the Cascades and the fact that many of the district's roads are located on old railroad grades that were often on mid-slopes. Eleven percent of the roads are located on ridge tops and 4 percent are in valley bottoms.

Over 95 percent of the road miles are surfaced with rock. Natural rock (pit run) quarries are common in the district and are frequently used for road surfacing. Clean crushed rock has been applied on approximately 30 percent of the road miles in the district.

The road surface on more than 90 percent of the road miles is shaped for good drainage. Cut slopes are rated as good on 80 percent of the road miles. Cut slope ravel is the major problem on the remaining miles. The road inventory has identified 41 areas as potentially unstable road fill where there is a risk of material entering a stream if failure occurs. Most of the unstable areas are on older roads, are small, and are the result of sidecast construction. Removing the sidecast material can stabilize them. Ditches are in good condition on 80 percent of the road miles. Approximately 8 percent of the road miles have ditches that are cutting, have been diverted, or are filled in. Twelve percent of the road miles do not have ditches. Roads without ditches are located on ridge tops or are outsloped for drainage.

There are nearly 2,100 culverts installed across the roads. One-third of the culverts are rated as being in good condition. The remaining culverts are in less than good condition because they show signs of rusting (36 percent), there is sediment in the culvert (22 percent), or mechanical damage (10 percent). Thirty-four culverts are installed in fish-bearing streams; two-thirds partially block fish passage and one-third totally block fish passage.

Recreation

Much of the Santiam State Forest is used for dispersed recreation. Dispersed camping, hunting, fishing, off-highway vehicle use, mountain biking, and horseback riding are popular activities. The Santiam State Forest has a few undeveloped recreation sites described below.

Shellburg Falls, in the Scattered Basin, is located off Highway 22 near the town of Mehama. A quarter-mile hiking trail leads directly to the falls. This area has recently been gated off in order to rehabilitate areas damaged by off-road vehicle use and garbage dumping. The north gate is open during the summer months for access to the trail and camping area.

Green Basin has two primitive hiking trails. One trail leads to the peak of Rocky Top Mountain where an old fire lookout used to be located. The other trail leads to a natural rock arch. Both of these trails are about a half-mile long.

Butte Creek Falls and several high elevation lakes such as Rhody Lake and Butte Lake are in the Butte Creek Basin. A quarter-mile-long trail leads to Butte Creek Falls. Rhody Lake can be accessed from a forest road. Abiqua Falls is located in the Cedar Creek Basin, but is not located on state lands. A trail leads across private land to a viewpoint of the falls.

Scenic

A large portion of the Santiam State Forest can be seen from Highway 22. There is state forest land both north and south of Highway 22: parcels in Scattered Basin and Green Basin to the north, and land in Rock Creek and Mad Creek basins to the south. Some of Mad Creek and Rock Creek basins can be seen from the towns of Mill City and Gates. The recreation sites mentioned above are also considered scenic areas. In all of these scenic areas, viewshed impact will be considered when management activities are planned.

Forest Stand Structure: Current Condition

The current stand condition is displayed in the graphs on the next page, and in the second map in the **Map Section**. Figure 5-1 shows the current stand structure as of 2002, acreage, and percentage, using the structure-based management definitions for structure types. In order to determine the current condition of the stand structure array on the district, the OSCUR stand inventory was screened, and results were verified with aerial photos and field work. The OSCUR inventory was developed in the late 1970s and early 1980s primarily to track the growth and yield of forest stand types for timber production. Therefore, it is possible to make errors on forest stand types using OSCUR, due to the incomplete stand structure information (e.g., there is no information on understory species composition, non-merchantable tree species, layering, etc.).

In order to correct any errors, all silvicultural prescriptions will be based on actual field reconnaissance during pre-operational analysis and planning, rather than on these initial OSCUR screens. A new Stand Level Inventory is now in use and will eventually update the forest stand structure information. The OSCUR inventory does include some information

related to stand structure, including tree species composition, stand age, stand density, and stand management history. These parameters were used in the current condition analysis.

Figure 5-2 shows the current age distribution of the forest as of 2002, regardless of structure, by acreage and percentage.

Figure 5-1. Current Stand Structure, by Acres and Percent

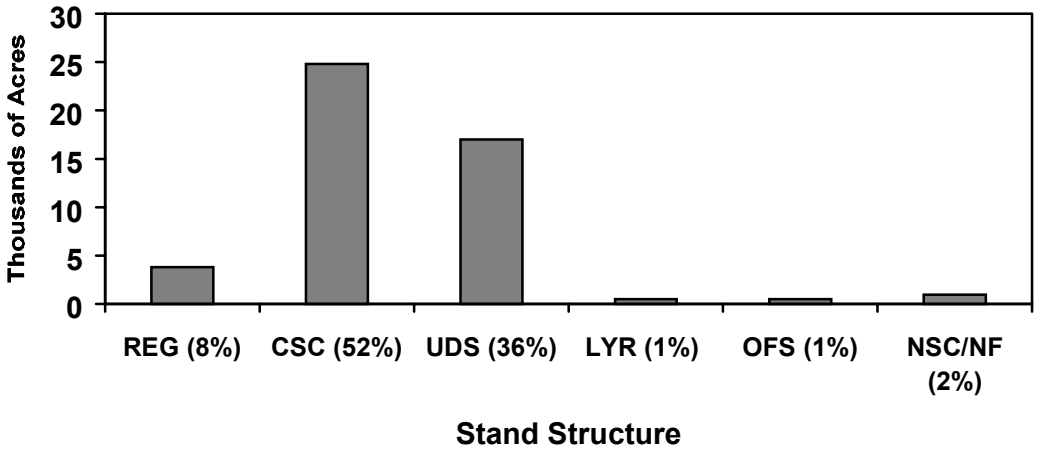
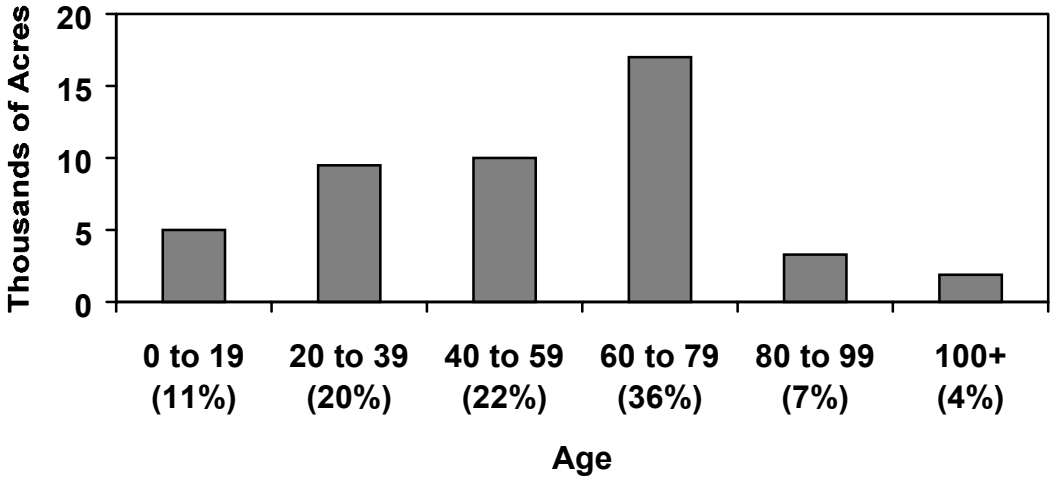


Figure 5-1 shows that the majority of the Santiam State Forest is classified as Closed Single Canopy stands. The Understory and Layered stands are the result of partial cutting done in the 1970s and 1980s. The long-term goal is to achieve more complex stands through management activities, which in turn will create multiple habitat opportunities for wildlife.

Figure 5-2. Stand Age Distribution, by Acres and Percent



As shown in Figure 5-2, a significant percentage of stands are 40- to 80-years-old. These stands are usually in the Closed Single Canopy structure. Most of these stands are good candidates for partial cutting, which would promote their development into more complex stand structures.

Management Activities

Current Condition Analysis

The Santiam State Forest has been managed since the early 1960s. A mix of clearcut harvests and thinning harvests have been accomplished across the forest. This has resulted in a forest with a mixture of stand ages from 0 to over 100 years old.

Stand Structures Interaction

The Current Condition Analysis and the Landscape Design sections of this Implementation Plan describe the amount of each of the identified forest stand types. As described in the *Northwest Oregon State Forests Management Plan* (January 2001), the stand types represent only five points along a continuum of forest development. Five "stand" types were developed as a means to plan for and assess the development of the forest toward a range of "forest" types over time. Because the five types are only points along a continuum they do not express five specific habitat types nor are they perceived as discrete habitats by wildlife species. This is discussed in detail in Appendix C of the *Northwest Oregon State Forests Management Plan* (January 2001, pg. C-1).

As you think about the current condition and desired future condition descriptions as they relate to wildlife habitat keep in mind the following concepts and refer to Appendix C in the *Northwest Oregon State Forests Management Plan* (January 2001, pg. C-1) for more detail.

In an attempt to describe how wildlife may view the forest, they seem to "see" three fundamental patch types. The table below compares these three patch types to the five stand types described in the *Northwest Oregon State Forests Management Plan* (January 2001).

Comparison between Landscape Patch Types and Stand Types	
Landscape Patch	**Stand Type**
Young forest	Regeneration through closed single canopy sapling stands
Pole-sized forest	Closed single canopy pole-sized through layered stands
Mature forests	Closed single canopy, understory, layered, and older forest structure stands (trees larger than pole-sized)

Thus, as you examine the current and desired future conditions described by the stand types, it is important to think about combinations and aggregations of different stand types that function together to provide the benefits for each of the three broad patch types that wildlife use.

For example when thinking about the amount of mature forest habitat that will be provided by the anticipated future array of layered and older forest structure stands – also consider the role of understory and closed single canopy stands. The desired future condition was developed to provide a blueprint of a desirable array for the development of the percentage of layered and older forest structure stand types in the future if natural disturbances allow and management assumptions come to fruition. As described in the table, these stand types will be complemented by adjacent understory and large diameter closed single canopy stands to provide habitat patches that represent mature forests to wildlife species. The result being significantly more acres of mature forest habitat available for wildlife than any single stand type represents.

The entire array of all stand types has not been depicted because it is virtually impossible to predict how each stand on the landscape will develop over the next several decades. By focusing on generally, where we anticipate the development of layered and older forest structure stands, it provides the local manager with the blueprint for the management prescriptions necessary to move the landscape in the desired direction. Future adjustments will undoubtedly have to be made as natural disturbances, insects and disease, or other factors result in some stands not developing in accordance with management plans.

Hardwoods

Although hardwood stands are not a stand structure type as defined in *the Northwest Oregon State Forests Management Plan* (January 2001), they do play a role in the mix of stand structures across the landscape. There are approximately 600 acres of hardwood stands within the Santiam State Forest. Other patches of hardwoods exist along streams and in small patches within conifer stands. Hardwood management is an evolving process and nontraditional silvicultural practices may be considered to manage and perpetuate hardwood stands. A component of hardwoods in mixed stands will be maintained during stand management activities.

Regeneration

Areas clearcut in the last 15 years are now in the regeneration stand structure. These areas comprise about 8 percent of the forest, and are characterized by an even-aged layer of conifer seedlings or saplings surrounded by a vigorous community of other plants and trees.

Closed Single Canopy

Stands clearcut more than 15 years ago are now considered to be in the closed single canopy stand structure. Generally, these are Douglas-fir plantations. These areas have a single, dense, even-aged layer of conifer trees. Other closed single canopy stands are older, dense, naturally regenerated stands that have not been previously partial cut. These are typically mixed conifer stands that include Douglas-fir, hemlock, western redcedar, and noble fir. They are generally dense stands that have an overstory of conifer and an understory of very suppressed brush species and an insignificant amount of hemlock seedlings and/or saplings.

Understory

Some understory stands exist where prior partial cutting has opened up the canopy enough to stimulate growth in the understory, but significant layering has not yet occurred. These are areas lightly partial cut during the 1970s through the 1980s and more recently. Other understory stands exist where stands have low densities and open canopy conditions that have allowed an understory to develop. These stands often have mixed species in the overstory as well.

Layered

The Santiam State Forest has a few areas that are currently in the layered stand structure. These are the results of a fairly aggressive partial cutting program during the 1970s and 1980s. Approximately 8,500 acres were partial cut. Some partial cuts were heavy enough to allow the layered stand structure conditions to develop. These stands generally have a large overstory of Douglas-fir with a midstory of hemlock, alder, and bigleaf maple.

Older Forest Structure

There are a few old stands on the Santiam State Forest that qualify as older forest structure. Generally, these are small patches that were not harvested during the railroad logging era. There are 10 separate patches of older forest structure totaling approximately 380 acres. These stands range in age from 120 to 500 years old.

Non-Silviculturally Capable

These areas are primarily small, scattered, parcels of state ownership that are mostly rock. They are incapable of supporting trees large enough to be commercially valuable.

Management Activities in Each Stand Type

Regeneration Stands

Reforestation

Reforestation strategies are directly linked to land management objectives. In the case of State Forest land, this includes the desired future condition of the site being reforested. The techniques and frequency of treatment that are utilized in reforesting a site that is not going toward layered or older forest structure may not be equally well suited to reforesting a site that is going toward complex stands. Strategies such as relying on natural regeneration, wide spacing of planted trees, retention of hardwoods, and tolerance of gaps created by brush species will foster the development of the diverse structural components desired in complex stands. On the other hand, aggressive control of competing vegetation along with techniques to minimize the impacts of wildlife on genetically improved, planted seedlings will move stands rapidly in the direction of non complex stands. The district plans to utilize a broad array of reforestation strategies and techniques during this implementation period to accomplish a variety of land management objectives.

Site preparation activities prepare sites for tree planting. Material such as logging debris and vegetation may be burned, piled, moved, rearranged, or any of these in combination to create planting spots. The goal of these activities is to move or remove logging debris and vegetation so reforestation can be achieved.

Initial reforestation establishes seedlings following regeneration harvests. The goal is to establish desired species at the desired spacing throughout the regeneration harvest area. Species mix and density depend on the site-specific management goals. Trees planted during initial reforestation eventually move the stand structure from the regeneration stage to the closed single canopy stage. Natural reforestation methods may also be used in certain scenarios such as shelter wood cuts or perhaps in small patch cuts less than five acres.

Interplanting is the activity of replanting a unit or parts of a unit where initial reforestation failed. Planting stock problems, animal damage, competing vegetation, and planting quality can cause plantation failure.

Tree protection measures are taken where animal damage is expected to reduce the unit stocking below desired levels. Protection measures include placing vexar tubes, or plastic tubes over the seedlings, animal trapping, and big game repellents.

Vegetation management activities include chemical and manual operations. These activities manage the growth of unwanted vegetation that may be competing with the planted seedlings. The district's philosophy is to aggressively control weeds the first year or two after a stand is planted so that seedlings can get on a rapid growth trajectory. Vegetation is never eliminated entirely by these management activities and will recover after the first two years of management to become a viable component of the understory.

Stands in the regeneration stage also have standing green trees and both new and old down woody material and snags from the previous stand. These components add structure in the regeneration stage as well as in the future stand. Regeneration stands may have the potential

to move through all the stand types to older forest structure, depending on the stand location in the landscape design.

Precommercial Thinning

When stands get a little older, but are still in the regeneration stage, the young trees start to compete with each other. Precommercial thinning is used to reduce tree competition. This activity improves the growth and value of the remaining trees. It is also used to influence the species composition of the stand. For example, slower growing western redcedar trees can be maintained by cutting faster growing trees that would overtop and possibly kill them.

Fertilization

Fertilization has not typically been used in stands in the regeneration stage. However, the district is conducting localized trials on a very small scale with early individual tree fertilization. These trials are ongoing. The district is also monitoring the projects and results of other trials, both within the department and by other agencies and organizations. If these practices improve stand value, young stand fertilization may be utilized on a larger scale.

Pruning

White pine trees planted within root disease pockets within the forest were tested for resistance from white pine blister rust. Even though the tests showed the trees resistance from white pine blister rust was high, the trees are not immune from the disease. Since the trees are not immune, young white pine stands are pruned to prevent the spread of white pine blister rust and maintain the health of the trees.

Closed Single Canopy Stands

Partial Cut Harvest

CSC Stands Developed from Plantations — Closed single canopy stands that developed from plantations are generally partial cut candidates. These stands are all younger than 40 years. These stands are starting to reach a size where a partial cut may be commercially valuable. Usually in this first harvest entry, the smaller, suppressed trees are removed, leaving the larger trees with more growing space. After harvest, the overstory will continue rapid diameter growth. Depending on the partial cutting prescription, the understory may start to develop a healthy layer of vegetation. Depending on how much of the overstory is removed, the partial cut may move the stand toward the understory stage or keep the stand in the closed single canopy stage.

Naturally Regenerated CSC Stands — Naturally regenerated stands have a variety of species, age classes, and size classes. A variety of harvest prescriptions are planned in these stands, depending on the condition of the site, the age of the stand, and the desired future condition of the area. Those stands not moving towards a complex stand structure may receive a lighter thinning and fewer thinning entries than stands moving towards a complex stand structure.

Stands moving towards layered and older forest structure conditions may receive heavier thinnings and multiple entries into the stands for management. Harvests in these stands

generally maintain a mix of species in the overstory and attempt to leave as much of the existing midstory layering components as possible.

Clearcut Harvest

Naturally Regenerated CSC Stands — Some of the natural closed single canopy stands are planned to be clearcut. These are stands that make poor partial cut candidates because of terrain, disease, or low growth potential. Some of these closed single canopy stands are not needed for layered or older forest structure.

CSC Stands Developed from Plantations - Very few stands resulting from plantations will be clearcut during this implementation plan period. The few stands that may be clearcut would be a result from severe disease problems that were affecting the stands.

Underplanting

Underplanting may be done after a heavy partial cut, in order to provide future layering or to introduce a desirable species not present. This is planned for stands that have a desired future condition of layered or older forest structure. Underplanting is beneficial for insuring the development of a second canopy of shade-tolerant trees that are typically found in older forest stands. Natural regeneration occurs in many, but not all stands following a partial harvest. These stands may not need to be underplanted.

Fertilization

Stands in the closed single canopy structure may be fertilized to increase growth of the overstory trees. Areas where additional harvest activities are expected in the next 7 to 12 years are potential fertilization candidates. The harvesting of the additional wood volume created by fertilization should provide a positive return on the fertilization investment.

Pruning

The only pruning project currently planned in the closed single canopy stage is in a 29 acre alder plantation. The pruning should increase the value of the trees and help evaluate the effects of pruning on red alder. If similar stands of red alder are created in the future, pruning opportunities will be evaluated.

Understory Stands

Partial Cut Harvests

Some of the stands partial cut in the 1970s and 1980s are now understory stands. Partial cut harvests in these stands are intended to reduce the overstory density and to maintain and further encourage the layering components of these stands. Partial cutting will also allow the residual trees within a stand to increase their diameter growth. These activities will help move the stands into layered stand structures. Snags and down woody material may be generated during these stand entries.

Underplanting

Underplanting may be done in a understory stand that has little shade-tolerant conifer understory or is lacking certain desired species. This will help the understory stand transition to a layered stand in the future. Underplanting is beneficial in insuring the development of a second canopy of shade-tolerant trees that are typically found in older forest stands.

Clearcut Harvest

Some clearcut harvesting will occur in understory stands. Most of these are stands that are not on the pathway to layered or older forest structure in the landscape design for the forest. Some of these stands may be headed for complex stand structures, but may not be well suited for partial cutting due to high height to diameter ratios, large amounts of root disease, overly dense stands or severe blow down.

Fertilization

Stands in the understory stand type may be fertilized to increase growth of the overstory trees and encourage development of the understory. Areas where additional harvest activities are expected within the next 7 to 12 years are priority candidates for fertilization.

Pruning

Pruning is not anticipated in Douglas-fir stands.

Layered Stands

Partial Cut Harvests

Some of the stands partial cut in the 1970s and 1980s are now layered stands. Partial cut harvests in these stands are intended to reduce the overstory density and to maintain and further encourage the layering components of these stands. Partial cutting will also allow the residual trees within a stand to increase their diameter growth. These activities will help move the stands into older forest structure. Snags and down woody material may be generated during these stand entries.

Underplanting

Underplanting may be done in a layered stand where additional tree species may be desired. This would help enhance the layering within the stand. Underplanting in a layered stand would not happen frequently.

Clearcut Harvest

Some clearcut harvesting may occur in layered stands. These may be stands that are not on the pathway to older forest structure in the landscape design for the forest. In these cases placement of complex stands was a higher priority elsewhere in the landscape due to considerations for northern spotted owls, recreation, visual concerns, etc..

Some of these stands may be headed for complex stand structures, but may not be well suited for partial cutting due to high height to diameter ratios, large amounts of root disease, overly dense stands or severe blow down. In these instances, the district believes that due to the current site conditions, the quickest way to achieve complex stand structures is through a clearcut versus a partial cut.

Fertilization

Stands in the layered stand type may be fertilized to increase growth of the overstory trees and encourage development of the understory. Areas where additional harvest activities are expected within the next 7 to 12 years are priority candidates for fertilization.

Pruning

Pruning is not anticipated in Douglas-fir stands.

Older Forest Structure Stands

Partial Cut Harvests

While partial cutting in older forest structure stands is not expected during this implementation period, a very small amount of partial cutting may occur. Partial cut harvests in these stands are intended to reduce the overstory density to maintain the vigor of the layering components of these stands. Partial cutting will also allow the residual trees within a stand to increase their diameter growth. Snags and down woody material may be generated during these stand entries to provide fresh material within the stand.

Clearcut Harvest

No clearcut harvests are planned in OFS stands during this implementation plan period.

Fertilization

Stands in the older forest structure stand type may be fertilized to increase growth of the overstory trees and encourage the continued development of the understory.

Pruning

Pruning is not anticipated in mature Douglas-fir stands.

Proposed Management Activities

Silvicultural Activities

The table below lists silvicultural activities for Santiam State Forest for fiscal years 2002 to 2011.

Table 5-5. Annual Silvicultural Activities for Fiscal Years 2002 to 2011

Activity	Estimated Annual Acreages

Partial cut	800 – 1,200 acres[1]
Clearcut	180 – 270 acres[2,3]
Reforestation	
- Initial Planting	115 - 345 acres[4]
- Underplanting	100 - 300 acres
Precommercial Thinning	150 - 250 acres[5]
Fertilization	1,000 – 1,400 acres[5]
Pruning	0 - 50 acres[5]

1. Diseased patch cuts less than five acres will count toward the annual partial cut objective.
2. For this 10-year planning period, stands currently identified as OFS will not be considered for clearcut harvest and LYR stands will be considered for clearcut harvest only with sufficient justification.
3. Diseased patch cuts greater than five acres will count toward the annual clearcut total.
4. Reforestation acres are higher than clearcut acres because it is anticipated that 3 to 5 percent of the partial cut acres will be reforested, where trees infected with *Phellinus weirii* have been removed, forming small openings in the stand approximately one-quarter to five acres.
5. The acres shown represent a range dependent on annual workloads and budget levels. In years of low fiscal budget levels, these estimates could fall to zero.

See Appendix A for additional information on the rationale and method applied to determine the proposed silvicultural activities in Table 5-5.

For planning purposes, 20 percent of the partial cutting is estimated to require underplanting in order to generate the desired stand structures in a reasonable time frame. Some understory reinitiation will occur through natural regeneration. Also, partial cut acres may require site preparation and vegetation management before underplanting occurs.

Roads

The desired future condition of the road system is one that safely meets the transportation needs of the district for fire protection, management activities, and public access. This road system must also minimize the impact on water quality and other forest resources. Guidance for obtaining this desired future condition will come from the Oregon Department of Forestry's *Forest Roads Manual 2000* (ODF, July 2000). The fundamental guidance for road management starts with the Level I planning document, the *Northwest Oregon State Forests Management Plan* (January 2001). For all intents and purposes, the following statement is true for this district: "The main road system is essentially complete. However, additional collector spurs and secondary spurs will still be needed to access future timber sale units. In addition, there are many miles of inherited old roads and old railroad grades now used as roads that need to be improved, reconstructed, or decommissioned to meet road maintenance standards and prevent damage to water and soil resources." (*Northwest Oregon State Forests Management Plan,* (January 2001, pg. 2-58)

The next level of planning, Level II, is the district Implementation Plan and more specific to roads is the district Transportation Plan. Elements of a Transportation Plan are described in the Oregon Department of Forestry's *Forest Roads Manual 2000* (ODF, July 2000, pg. 2-1).

A district Transportation Plan is currently in development. The Transportation Plan will describe the current conditions of the road system, a vision for the future road system, and the road construction, improvement and maintenance activities needed to reach that vision. The Transportation Plan will be updated as information from watershed assessments, road inventories and future Implementation Plan revisions become available.

- **Location** — Roads will be located to maximize their effectiveness and to minimize the impact on forest resources. By locating roads to maximize the area served by each road, the amount of road on the forest will be kept to a minimum. New roads will be located on ridge tops or gentle slopes whenever possible. When road locations are considered on steep slopes or high landslide hazard locations, engineering and/or geotechnical analysis will be done to determine alternate road locations and to determine the likelihood of road-related slope failures. This analysis will involve the district engineer, district road specialist, and the area geotechnical specialist. Roads will be designed to the standard needed to accomplish the planned management activity.

- **Use of Expertise (specialists)** – Road management will be the responsibility of the district forest engineering supervisor. Employees with specialized skills in forest engineering will make or review all decisions on road management. The Annual Operations Planning process and sale layout are the primary times that area geotechnical specialist will be utilized. The *Northwest Oregon State Forests Management Plan,* (January 2001, pg. 4-72) further defines in more detail the hazard and risk levels that necessitate the use of geotechnical evaluation.

- **Surfacing —** High-use standard roads and a few medium-use standard roads will be surfaced with crushed rock to a depth sufficient to allow all-weather use, efficient surface grading/maintenance, and to minimize sedimentation. Stockpiles of crushed rock will be strategically located throughout the district to provide a source of clean maintenance rock for log haul routes. Medium-use roads and many of the low-use standard roads will be surfaced with pit-run rock sufficient to allow use consistent with planned management activities and to minimize sedimentation. Some low-use roads will not be surfaced when these roads access small areas, are used only during dry conditions, are maintained to minimize erosion, and are waterbarred and closed at the conclusion of use.

- **Drainage —** Drainage will be rehabilitated on all roads used by a timber sale, with the goal of rehabilitating the drainage of all roads on the district within the next 10 years. Items contributing to the proper drainage of a road are:
  - Properly sized and spaced cross-drain culverts.
  - Stream structures sized to pass at least a 50-year storm event.
  - Culverts in good condition and properly installed.
  - Ditchlines disconnected from streams with cross-drain culverts.

- Stream-crossing structures in Type F streams will provide juvenile and adult fish passage upstream and downstream from the road crossing.

- **Treatment of unstable oversteepened sidecast —** The district's recently completed roads inventory has identified areas of oversteepened sidecast along some existing roads. Areas with a high and medium downslope risk and showing any movement indicators will be reconstructed to minimize the risk of resource damage.

- **Road maintenance** — The goals for road maintenance are:
  - Protect the state's investment in the road infrastructure.
  - Ensure continued access to the forest for various uses.
  - Minimize adverse impacts to water quality and wildlife habitat associated with the presence of the road infrastructure on the forest.

  Key elements of road maintenance include:
  - Inventory — Regularly update the road database portion of the GIS (Geographic Information System).
  - Inspection — Inspect roads on an annual basis or more frequently as the level of road use varies or local conditions warrant.
  - Planning — Develop a plan to perform road maintenance using information from the inventory and inspections. This plan will include the standards to which each road will be maintained, the frequency of maintenance, and the specific activities to accomplish the road maintenance.
  - Implementation — Three tools are available to accomplish road maintenance: state crews and equipment, timber sale purchasers, and service contracts.
  - Monitoring — Observations will be made to see if the work has been effective.
  - Priority Maintenance — Establish a procedure to patrol roads during storm periods when potential of damage to the roads is high. This procedure will include mapped patrol routes and established reporting methods.

- **Road vacating —** Many low-use standard roads will be vacated after use if they are spur roads that access timber stands where no operations will occur for 15 years or more. Abandoned roads may also be vacated. These closures will reduce the district's road maintenance expenditures and reduce sedimentation from roads. Road vacating will include:
  - Removal of culverts and re-establishing original stream channels.
  - Waterbarring subgrade and running surfaces.
  - Grass seeding erodible soils.
  - Blocking access to vehicles.

Table 5-6 summarizes proposed road activities in the Santiam State Forest.

Table 5-6. Road Activities for the Cascade District from Fiscal Year 2002 through Fiscal Year 2011, by Road Classification and Miles

	Low Use	Medium Use	High Use
Current Miles of Road	116 miles	86 miles	88 miles
New Road Construction	40 – 52 miles	2 – 3 miles	0 – 4 miles

Road Improvement	24 – 36 miles	49 – 61 miles	15 – 16 miles
Road Closure and Vacation	46 – 58 miles	0 – 5 miles	0 – 5 miles
Estimate Miles of Road in 2011	90 – 119 miles	72 – 98 miles	70 – 99 miles

These activities will result in minimized road density throughout the forest and a better drained, higher quality road system. If funding is available, there is an opportunity to increase the amount of improvements made on high- and medium-use roads. A higher fiscal budget level would also allow a more aggressive approach to improving fish-passage structures where roads cross fish-bearing streams. Stream crossing structures in Type F streams would be improved to provide juvenile and adult fish passage upstream and downstream from the road crossing. These improvements may include replacing an impassible structure with a bridge, counter-sunk arch pipe, baffled arch pipe, or a bottomless arch pipe. Another option may be to remove the impassible structure and restore the streambed and banks to their natural condition without replacing the structure.

Recreation

The *Santiam State Forest Recreation Management Plan* was developed to address the management for all current recreation sites and possible future sites. The plan was adopted in November 2000. The planning process included: evaluating existing recreation sites for use and access, evaluating areas for potential recreation opportunities, and addressing concerns about potential conflicts among different recreation users or with other forest management activities. The plan also looked for opportunities to achieve goals through cooperative efforts with other agencies, user groups, or organizations.

The planning process included input from a citizen advisory committee. The committee included local citizens representing different recreation user groups. A technical planning team provided input on the technical issues associated with the plan. The technical planning team consisted of county, state, and federal recreation specialists.

A Recreation Advisory Committee has been formed. This committee will include people representing different recreation user groups, and will review recreation management activities accomplished during the previous year. The committee will also review and comment on priority management activities for the current year, based on the previous year's accomplishments, the current budget, the *Santiam State Forest Recreation Management Plan*, and staffing levels.

Recreation on the Santiam State Forest has an economic value to local communities. Recreation opportunities draw visitors from outside the immediate area who buy food, gas and other products, benefiting local merchants.

The *Santiam State Forest Recreation Management Plan* defines planned recreation management activities. In this document, specific plans for recreation development are described in the Management Basin Descriptions. The following is a list of general recreation management objectives for the Santiam State Forest's recreation program over the next 10 years.

Recreation Management:

- Develop standards, plans, and procedures for public use activities on the forest.
- Establish a program to inform and educate users about rules and opportunities, and to orient visitors to the state forest.
- Increase enforcement of laws and rules governing recreation use of state land.
- Improve the safety and management of recreational target shooting in the forest.
- Increase user group participation in recreation projects on the forest.
- Integrate recreation management with forest operations, fire season regulations, adjacent landowners, and other management activities.

Motorized Recreation:

- Establish motorized use zones to separate conflicting uses and provide motorized recreation opportunities.

Camping:

- Provide for low amenity, high quality camping facilities.

Day-Use Activities:

- Address need for day-use areas.

Public Safety and Law Enforcement

Visitor safety is top priority at the Santiam State Forest. Developed trails will be maintained to ODF standards. Difficulty levels at developed hiking trails will be described in brochures and posted on kiosks. This limits conflicts among visitors and improves safety. Due to the nature of forest recreation, visitors must be responsible and know their limits, obey traffic laws on forest roads and give consideration to other visitors.

Oregon State Police Troopers have been hired to conduct vehicle patrols and provide law enforcement on the Santiam State Forest. Emphasis of the patrols is to enforce laws pertaining to fish and wildlife, trespass, vandalism, garbage dumping, off road ATV use, minor forest products and fire regulations, and to ensure public safety.

ODF recreation employees also patrol recreation areas and provide visitor assistance during weekends and periods of high use.

Informing Recreation Users of Management Operations

Recreation visitors can learn of active operations in several ways. Roads leading through recreation areas will be posted if management operations will effect traffic flow or recreation use. These roads will either be closed or caution signs will be posted. When possible, detour routes will be given. At the ODF office in Lyons, recreation areas that will be effected by management operations and road closures will be posted at the kiosk. In the future, this information may also be posted on the Santiam State Forest web site and recorded on a recreation information phone line.

Aquatic Resources: Stream Enhancement Projects

Stream enhancement projects will be accomplished in accordance with the *Oregon Plan for Salmon and Watersheds* and in consultation with the Oregon Department of Fish and

Wildlife (ODFW). After reviewing the district, ODFW fish biologists recommended Stout Creek and the lower reaches of Rock and Mad creeks as good areas for stream enhancement work. Enhancement projects will be done on those streams and others as opportunity allows. Stream enhancement projects include placement of large wood or boulders within a stream, re-establishment of historical channels, development of off-channel habitat, or riparian vegetation planting. ODFW biologists will be consulted on project designs and locations as opportunities arise. All projects will be in compliance with the Oregon Forest Practices Act and U.S. Army Corps of Engineers regulations.

Cultural Resources

- A cultural resource inventory was developed and completed in August, 2002. Revisions and updates will continue throughout the 10-year implementation planning period.
- Inventoried cultural resource sites will be evaluated to determine the appropriate protection class (Class I, II, or III).
- Potential operation areas will be checked against the cultural resource site inventory for the district to see if any sites are in or adjacent to the operation area.
- Sites that are within or adjacent to a proposed operation that has the potential to impact the site, and which have not been assessed for class designation, will be evaluated to determine the appropriate cultural resource class.
- Class I sites will be protected according to the legal standards in the applicable laws.
- Protection of Class II or III sites will be based on field inspection of the site and consultation with the appropriate Department of Forestry or other specialist.

Energy and Mineral Resources

The district will assess aggregate rock sources where adequate sources for future management are not currently identified. The district will also assess the amount and quality of rock present at identified sources. Finally, the district will create quarry development and reclamation plans based on the assessment data, estimated long-term needs, and resource protection issues.

Lands and Access

The district will carry out the following activities.

- Continue to pursue land exchange opportunities when:
  (1) The transaction furthers the purposes of ORS 530.010, the acquisition of lands chiefly valuable for the production of forest crops, watershed protection and development, erosion control, grazing, recreation or forest administration purposes; and
  (2) The exchange furthers the objectives of achieving greatest permanent value as defined in OAR 629-035-0020 as expressed in the approved forest management plan; and
  (3) The transaction results in the consolidation of state forest lands, or makes management of state-owned forest lands more economically feasible.

- Follow current Board of Forestry policies for land acquisitions and exchanges and the Administrative Rule for State Forest Land Acquisitions and Exchanges (Chapter 629, Division 33).
- Complete a land exchange and acquisition plan, as required (OAR 629-033-0015).
- Maintain the inventory of property corners and lines.
- The establishment and maintenance of property corners and lines will be prioritized and scheduled through the annual operations plans.

Scenic Resources

- Proposed operations in high and moderate sensitivity areas will be evaluated to determine appropriate landscape and/or stand-level prescriptions to mitigate the visual impacts consistent with the management objectives in the strategies.
- The resource analysis section of the annual plan will include an evaluation of the potential visual impacts and a description of the landscape and/or stand-level prescription that will be applied.

Plants

The district will protect plant species in accordance with state and federal Endangered Species Acts. In addition to Endangered and Threatened plants, the district will also make provisions for candidate and special plants. The District Plant List (Table 5-7) includes endangered, threatened, candidate, and special concern plants that are, or have the potential to be found, on the district. This list is an expanded version of the list found in the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 2-62).

This will be accomplished by the following:

- During the planning of forest operations, the district will determine whether the proposed operation areas contain a plant on the District Plant List. This determination will be made by reviewing the Oregon Natural Heritage Program database for rare plant locations. In addition, the district will use its local knowledge on rare plant locations and habitat requirements.
- When the district has determined that a plant from its list may occur within an operation area, it will consult with the Oregon Department of Agriculture (ODA) to determine the appropriate level of protection. If ODA deems a field survey is necessary due to the presence of listed plants and/or habitats, the survey results will be submitted to ODA. Survey methods and survey results will comply with OAR 603-73-090 5(C).
- The district will contribute all information about rare plant locations to ONHP so that the database is kept updated.

In addition, the district will contribute to statewide efforts to reduce the quantity and range of invasive, non-native plant species. A plan for the control of noxious weeds on the district has not been developed at this time. If significant populations of noxious weeds are

determined to be present on the district, a more formal plan will be created and implemented to address their control.

Table 5-7. Cascade District Endangered, Threatened or Candidate Plant Species

Genus	Species	Subspecies	Common name[1]	Status	Record exists[2]	Potential to be present
Threatened and Endangered Plants						
Aster	*vialis*		Wayside aster	ST	✔	
Castilleja	*levisecta*		Golden Indian-paintbrush	SE, FT	✔	
Lomatium	*bradshawii*		Bradshaw's lomatium	SE, FE	✔	
Lupinus	*sulphureus*	*kincaidii*	**Kincaids lupine**	ST, FT		✔
Plants of Special Concern						
Aster	*gormanii*		**Gorman's aster**	SP	✔	
Candidate Plants						
Cimicifuga	*elata*		Tall bugbane	SC		✔
Corydalis	*aquae-gelidae*		**Cold water corydalis**	SC	✔	
Erigeron	*oreganus*		**Oregon daisy**	SC		✔
Montia	*howellii*		Howell's montia	SC		✔
Sisyrinchium	*sarmentosum*		**Pale blue-eyed grass**	SC		✔
Sullivantia	*oregana*		**Oregon sullivantia**	SC		✔

[1]Plant names in bold are on the NW FMP list of plants.
[2]Plants have been observed on or in close proximity to state forestlands.

Status:
SE – State Endangered
ST – State Threatened
SC – State Candidate
SP – Special Concern
FE – Federal Endangered
FT – Federal Threatened

Special Forest Products

The district will carry out the following activities:

- Provide permits to harvest special forest products on a request basis consistent with product availability, protection requirements, and other resource management strategies.
- Periodically review and update district policies, procedures, and product price listings.

Landscape Design Overview

Both the Willamette and the Mount Hood national forests are located to the east of the Santiam State Forest. Silver Falls State Park is west of the forest. Most of the land surrounding Santiam State Forest is Bureau of Land Management forest land and privately owned land. There are several federal late successional reserves near or immediately adjacent to the Santiam State Forest.

District staff organized a meeting and two-day tour with Oregon Department of Forestry biologists and ODFW biologists to discuss the landscape design for the Santiam State Forest. The following assumptions and recommendations resulted.

- Given the close proximity of federal forest land, large patches of complex stands are not necessarily a critical component of the landscape design for Santiam State Forest. Instead, a variety of habitat sizes and configurations necessary for a variety of species will be located across the landscape.
- In scattered tracts that are not conducive to the production of complex structures or adequately sized patches of complex stands, individual structural components become very important. Particularly in areas surrounded by privately owned land, snags, green trees, and down wood may be retained at levels above the minimum recommendation in the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-47 to 4-58).

To begin development of the landscape design, the district looked at the past management history, current stand conditions, and placement on the landscape of the forest stands. Future OFS and LYR stands will be located in places where the current stand condition can be managed to produce complex forest structures within a time frame of 60 to 80 years. Younger stands have been included as potential future complex stands due to their location on the landscape and their potential contribution to landscape design goals.

Complex forest structures will be located around northern spotted owl sites located on the Santiam State Forest and on state forest lands near other owl sites adjacent to the state forest. Complex forest structures will be located around scenic and recreational areas; streams containing winter steelhead, cutthroat trout and rainbow trout; and areas where water quality is a concern. These stands will be located in both high and low elevation areas, on both high and low site ground, and in both older and younger stands. Some complex stands will be located immediately adjacent to federal late successional reserves (LSR) in order to create some larger patches of complex stands and also to provide some connectivity between the LSRs, other federal lands, and complex stands within the state forest. Some complex stands will be located in areas that are adjacent to or surrounded by BLM lands not designated as LSRs, and also in areas adjacent to privately owned land.

Complex forest structures will be located across the landscape and provide a variety of habitat sizes and configurations. Although one of the recommendations that came from the tour with the biologists was that large patches of complex stands were not necessarily a

critical component for the landscape design, some large patches developed after placing complex stands around owl sites, recreation and scenic areas, water quality areas and certain fish bearing streams. This landscape design will result in 10 large patches of complex stands (larger than 700 acres), 22 moderately sized patches (between 200 and 700 acres), and 30 small patches (between 40 and 200 acres). Some of the medium-sized patches will be connected by corridors of complex structure, resulting in a combined network of complex stands throughout the state forest. The planned design for complex forest structure stands is shown on Map 2B, the Desired Future Condition Stand Structure map, in the **Map Section**. The district estimated the extent and location of these stands approximately 70 years in the future to the best of our ability at this time.

The intent is to apply the appropriate silvicultural strategies and operations needed to create these complex stand structures, in accordance with the *Northwest Oregon Forests Management Plan* (January 2001). The districts' recent experiences in structure-based management have already demonstrated that map polygons cannot accurately depict conditions on the ground. It is unlikely that the physical landscape 70 years from now will look exactly like Map 2B.

Management Basins

Management Basins Overview

Management basins were delineated using major creek drainages and land form locations. The Santiam State Forest has seven management basins. These basins are listed below.

Butte Creek Basin — This basin has 10,074 acres. It is located southeast of Silverton, and is drained by Butte Creek into the Pudding River and by Gawley Creek into the Molalla River.

Cedar Creek Basin — This basin has 4,229 acres. It is northeast of Silver Falls State Park, and is drained by Abiqua Creek and North Fork Silver Creek into the Pudding River.

Crabtree Basin — This basin has 1,890 acres. It is located east of Lebanon, and is drained by Crabtree Creek into the South Santiam River.

Green Basin — This basin has 6,905 acres. It is northeast of Gates, and drains into the North Santiam River.

Mad Creek Basin — This basin has 6,737 acres. It is located southeast of Mill City, and is drained by Mad Creek into the North Santiam River.

Rock Creek Basin — This basin has 12,603 acres. It is south of Mill City and adjacent to Mad Creek Basin. It is drained by Rock and Snake creeks into the North Santiam River.

Scattered Basin — This basin has 5,276 acres. It is located in scattered blocks throughout Clackamas, Marion, and Linn counties, and drains into the North Santiam River, South Santiam River, and the Pudding River.

Table 5-8. Cascade District Planning Basins

Management Basin	Acres	District Percent
Butte Creek	10,074	21%
Cedar Creek	4,229	9%
Crabtree	1,890	3%
Green Basin	6,905	15%
Mad Creek	6,737	14%
Rock Creek	12,603	27%
Scattered	5,276	11%

Basin Descriptions

The basin descriptions below are presented in alphabetical order.

Butte Creek Basin

The Butte Creek Basin contains 21 percent (10,074 acres) of Santiam State Forest's land, and is located in the northern half of the forest. Bureau of Land Management (BLM) land and privately owned lands border the management basin. The Willamette National Forest and the Mount Hood National Forest, and the BLM's Table Rock Wilderness are in close proximity to the basin. Most streams in this basin flow into the Pudding River. The rest of the streams flow into the Molalla River.

This basin is characterized by broad ridges and long mountain slopes dissected by parallel road systems. Extensive stands of even-aged conifer blanket these slopes, interrupted infrequently by a stringer of hardwoods along a stream or seep. The basin is also unique in containing both high elevation lakes and steep rock outcroppings. The stands consist primarily of Douglas-fir with minor amounts of western hemlock, noble fir, and tag alder stringers along streams.

Cold water corydalis has been identified by the Natural Heritage Program in two separate locations within the basin. The steps outlined under the heading, Plants, in the **Management Activities** section will be followed before management activities occur in an area where the cold water corydalis might be located.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified four potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State Forests Management Plan* (January 2001) and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-9. Butte Creek Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	6	53	36	0	2	3
Post Implementation Plan Condition[1]	6	41	48	0	2	3
Desired Future Condition	8	16	16	30	27	3

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- Recreation considerations include Butte Creek Falls, which supports hiking trails, OHV areas, and camping areas; as well as Rhody Lake, Butte Lake, and Beaver Lake, which are popular for camping and fishing.
- There are approximately 15 miles of fish bearing streams within the basin. None of these streams contain anadromous fish. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 18 miles of stream within the basin.

Desired Future Condition and Landscape Design

The landscape design for the Butte Creek Basin will provide complex stands across the landscape.

- A large patch (> 700 acres) of complex stands will be located around the Rhody Lake and Butte Lake recreation and scenic areas. These are unique high elevation lakes within the district that are popular recreation areas.
- A medium patch (200 to 700 acres) of complex stands will be located around the Butte Creek Falls recreation and scenic areas. Another medium patch of complex stands will be located within a northern spotted owl area and adjacent to a federal late successional reserve. The location of the late successional reserve links this patch of complex stands within the Butte Creek Basin to complex stands within the Cedar Creek Basin.
- Two small patches (40 to 200 acres) of complex stands will be located in two 160 acre parcels located within the basin. These two parcels are completely surrounded by private lands.

Discussions with ODFW and Department of Forestry biologists indicate that 5- to 20-acre openings are needed in the large areas of unbroken forested landscape within this basin. These openings would provide foraging opportunities for deer and elk.

The riparian areas of all fish-bearing streams, including Butte Creek and Gawley Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams. These riparian areas will help to connect patches of complex stands together across the basin.

Potential Management Activities

Harvesting — In this basin, most of the partial harvesting will occur in stands currently classified as CSC or UDS. Most of the stands that are partial cut will move along the pathway to LYR or OFS, with the remaining stands moving along the pathway to UDS.

Existing structural components such as snags, down wood, and understory species will be maintained as much as possible during the partial harvests in these stands.

The partial harvests will result in moving an estimated 12 percent of stands out of the CSC designation and into the UDS designation. The partially harvested UDS stands will remain in the UDS classification, but will be moved further along the pathway to the LYR classification.

Most clearcut harvests are planned in stands currently classified as CSC or UDS. Some clearcuts may be placed in stands planned for development into LYR or OFS conditions. These clearcuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines in the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

An estimated 20 percent of the partially harvested acres may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity helps to produce an understory in future LYR and OFS stands and to introduce another species to the stand.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Some REG stands may need to be precommercially thinned within the time frame of this plan. It is unknown at this time how many acres will be precommercially thinned within this basin. The district silviculturist recommends acres for precommercial thinning each year.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends acres for fertilization each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-10. Butte Creek Basin: Potential Harvesting Activities for Fiscal Years 2002-2011

	Partial Cut	Clearcut
Acres	1,960 – 2,940	410 - 620

Recreation

Management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

This basin experiences a high amount of recreational use. Future plans include a large increase in developed recreational opportunities to better manage the amount of use.

Trails

Existing trails will be upgraded to standards as described in the *ODF Draft Facilities Standards Manual*. A maintenance program including ongoing inspection of trails to ensure that the standards described in the manual are attained.

The existing trail leading to Butte Creek Falls is the most heavily used hiking trail in this basin. This trail shall be constantly maintained and improved for ease of use and visitor safety. The length of the trail shall be increased to allow for foot travel to campgrounds which will be developed by the summer of 2003.

A multi-use, non-motorized trail shall be designed and constructed to provide a connection between Rhody Lake and the Butte Lakes. This trail shall be a challenging hike and provide a unique experience. Shorter loop trails shall be constructed around the lakes to provide visitors with additional hiking options.

When operations such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads and Staging Areas

Camping will be developed throughout the basin. Butte Creek Falls, Rhody Lake and the Butte Lakes will see the most development. The campgrounds created within these areas may included fire rings, picnic tables, garbage receptacles and vault toilets.

Existing trailheads and parking lots shall be expanded and improved. New trailheads and parking lots shall be built as needed as recreational opportunities are developed. Signs or kiosks shall be posted or built in areas where information is needed. These should help reduce conflicts between users and improve visitors experiences.

Public Involvement

Environmental education programs shall be designed and offered to give visitors opportunities to explore the unique natural features in this basin. Activities such as litter clean-up and environmental rehabilitation shall take place to allow local communities to become involved in forest stewardship.

Roads

Many of the medium-use and most of the high-use standard roads in this basin were constructed on old railroad grades. Drainage improvement projects have been completed on approximately 35 miles of the medium-use and high-use roads in the basin, as of fall 2000. Approximately 18 miles of the medium-use and low-use roads need improvement, particularly surface work and drainage work. It will be difficult to significantly reduce the road density in this basin and still carry out partial cutting operations.

Table 5-11. Butte Creek Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	23	27	19
Desired Future Condition	15	30	19

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm, stable surface. Generally, after each partial harvest is completed, most of the spur roads will be vacated. After each clearcut harvest is completed, some of the spur roads will be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be vacated. Road activities will be accomplished as either project work in conjunction with a harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts. Table 5-12 summarizes the road activities for this basin.

Table 5-12. Butte Creek Basin: Potential Road Activities by Road Classification and Miles for Fiscal Years 2002 to 2011

	Low Use	Medium Use	High Use
New Road Construction	3-5	2-3	0
Road Improvement	4-6	15-17	2-3
Vacated Roads	4-6	0	0

In sum, all road work will result in the improvement of 15 to 17 miles of medium-use roads and 2 to 3 miles of high-use roads. This work will reduce sedimentation caused by roads, reduce road density, and improve the condition of the remaining roads.

Two to three miles of new medium-use road will be constructed to replace a poorly designed low-use road. The low-use road has a poorly designed approach that requires large trucks to drive an additional mile up the road in order to turn around, since the trucks can only make the turn onto the road in one direction. The new medium-use road will correct this situation and be in a better location. It is anticipated that the newly designed road will receive more use than the old road, so it is being designed as medium use. This work makes significant progress toward the desired future condition for the basin's road system. The desired future condition will have roads that are well drained, and have a clean and stable surface. This road system will provide access to the forest not only for timber harvest, but also for fire prevention and recreational uses, while minimizing adverse impacts to water quality and wildlife habitat.

Cedar Creek Basin

The Cedar Creek Basin encompasses 9 percent (4,229 acres) of the Santiam State Forest's land, and is located in the northwestern part of the forest. The basin is composed of 10 separate parcels of land. Silver Falls State Park is adjacent to the basin's southwest boundary. Butte Creek Basin is northeast of the basin, but is not contiguous. BLM lands and privately owned land are intermixed with the state forest lands in this basin.

Major streams in this basin include Bridge Creek, Cedar Creek, Abiqua Creek, North Fork Silver Creek, and Little Abiqua Creek, which all flow into the Pudding River.

One pair of northern spotted owls resides in the basin. This pair is protected by a 133-acre core area located on state land.

The basin's forest consists primarily of mixed Douglas-fir and hemlock. Small amounts of western redcedar are scattered around the basin. Some regeneration areas have been replanted with western redcedar and white pine in addition to Douglas-fir, increasing species diversity within the basin.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified eight potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State Forests Management Plan* and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-13. Cedar Creek Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	10	48	40	1	1	0
Post Implementation Plan Condition[1]	9	35	54	1	1	0
Desired Future Condition	9	11	23	33	24	0

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- A pair of northern spotted owls resides on state lands within this basin.
- There is a scenic area around Abiqua Falls. The falls themselves are located on private land.
- The city of Silverton gets its water from Abiqua Creek.
- According to the Oregon Department of Water Resources, there is one domestic use water source that is adjacent to this basin.
- There are 8 miles of fish bearing streams within the basin. Some of these streams contain steelhead. Beneficial use (i.e. fish bearing or not) has yet to be determined for approximately 18 miles of stream.

Desired Future Condition and Landscape Design

The landscape design for the Cedar Creek Basin provides complex stands throughout most of the basin. Due to the configuration of state owned lands within this basin, large patches of complex stands were not achievable on state lands alone.

- Two medium patches (200 to 700 acres) of complex stands will be located within the northern spotted owl area. These patches will be placed adjacent to federal late successional reserves. This placement links the patches of complex stands together within the northern spotted owl area and to complex stands located within Butte Creek Basin. Another medium patch of complex stands will be located around the Abiqua Falls area. Although the falls are located on private lands, the state lands receive some recreational use in this area and provides a scenic back drop to the falls.

- A small patch (40 to 200 acres) of complex stands will be located within the northern spotted owl area adjacent to a federal late successional reserve. Another small patch of complex stands will be located around Homestead Falls.

- Additional small and medium patches of complex stands will be located across the basin to try to spread the complex stands across the landscape.

The riparian areas of all fish-bearing streams, including Cedar Creek, Abiqua Creek, and Little Bridge Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams. These riparian areas will help to connect patches of complex stands together across the basin.

Potential Management Activities

Harvesting — Most partial harvests in this basin will be conducted in CSC and UDS stands. Most of these stands will move along the pathway toward LYR or OFS stands, with a minority of the CSC stands on the pathway to UDS.

The partial harvests will move an estimated 17 percent of stands out of the CSC designation and into the UDS designation. Approximately 14 percent of the partial-harvested UDS stands will remain in the UDS classification, but will be moved further along the pathway to the LYR type.

Most clearcut harvests are planned in stands currently classified as CSC or UDS. Some clearcuts may be placed in stands planned for development into LYR or OFS conditions. These clearcuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

An estimated 3 percent of CSC stands will become REG stands and 1 percent of UDS stands will become REG stands as a result of the planned clearcuts. Approximately 5 percent of the REG stands will move into the CSC category. As a result, there will be an estimated 9 percent of REG stands within the basin at the end of the 10-year planning period.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines in the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvest areas will be promptly reforested after harvest. Site preparation may be needed after harvest, before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

An estimated 20 percent of the partially harvested acres may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity helps produce a desirable understory in future LYR and OFS stands and to introduce another species to the stand.

Surveys will be conducted one, three, six, and nine years after planting to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Some REG stands may need to be precommercially thinned within the time frame of this plan. It is unknown at this time how many acres will be precommercially thinned within this basin. The district silviculturist recommends acres for precommercial thinning each year.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-14. Cedar Creek Basin: Potential Harvest Activities for Fiscal Years 2002-2011

	Partial Cut	Clearcut
Acres	1,040 – 1,560	140 - 200

Recreation

Recreation management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

OHV use is the primary recreational activity in this basin. There are several waterfalls located on private lands within this basin. Cooperative efforts will be sought with these landowners to possibly connect trails located on ODF lands to the waterfalls located on the private lands.

Trails

Current OHV and non-motorized trails shall be inventoried and a system of designated trails shall be established to better manage their use. Existing trails shall be redesigned, upgraded, closed and built to minimize adverse resource impacts.

OHV use along the Crooked Finger Mainline is heavy. There are already several established OHV trails in this area. These trails will be improved to ODF standards. New trails shall be developed to provide continuity to the existing trails. Trails that cause adverse environmental impacts or do not provide a continuos trail system shall be closed. Neighboring private landowners are very concerned about the OHV use. ODF will work with these landowners to address their concerns.

There are unique natural resources, such as Abiqua Falls, within this basin that are located on private lands. Currently there are trails that cross ODF land leading to these sites. Cooperative efforts with adjacent landowners shall be investigated to provide non-motorized, hiking trails to these areas.

When operations such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to

recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads, and Staging Areas

Camping will remain dispersed within this basin. Existing trailheads and parking lots shall be expanded and improved. New trailheads and parking lots shall be built as needed as recreational opportunities are developed. Signs or kiosks shall be posted or built in areas where information is needed. These should help reduce conflicts between users and improve visitors experiences.

Public Involvement

Activities such as litter clean-up and environmental rehabilitation shall take place to allow local communities to become involved in forest stewardship.

Roads

The roads in this basin access ten different parcels of state forest land, all located in the same general area. Some roads in this basin are located behind private landowners' gates.

Table 5-15. Cedar Creek Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	15	13	4
Desired Future Condition	10	13	4

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm, stable surface. Generally, after each partial harvest is completed, most of the spur roads will be vacated. After each clearcut harvest is completed, some of the spur roads will be left open to provide access for managing the newly planted stand. When these stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be vacated. Road activities will be accomplished either as project work in conjunction with a harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts. Table 5-16 summarizes the road activities for this basin.

Table 5-16. Cedar Creek Basin: Potential Road Activities by Road Classification and Miles For Fiscal Years 2002-2011.

	Low Use	Medium Use	High Use

New Road Construction	3-5	0	0
Road Improvement	2-4	10-12	2-3
Vacated Roads	5-7	0	0

In sum, this road work will result in the improvement of 10 to 12 miles of medium-use and 2 to 3 miles of high-use roads. This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads. This work makes significant progress toward the desired future condition for the basin's road system.

Crabtree Basin

Located in the southernmost part of the Santiam State Forest, the Crabtree Basin contains only 3 percent (1,890 acres) of the forest's land. The basin is bordered by privately owned land. However, large portions of BLM lands surround this private land. The major streams in this basin include Green Mountain Creek, Bald Peter Creek, Bald Barney Creek, Cruiser Creek, and Camp Creek. All of these streams flow into Crabtree Creek, which ultimately flows into the South Santiam River.

Stands in the basin consist primarily of Douglas-fir and western hemlock. Hardwoods can be found along riparian areas.

A major portion of the Crabtree Basin is infected with root disease. The district is planning clearcut harvests in the infected areas. These areas will be planted with disease-resistant species, which will increase species diversity within the basin. Logging in the late 1930s may have occurred when the soils were wet, leaving Crabtree Basin with significant soil compaction along old skid roads.

Table 5-17. Crabtree Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	5	39	56	0	0	0
Post Implementation Plan Condition[1]	31	13	56	0	0	0
Desired Future Condition	15	38	47	0	0	0

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- There are 6 miles of fish bearing streams within this basin. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 5 miles of stream.
- There is a significant amount of the root disease *Phellinus weirii* within the basin.

Desired Future Condition and Landscape Design

Recent surveys have discovered significant amounts of the root disease *Phellinus weirii* within the basin. The district's main management goal in this basin is to reduce the amount of root disease and regenerate stands with resistant tree species that could some day achieve complex structures. There are no planned complex stands in the desired future condition of this basin due in part to the large amount of root disease within the basin. Also, this basin is a likely candidate for land exchange as it is surrounded completely by one private landowner. There is a federal late successional reserve area a little over a mile south of this basin.

The riparian areas of all fish-bearing streams, including Green Mountain Creek, Bald Peter Creek, and Camp Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams.

Old skid roads within this basin may be ripped and planted to reduce the compaction and restore the production of these strips of land. Any existing log culverts within these skid roads will be removed.

Potential Management Activities

Harvesting — Any partial harvests in this basin will occur in CSC or UDS stands. Clearcut harvests in this basin will occur in CSC or UDS stands. These harvests will move approximately 29 percent of the CSC stands into the REG classification. This will result in

31 percent of the basin in the REG stand type at the end of the 10-year period. This percentage is higher than the desired future condition of 15 percentage in REG due to the treatment of the large amounts of root disease within this basin.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-18. Crabtree Basin: Potential Harvest Activities for Fiscal Years 2002-2011

	Partial Cut	**Clearcut**
Acres	40 – 60	410 - 650

Roads

The state forest roads in this basin serve an isolated block of state ownership. In the past several years, 3 miles of low-use and medium-use roads have been constructed to better access the area. Approximately 1.8 miles of medium-use roads have been improved, particularly the road drainage and surface rock, as of fall 2000.

There are several miles of abandoned roads in the basin that will be evaluated for vacating.

Table 5-19. Crabtree Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	**Medium Use**	**High Use**
Current Condition	6	1	3

Desired Future Condition	3	1	3

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm, stable surface. Generally, after each partial harvest is completed, most of the spur roads may be vacated. After each clearcut harvest is completed, some of the spur roads may be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be vacated. Road activities will be accomplished as project work in conjunction with a harvesting operation.

Table 5-20. Crabtree Basin: Potential Road Activities by Road Classification and Miles For Fiscal Year 2002-2011

	Low Use	Medium Use	High Use
New Road Construction	3-4	0	0
Road Improvement	2-3	0	0
Vacated Roads	5-6	0	0

This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads. This work makes significant progress toward the desired future condition for this basin's road system.

Green Basin

The Green Basin contains 15 percent (6,905 acres) of Santiam State Forest's land, and is located in the eastern portion of the forest. Much of the basin is bordered by the Willamette National Forest and BLM land. A small part of the basin is bordered by privately owned land.

During the 1950s a large fire burned the entire Sardine Creek Drainage and most of Green Basin. The site was planted with off-site Douglas-fir seedlings. Although the seedlings came from an off-site seed source, the trees are relatively healthy at this time. It is unclear if there will be long-term problems with the trees' health and vigor because of their off-site origins. If problems develop, the basin's future landscape design may need to be revised.

Stands within the basin consist primarily of Douglas-fir. Alder is found in the lower elevations, and noble fir and mountain hemlock in the higher elevations. White pine has been planted in some root disease pockets. These pockets will add to the species diversity within the basin.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified two potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State Forests Management Plan* and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-21. Green Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	3	68	25	1	1	2
Post Implementation Plan Condition[1]	1	59	36	1	1	2
Desired Future Condition	9	20	15	24	28	2

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- There are three northern spotted owl sites located on U.S. Forest Service lands adjacent to the basin.
- Rocky Top and the Natural Rock Arch recreation areas.
- Several areas of this basin are visible from Highway 22.
- The city of Salem water supply is the North Santiam River.
- According to the Oregon Department of Water Resources, 15 domestic water sources are located either adjacent to or on state lands within this basin.
- There are approximately 3 miles of fish bearing streams within this basin. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 23 miles of stream.

Desired Future Condition and Landscape Design

The landscape design for the Green Basin will provide complex stands across the landscape.

- A medium patch (200 to 700 acres) of complex stands will be located within one of the northern spotted owl areas. Another medium patch of complex stands will be located within and adjacent to the Natural Rock Arch recreation area.
- A small patch (40 to 200 acres) of complex stands will be located adjacent to the Rocky Top recreation area. Small patches of complex stands will be located in two of the northern spotted owl areas. Other small patches of complex stands will be located in areas of the basin that are visible from Highway 22. Highway 22 is considered a scenic highway.

- Additional complex stands in a variety of patch sizes will be located across the basin to spread the complex stands over the landscape.

The riparian areas of all fish-bearing streams, including Sardine Creek and Bad Banks Creek, will be managed for mature forest conditions. The same management strategy will apply also to medium-sized non-fish-bearing streams. These riparian areas will help to connect patches of complex stands together across the basin.

Potential Management Activities

Harvesting — The partial harvests will occur mostly in CSC and UDS stands. These stands are on the pathway to UDS, LYR or OFS. Approximately 11 percent of the CSC stands will move into the UDS classification as a result of the planned partial harvests. An estimated 10 percent of the UDS stands will remain UDS stands, but will be moved further along the pathway to LYR stands as a result of planned partial harvests.

The majority of clearcut harvesting will occur as patch cuts in CSC and UDS stands. These patch cuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

An estimated 3 percent of REG stands will move into the CSC classification by the end of this planning period. This will result in approximately 1 percent of stands within this basin in the REG stand type.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

An estimated 20 percent of the partially harvested acres may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity helps to produce a desirable understory in future LYR and OFS stands and to introduce another species into the stand.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-22. Green Basin: Potential Management Activities for Fiscal Years 2002-2011

	Partial Cut	**Clearcut**
Acres	790 – 1,950	40 - 100

Recreation

Management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

This basin receives moderate use from visitors to the Santiam State Forest. The areas of interest within this basin include Rocky Top and the Natural Rock Arch. Due to the steep, rocky nature of the land, hiking and site seeing are the primary recreational activities within the area.

Trails

Existing trails will be upgraded to the standards described in the *ODF Draft Facilities Standards Manual*. A maintenance program is in place including ongoing inspection of trails to ensure that standards described within the manual are attained.

The current trail system within the basin includes two difficult level trails leading to Rocky Top and the Natural Rock Arch. The Natural Rock Arch trail will be redesigned to increase visitor safety and decrease erosion. The trail leading to Rocky Top is in good condition and will be maintained regularly. When possible, trails will be designed to connect current and future recreation sites within the basin.

There are no current plans for OHV trails within the basin.

When operations such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads and Staging Areas

Camping in the Green Basin area will remain dispersed with no developed campgrounds planned for the future. This is due to the steep, rocky nature of the land within the basin. Other agencies nearby offer large campgrounds facilities along Highway 22.

Existing trailheads and parking lots will be expanded and improved. Signs or kiosks will be posted or built in areas where information is needed. These should help reduce conflicts between users and improve visitors experiences.

Public Involvement

Environmental education programs shall be designed and offered to give visitors opportunities to explore the unique natural features in this basin. Activities such as litter

clean-up and environmental rehabilitation will take place to allow local communities to become involved in forest stewardship.

Roads

Many roads in this basin were built after the Sardine Creek Fire for salvage logging and reforesting the area. Four miles of low-use roads have been vacated and 4 miles of high-use and medium-use roads have been improved, particularly the road drainage and surface rock, as of fall 2000. The following table describes the current condition and desired future condition of the road system in the Green Basin.

Table 5-23. Green Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	17	10	7
Desired Future Condition	15	10	7

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm, stable surface. Generally, after each partial harvest is completed, most of the spur roads may be vacated. After each clearcut harvest is completed, some of the spur roads may be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads in the vicinity of either partial harvests or clearcut harvests may be vacated. Road activities will be accomplished as project work either in conjunction with a harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts. Table 5-24 summarizes the road activities for this basin.

Table 5-24. Green Basin: Potential Road Activities by Road Classification and Miles For Fiscal Years 2002-2011

	Low Use	Medium Use	High Use
New Road Construction	5-6	0	0
Road Improvement	3-5	2-4	0
Vacated Roads	6-7	0	0

In sum, this road work will result in the improvement of 2 to 4 miles of medium-use roads. This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads.

This work makes significant progress toward the desired future condition for the basin's road system. This road system will provide access to the forest not only for timber harvest, but also for fire prevention and recreational uses, while minimizing adverse impacts to water quality and wildlife habitat.

Mad Creek Basin

The Mad Creek Basin contains 14 percent (6,737 acres) of Santiam State Forest's land and is located in the forest's southeastern portion, south of Highway 22 and the town of Gates. Privately owned land and some BLM land border the rest of the basin. Some of the basin is adjacent to Highway 22, or can be seen from the highway or Gates.

The basin's major streams include Little Rock Creek, Mad Creek, Burbank Creek, Pennick Creek, Green Mountain Creek, Seven Mile Creek, and Turnidge Creek. These streams all flow into the North Santiam River.

Stands consist primarily of a Douglas-fir and western hemlock mix. Alder and bigleaf maple are present at the lower elevations, and some noble fir is found at the higher elevations. Some areas of the basin have moderate amounts of large residual trees, snags, and down woody debris, but other areas have little to none. Some root disease pockets have been replanted with alder, bigleaf maple, western redcedar, and white pine, adding species diversity to the basin.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified eight potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State Forests Management Plan* (January 2001) and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-25. Mad Creek Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	16	29	52	2	0	1
Post Implementation Plan Condition[1]	8	35	54	2	0	1
Desired Future Condition	10	10	25	28	26	1

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- Two resident single owls and a pair of northern spotted owls affect the management activities within this basin.
- There are 6 miles of fish bearing streams within this basin. Mad Creek, Seven Mile Creek, and Turnidge Creek support steelhead populations. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 7 miles of stream.
- The cities of Salem, Lyons, Mill City and Gates get their water from the North Santiam River.
- According to the Oregon Department of Water Resources, there are 2 domestic water sources located adjacent to or on state lands within this basin.

Desired Future Condition and Landscape Design

The landscape design for the Mad Creek Basin will provide complex stands across the landscape.

- Medium patches (200 to 700 acres) of complex stands will be located within northern spotted owl areas. Additional medium sized patches of complex stands will be located within areas of the basin that are visible from Highway 22 and the cities of Gates and Mill City. Other medium sized patches of complex stands will be located adjacent to complex stands within the Rock Creek Basin to form large continuous blocks of complex stands.
- Small patches (40 to 200 acres) of complex stands will be located within northern spotted owl areas. Additional small patches of complex stands will be located within areas of the basin that are visible from Highway 22 and the cities of Gates and Mill City.
- Additional patches of complex stands will be located across the basin to spread the complex stands over the landscape.

The riparian areas of all fish-bearing streams, including Mad Creek, Turnidge Creek, and Seven Mile Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams. These riparian areas will provide connectivity between blocks of complex stands within the basin.

Potential Management Activities

Harvesting — In this basin, most of the partial harvesting will be stands currently classified as UDS, with a minor amount of stands classified as CSC. Most of these stands are on the pathway to LYR or OFS, with a minor amount of the stands moving towards UDS.

Approximately 3 percent of CSC stands will move into the UDS designation as a result of the planned partial harvests. An estimated 25 percent of UDS stands may move into the LYR classification as a result of the planned partial harvests.

Clearcut harvests will occur mostly in CSC and UDS stands. Clearcuts may be placed within stands planned for development into UDS, LYR, or OFS stands. These clearcuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

Less than 1 percent of the CSC stands will move into the REG classification as a result of the planned clearcuts. An estimated 13 percent of REG stands will move into the CSC classification during the 10-year planning period. These changes in stand type will result in 8 percent of the basin in REG stands.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

An estimated 20 percent of the partially harvested acres may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity helps to produce a desirable understory in future LYR and OFS stands and to introduce another species into the stand.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Some REG stands may need to be precommercially thinned within the time frame of this plan. It is unknown at this time how many acres will be precommercially thinned within this basin. The district silviculturist recommends acres for precommercial thinning each year.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-26. Mad Creek Basin: Potential Management Activities for Fiscal Years 2002-2011

	Partial Cut	**Clearcut**
Acres	1,480 – 2,400	50 - 150

Recreation

Management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

This basin experiences a high amount of recreational use from camping and day use activities. This is an excellent area for developing multi-use trail systems which may be designed to connect with trails in the Rock Creek Basin.

Trails

Existing trails will be upgraded to standards as described in the ODF Draft Facilities Standards Manual. A maintenance program will be established including ongoing inspection of trails to ensure that the standards described in the manual are maintained.

There are currently no developed trails within the Mad Creek Basin. Existing rogue trails will be inventoried and then improved to ODF standards or closed depending on the viability of the trail. The future goal is to have a trail system spanning both the Mad Creek and Rock Creek Basins. These trails will be non-motorized and multi-use.

OHV use is moderate within the basin and is currently restricted to roads. The road system is the best place for OHV use at this time. Where conditions permit, detour trails may be constructed for motorized use, providing OHV users with off road experiences.

When operations such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads and Staging Areas

Camping will remain dispersed within the basin. Developed campgrounds will be located in the nearby Rock Creek Basin. Staging areas and trailheads will be constructed and where use is heaviest, vault toilets and day-use facilities will be installed. Equestrian facilities such as hitching posts and compost areas will be installed as this type of use increases.

Trailheads and parking lots will be created or expanded or improved where existing. Signs or kiosks will be posted or built in areas where information is needed. These should help reduce potential conflicts between users and improve visitors experiences.

Public Involvement

Environmental education programs shall be designed and offered to give visitors opportunities to explore the unique natural features within this basin. Activities such as litter clean-up and environmental rehabilitation will take place to allow local communities to become involved in forest stewardship.

Roads

The roads in this basin are in good condition. Four miles of low-use roads have been vacated, and 22 miles of high-use and medium-use roads have been improved, particularly the road drainage and surface rock, as of fall 2000.

Table 5-27. Mad Creek Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	19	13	19
Desired Future Condition	15	18	19

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm and stable surface. Generally, after each partial harvest is completed, most of the spur roads may be vacated. After each clearcut harvest is completed, some of the spur roads may be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be vacated. Road activities will be accomplished as project work either in conjunction with the harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts.

Table 5-28. Mad Creek Basin: Potential Road Activities by Road Classification and Miles for Fiscal Years 2002-2011

	Low Use	Medium Use	High Use
New Road Construction	12-16	0	0
Road Improvement	3-5	16-18	8-9
Vacated Roads	11-14	0	0

In sum, the road work will result in the improvement of 16 to 18 miles of medium-use and 8 to 9 miles of high-use roads. This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads.

This work makes significant progress toward the desired future condition for the basin's road system. This road system will provide access to the forest not only for timber harvest, but also for fire prevention and recreational uses, while minimizing adverse impacts to water quality and wildlife habitat.

Rock Creek Basin

The Rock Creek Basin is the largest of all the management basins, encompassing 27 percent (12,603 acres) of the Santiam State Forest. The basin is located south of Highway 22 and Mill City. It is bordered by Mad Creek Basin, BLM lands, and privately owned land. Some of this basin can be seen from Mill City and Highway 22. The major streams include Rock

Creek and Snake Creek, which flow into the North Santiam River; and tributaries of Thomas Creek, which flows into the South Santiam River.

The basin's stands consist primarily of Douglas-fir and hemlock, with some small patches of pure hemlock stands. Bigleaf maple and alder are present at lower elevations, western redcedar, noble fir, and occasionally western white pine at higher elevations. Some hemlock patches are infected with mistletoe. Large patches of mistletoe-infected trees will be removed to prevent further spreading. In areas where only a few trees are infected, the infected trees will be left as wildlife trees. Some parts of the basin have moderate amounts of large residual trees, snags, and down woody debris, but other areas have little to none.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified ten potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State Forests Management Plan* and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-29. Rock Creek Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	3	56	38	1	0	2
Post Implementation Plan Condition[1]	5	47	46	0	0	2
Desired Future Condition	12	15	16	33	22	2

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- There are 5 pairs and 1 resident single northern spotted owls that affect the management activities within this basin.
- There are 17 miles of fish bearing streams within this basin. Rock Creek has winter steelhead runs. Beneficial use (i.e. fish bearing or not) has yet to be determined on 7 miles of streams.
- Areas of the basin are visible from Highway 22 and Mill City.
- The cities of Salem, Lyons and Mill City get their water from the North Santiam River.

Desired Future Condition and Landscape Design

The landscape design for the Rock Creek Basin will provide complex stands across the landscape.

- Large patches (>700 acres) of complex stands will be located within the northern spotted owl areas. Additional large patches of complex stands will be located adjacent to complex stands within the Mad Creek Basin. This will create large continuos blocks of complex stands.
- Medium patches (200 to 700 acres) of complex stands will be located within northern spotted owl areas. Additional patches of complex stands will be located within areas visible from Highway 22 and from the cities of Mill City and Gates.
- Small patch sizes (40 to 200 acres) of complex stands will be located within northern spotted owl areas. Additional patches of complex stands of this size will be located within areas visible from Highway 22 and from the cities of Mill City and Gates.
- Additional patches of complex stands will be located throughout the basin to spread the complex stands over the landscape.

The riparian areas of all fish-bearing streams, including Rock Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams. These riparian areas will provide connectivity between blocks of complex stands across the landscape.

Potential Management Activities

Harvesting — The majority of the stands being partial harvested are currently classified as CSC or UDS stands. Most of these stands are on the pathway to UDS, LYR, or OFS stands.

Approximately 10 percent of the CSC stands will grow into the UDS stand type as a result of the planned partial harvests. The UDS stands will remain UDS stands, but will be moved further along the pathway to LYR stands as a result of planned partial harvests.

Most of the clearcut harvests are planned in CSC or UDS stands. Clearcuts may be placed within stands that are planned for development into UDS, LYR, or OFS stands. These clearcuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

An estimated 2 percent of CSC and 2 percent of UDS stands will become REG stands as a result of the planned clearcuts. Approximately 2 percent of the REG stands will move into the CSC category. As a result of these activities, there will be an estimated 5 percent of REG stands within the basin at the end of the 10-year planning period.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling

species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings.

An estimated 20 percent of the partially harvested acres may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity will help to produce a desirable understory in future LYR and OFS stands, and potentially introduce another species into the stand.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Some REG stands may need to be precommercially thinned within the time frame of this plan. It is unknown at this time how many acres will be precommercially thinned within this basin. The district silviculturist recommends acres for precommercial thinning each year.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-30. Rock Creek Basin: Potential Harvest Activities for Fiscal Years 2002-2011

	Partial Cut	**Clearcut**
Acres	1,690 – 2,540	470 - 700

Recreation

Management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

Recreation in the Rock Creek Basin consists primarily of hiking, equestrian use, mountain biking, and OHV use. The large area provides excellent opportunities for long, continuous trails. This is unique when compared to the rest of the Santiam State Forest.

Trails

Existing trails will be upgraded to standards as described in the ODF Draft Facilities Standards Manual. A maintenance program will be established including ongoing inspection of trails to ensure that the standards described in the manual are maintained.

Currently there are many rogue trails and only a few developed trails. A continuous, non-motorized, multi-use trail will be developed in this basin. It will start in the western end of the basin and continue through the Mad Creek Basin. Its primary use will be for equestrian

riders and mountain bikers. Existing portions of this trail are currently being improved to ODF standards.

OHV use is moderate in this area and is currently restricted to roads. The road system is the best place for OHV use at this time. A system of designated trails will be established to better manage motorized use and redesign, upgrade, and / or build designated trails to minimize adverse resource impacts.

When operations such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads and Staging Areas

Camping is common within the basin. Open areas with accessible streams make the Rock Creek Basin attractive for camping and day use activities. Campgrounds will be developed to provide facilities for visitors and improve their experience. These campgrounds may include fire rings, picnic tables, garbage receptacles and vault toilets nearby.

Signs or kiosks will be posted or built in areas where information is needed. These should help reduce potential conflicts between users and improve visitors experiences.

Public Involvement

Environmental education programs will be designed and offered to give visitors opportunities to explore the unique natural features in this basin. Activities such as litter clean-up and environmental rehabilitation will take place to allow local communities to become involved in forest stewardship.

Roads

The majority of the high-use roads in this basin have been built on old logging railroad grades. The roads in this basin are in good condition. In the past several years, 8 miles of low-use roads have been vacated, and 27 miles of high-use and medium-use roads have been improved, particularly the road drainage and surface rock, as of fall 2000.

Table 5-31. Rock Creek Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	27	18	27
Desired Future Condition	22	26	27

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system and a firm and stable surface. Generally, after each partial harvest is completed, most of the spur roads may be vacated. After each clearcut harvest is completed, some of the spur roads may be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be evaluated for vacating. Road activities will be accomplished as project work either in conjunction with a harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts.

Table 5-32. Rock Creek Basin: Potential Road Activities by Road Classification and Miles For Fiscal Years 2002-2011

	Low Use	Medium Use	High Use
New Road Construction	9-10		0-4
Road Improvement	3-5	5-7	3
Vacated Roads	9-11	0	0-4

In sum, the road work will result in the improvement of 5 to 7 miles of medium-use roads and 3 miles of high-use roads. This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads. The new construction of high-use roads may be needed to replace a section of the South Rock Creek Road washed out in 1999. It may not be possible to repair the area of the washout, so an alternate route would need to be constructed, as this road is part of the major access for this basin. This work makes significant progress toward the desired future condition for this basin's road system. These roads will be well drained, and have a clean and stable surface. This road system will provide access to the forest not only for timber harvest, but also for fire prevention and recreational uses, while minimizing adverse impacts to water quality and wildlife habitat.

Scattered Basin

The Scattered Basin (5,276 acres) includes approximately 25 separate land parcels. This basin includes the Shellburg, Stout Creek, Canyon Creek, Fawn Creek, Elkhorn, Gates Hill parcels, and other areas. The parcels are intermingled with the Willamette National Forest, BLM, and privately owned land. Most of the streams associated with the Scattered Basin flow into the North Santiam River. The basin's stands consist of Douglas-fir and hemlock. Alder, bigleaf maple, cedar, and noble fir can be found on different land parcels.

The *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* identified two potential cultural resource sites within this basin (ODF, 2000c). These sites will be protected in accordance with the guidelines in the *Northwest Oregon State*

Forests Management Plan and the information provided under the Cultural Resources heading in the **Management Activities** section of this document.

Table 5-33. Scattered Basin: Current Condition, Post Implementation Plan Condition, and Desired Future Condition, by Stand Structure and Percentage

	REG	CSC[2]	UDS[3]	LYR[4]	OFS	NSC
Current Condition	19	56	20	2	2	1
Post Implementation Plan Condition[1]	21	45	29	2	2	1
Desired Future Condition	8	19	18	30	24	1

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

Key Resource Considerations

- Shellburg Falls recreation area.
- Some areas are visible from Highway 22.
- There are five pairs and one resident single northern spotted owls adjacent to state lands that affect management activities within this basin.
- There are 8 miles of fish bearing streams within this basin. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 10 miles of streams.
- The city of Detroit's municipal water intake is located on state lands within this basin.
- According to the Oregon Department of Water Resources, 6 domestic water sources are located either adjacent to or on state lands within this basin.
- The city of Salem water supply comes from the North Santiam River.

Desired Future Condition and Landscape Design

- A large block (>700 acres) of complex stands will be located within the Shellburg recreation and scenic areas. Another large block of complex stands will be located within the Ayers Creek/Stout Creek parcel. These two areas are the only parcels with enough contiguous lands to create large patches of complex stands.
- Medium patches (200 to 700 acres) of complex stands will be located within northern spotted owl areas and areas that can be seen from Highway 22.
- Small patches (40 to 200 acres) of complex stands will be located within northern spotted owl areas and areas that can be seen from Highway 22 or the Little North Fork Road. A small patch of complex stands will be located within the scattered parcel that contains the water intake for the city of Detroit's water supply.

The riparian areas in all fish-bearing streams, including Stout Creek and Ayers Creek, will be managed for mature forest conditions. The same management strategy will apply also to

any medium-sized non-fish-bearing streams. These riparian areas will provide connectivity between complex stands.

Potential Management Activities

Harvesting — The partial harvests are planned in a mixture of stands currently classified as CSC and UDS. These stands are on the pathway to becoming UDS, LYR, or OFS stands.

Approximately 10 percent of the CSC stands will move into the UDS classification as a result of the planned partial harvests. An estimated 3 percent of the UDS stands will remain UDS stands, but will be moved further along the pathway to LYR stands as a result of planned partial harvests.

Clearcut harvests are planned in CSC or UDS stands. Clearcuts may be placed within stands planned for development into UDS, LYR, or OFS stands. These clearcuts may take place due to the presence of root disease, overdense stocking, operational considerations, or other unexpected conditions.

An estimated 6 percent of CSC & UDS stands will become REG stands as a result of the planned clearcuts. Approximately 4 percent of the REG stands will move into the CSC category. As a result of these activities, there will be an estimated 21 percent of REG stands within the basin at the end of the 10-year planning period.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (January 2001, pg. 4-52) for the amounts, sizes, and distributions of these structural components.

Reforestation — All clearcut harvests will be promptly reforested following the completion of harvesting activities. Site preparation may be needed after harvest and before trees are planted. Root disease areas will be planted with disease-resistant species. Certain seedling species, such as western redcedar, may be protected from animal damage by placing vexar or plastic tubes over the seedlings. An estimated 20 percent of the acres that are partial harvested may be underplanted. Underplanting is the process of planting seedlings underneath a canopy of trees. This activity will help to produce a desirable understory in future LYR and OFS stands, and will potentially introduce another species into the stand.

Surveys will be conducted one, three, six, and nine years after planting activities to monitor the survival, health, and growth of the trees. Areas with low survival rates will be interplanted during the next planting season. Areas where competing vegetation is affecting the growth or survival of the trees may be treated. Treatment may include use of herbicides, hand clearing of competing vegetation, or other methods.

Some REG stands may need to be precommercially thinned within the time frame of this plan. It is unknown at this time how many acres will be precommercially thinned within this basin. The district silviculturist recommends acres for precommercial thinning each year.

Stands that will be harvested in the next seven to twelve years are candidates for fertilization. The district silviculturist recommends areas to fertilize each year.

More specific information on management activities can be found in the **Management Activities in Each Stand Type** section of this document.

Table 5-34. Scattered Basin: Potential Management Activities for Fiscal Years 2002-2011

	Partial Cut	**Clearcut**
Acres	980 – 1,470	300 – 450

Recreation

Management activities proposed for this basin are in accordance with the *Santiam State Forest Recreation Management Plan*.

The primary recreation in the Scattered Basin occurs in the Shellburg Falls recreation area. Over the years, due to the proximity of surrounding cities and lack of recreation management, the Shellburg Falls area received damage from vandalism and over use. Most of the damage was caused by off highway vehicle use such as ATVs, motorcycles, and 4-wheel drive vehicles, which caused major site compaction and erosion. Additional problems were caused from garbage dumping, target shooting and other acts of site degradation. In 1997 Shellburg Falls was closed to the public and intensive rehabilitation efforts began. Garbage was removed and vegetation was planted in areas where erosion was heavy. Problem trails were closed and gates were installed on the roads to limit use to seasonal only. After rehabilitation, the Shellburg Falls area is now open seasonally and recreation is increasing.

Trails

Existing trails will be upgraded to standards as described in the ODF Draft Facilities Standards Manual. A maintenance program is established including ongoing inspection of trails to ensure that the standards described in the manual are attained.

The Shellburg Falls trail is the most heavily used hiking trail in this area. It has been improved to ODF standards and will be constantly maintained. There are multiple trails in the vicinity of Shellburg Falls. These trails will be improved or reconstructed and additional trails may be added to create a continuous trail system to Silver Falls State Park. ODF will cooperate with the BLM and State Parks to construct and manage this non-motorized, multi-use trail.

OHV use is common in the Scattered Basin near the Ayers Creek road. Existing off road trails will be closed where erosion is a problem. Other trails will be improved and connected to provide loop trails for OHV users.

When operation such as timber harvesting, road construction or improvement occur in areas where trails are located, these operations may be used to help with trail construction, maintenance or closure. Trails located within timber harvest areas would be closed to

recreational use during the operation. After the harvest is complete, the trails will be re-opened in the condition they were in prior to the harvest or possibly improved.

Campgrounds, Trailheads and Staging Areas

Camping will be developed near Shellburg Falls. Sites will be established along the Shellburg road and near the Shellburg Falls trailhead. Campgrounds will be high quality and low amenity. These facilities will include fire rings, picnic tables, garbage receptacles, vault toilets where necessary and water outlets. Hitching posts for equestrian riders will be provided near the Shellburg Falls trailhead as well.

Existing trailheads and parking lots shall be expanded and improved. New trailheads and parking lots shall be built as needed. Signs or kiosks will be posted or built in area where information is needed. These should help reduce potential conflicts between users and improve visitors experiences.

Public Involvement

Environmental education programs will take place regularly at Shellburg Falls. This area is located near Highway 22. People from several local communities can take advantage of the area's unique characteristics and close proximity. Activities such as litter clean-up and environmental rehabilitation will take place to allow local communities a chance to become involved in forest stewardship.

Roads

The roads in this basin access eighteen different areas of state forest land, located both north and south of the Santiam River and well-separated from east to west. Approximately 6.1 miles of medium-use roads have been improved, particularly the road drainage and surface rock, as of fall 2000.

Table 5-35. Scattered Basin: Current Condition and Desired Future Condition of Roads, by Road Use Standards and Miles

	Low Use	Medium Use	High Use
Current Condition	12	3	6
Desired Future Condition	10	3	6

Potential Road Activities

To provide access to harvest units, a number of low-use spur roads will be constructed. Improvements will be made to the high-use and medium-use roads that are log haul routes. These improvements will provide a well-designed and maintained drainage system, and a firm and stable surface. Generally, after each partial harvest is completed, most of the spur roads may be vacated. After each clearcut harvest is completed, some of the spur roads may be left open to provide access for managing the newly planted stand. When these regeneration stands grow into the closed single canopy stage, these spur roads may then be vacated. Abandoned roads near partial harvests or clearcut harvests may be evaluated for

vacating. Road activities will be accomplished as project work either in conjunction with a harvesting operation, by Department of Forestry road maintenance specialists, or through service contracts.

Table 5-36. Scattered Basin: Potential Road Activities by Road Classification and Miles for Fiscal Years 2002-2011

	Low Use	Medium Use	High Use
New Road Construction	5-6	0	0
Road Improvement	7-8	1-3	1
Vacated Roads	6-7	0	0

In sum, the road work will result in the improvement of 1 to 3 miles of medium-use and 1 mile of high-use roads. This work will reduce sediment transport from the roads, reduce road density, and improve the condition of the remaining roads. This work makes significant progress toward the desired future condition for the basin's road system.

Information Summary for All Management Basins

The Table 5-37 shows the desired future condition for stand structures by individual management basins and for the Santiam State Forest as a whole.

Table 5-37. Summary: Current Condition (CC) and Desired Future Condition* (DFC), by Stand Structure and Percentage

Management Basin	Acres	NSC/ Non-Forest**		REG		CSC		UDS		LYR		OFS	
		CC	DFC	CC	DFC	CC	DFC	CC	DFC	CC	DFC	CC	DFC
Butte Creek Basin	10,074	3	3	6	8	53	16	36	16	0	30	2	27
Cedar Creek Basin	4,229	0	0	10	9	48	11	40	23	1	33	1	24
Crabtree Basin	1,890	0	0	5	15	39	38	56	47	0	0	0	0
Green Basin	6,905	2	2	3	9	68	20	25	15	1	24	1	28
Mad Creek Basin	6,737	1	1	16	10	29	10	52	25	2	28	0	26
Rock Creek Basin	12,603	2	2	3	12	56	15	38	16	1	33	0	22
Scattered Basin	5,279	1	1	19	8	56	19	20	18	2	30	2	24
District Total	**47,714**	**2**	**2**	**8**	**10**	**52**	**16**	**36**	**19**	**1**	**29**	**1**	**24**

* The Desired Future Condition will be achieved in an estimated 60 to 80 years.
** NSC/Non-Forest (Non-Silviculturally Capable and Non-Forest lands). Non-Silviculturally Capable lands are not capable of growing forest tree species (defined in OAR 629-035-0040). Non-Forest lands are those areas, greater than 5 acres, that are maintained in a permanently no forest condition (example include district offices, work camps and large power line right-of-ways).

The forest-wide totals for each stand structure type fall within the accepted stand structure range given in Landscape Management Strategy 1 of the *Northwest Oregon State Forests Management Plan* (January 2001) as shown below.

Regeneration (REG)	5-15%
Closed Single Canopy (CSC)	10-20%
Understory (UDS)	15-35%
Layered (LYR)	20-30%
Older Forest Structure (OFS)	20-30%

This implementation plan will move stands toward the desired future condition with minimal loss of options for future landscape design considerations. The desired future condition will provide a range of stand conditions that will meet habitat requirements for a full assortment of native wildlife species. It is estimated that the desired future condition can be achieved in approximately 60 to 80 years for all management basins.

Expected Outputs and Habitat Achievements

Table 5-38. Anticipated Stand Structure Development by 2011

	REG	CSC[2]	UDS[3]	LYR[4]	OFS
Current Condition	8	52	36	1	1
After Implementation Plan Period[1]	8	43	45	1	1
Desired Future Condition	10	16	19	29	24

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 2 to 3 years for an understory to develop.
3. After partial cutting and/or underplanting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop LYR stands into OFS is highly variable and depends on many factors, including (but not limited to): snag and down wood recruitment; development of trees greater than 32 inches in diameter.

The goal of the *Northwest Oregon State Forests Management Plan* (January 2001) is to create a forest that has many different stand types across the landscape, and components of structural diversity within stands, such as snags and down wood. Some examples of this landscape design are: closed single canopy stands with openings for deer and elk forage; riparian management areas that provide connectivity between patches of layered and older forest structure stands; and brush and rock outcroppings mixed in with layered and understory stands.

Partial cutting will be the primary silvicultural activity to advance stands toward the next level of structural complexity. More complex structures will not be achieved immediately after a partial cut. Historical evidence suggests that it may take approximately 20 to 25 years after the management prescription for a more complex structure to be achieved. For partial cuts, approximately 60 percent of the yearly harvest acreage will be in older stands (more than 55 years old). The other 40 percent of the partial cut harvest acreage will be in younger stands (less than or equal to 55 years old). Partial cutting in both younger and older stands will help CSC and UDS stands develop into the more complex LYR stand structure. Some younger stands will receive multiple partial cut entries on 20-year intervals to develop the components of a LYR stand. Some LYR stands may require an additional partial cut entry to hasten the development of OFS characteristics (larger diameter trees, higher snag densities, and greater down wood levels, etc.). Partial cutting may also be done in OFS stands.

The harvest levels proposed in this implementation plan will contribute toward the desired future structure targets as outlined in Table 5-37. During this initial 10-year planning period, stands in the following conditions will be assessed for conversion into the REG structure:

- Stands in poor forest health condition (e.g., *Phellinus weirii*-infected stands larger than 5 acres).

- Stands surplus to the CSC or UDS stand structure targets.
- Stands that are not reasonable silvicultural candidates for development into complex LYR or OFS stands. Typically these stands are sparsely stocked with a brush understory, or overstocked with a low likelihood of responding positively to partial cutting.
- Stands in a location on the landscape that cannot effectively be managed for complex LYR or OFS forest structure.

The annual operations plan will include a projection of how the planned silvicultural activities in a given fiscal year will contribute toward meeting desired future condition goals.

The Table 5-39 shows the timber outputs that will be produced through this implementation plan.

Table 5-39. Annual Partial Cut and Clearcut Harvest Objectives, by Volume and Acres

Partial Cut		Clearcut		Total
Acres	**MMBF**	**Acres**	**MMBF**	**MMBF**
800 – 1,200	10.4 – 15.6	180 - 270	6.3 – 9.5	16.7 – 25.1

The Cascade District expects to accomplish the following actions to develop and enhance wildlife habitat, over the 10-year implementation period.

Table 5-40. Estimated Annual Habitat Achievements for Partial Cuts and Clearcuts for Fiscal Years 2002 to 2011

Harvest Type	Structure Development (acres)	Snag Retention[1] (snags)	Down Wood Recruitment[2] (thousand cubic feet)	Green Tree Retention[3] (trees)
Clearcut		360 - 540	135 - 203	900 – 1,350
Partial Cut	800 – 1,200	1,600 – 2,400	36 - 240	

1. Snag retention levels – younger partial cuts may not include snag creation; older partial cuts will have a target of 1 or 2 snags per acre, and clearcuts 2 snags per acre.
2. Down wood recruitment levels – average of 200 cubic feet per acre in partial cuts, and average of 750 cubic feet per acre in clearcuts.
3. Green tree retention level – average of 5 trees per acre

FY 2001 Sale Plan and Existing Active Sales

Table 5-41 summarizes the timber harvest and road activities for pre-existing active sales.

Table 5-41. Summary of Current and Planned Timber Sales as of January 1, 2003.

Harvest Type	Clearcut Acres	Partial Cut Acres
FY 2000*	61	551
FY 2001*	19	785
FY 2002	191	878
FY 2003	254	1,087

* The Annual Operations Plans for Fiscal Years 2000 and 2001 were approved prior to the adoption of the Northwest and Southwest Oregon State Forest Management Plans by the Oregon Board of Forestry. These two operation plans also occur prior to the time frame of this implementation plan, although the contracts extend into the implementation period.

During the Implementation Planning period, approximately ten to fifteen recreation trails will be constructed, five to ten trails will be improved and ten to twenty campsites will be developed and spread across the district. A number of trail heads, kiosks and vault toilets will also be installed around the district.

Appendix A

Determining Levels of Harvest and Other Silvicultural Activities

This document shows the results and outlines the steps and processes used to arrive at the activity levels in the *Cascade District Implementation Plan.* Levels for harvest and other silvicultural activities were determined utilizing the Department of Forestry's *Implementation Plans 2001: Determining Levels of Harvest and Other Silvicultural Activities for Northwest State Forests and Procedure for Review and Refinement of the Draft IP Harvest Calculations, March 6, 2001* (ODF, March 2001b).

Results

Table 5-42 summarizes the estimated annual objectives for harvests and other silvicultural treatments for the 10-year period from fiscal year 2002 to fiscal year 2011.

Table 5-42. Annual Objectives/Estimates

Silvicultural Activity	Annual Objective Acres / Year
Conifer Partial Cut Harvest[1]	800 – 1,200
Conifer Clearcut Harvest[2,3]	180 - 270
Hardwood Partial Cut Harvest	N/A
Hardwood Clearcut Harvest	N/A
Rehabilitation	0 - 100
Reforestation	
Initial Planting[4]	115 - 345
Underplanting	100 - 300
Precommercial Thinning[5]	150 - 250
Fertilization[5]	1,000 – 1,400
Pruning[5]	0 - 50

1. Diseased patch cuts less than five acres in size will count toward the annual conifer partial cut objective.
2. For this 10-year planning period, stands currently identified as OFS will not be considered for clearcut harvest, and LYR stands will be considered for clearcut harvest only with sufficient justification.
3. Diseased patch cuts greater than five acres in size will count toward the annual conifer clearcut objective.
4. Reforestation acres are higher than clearcut acres because it is anticipated that 3 to 5 percent of the partial cut acres will be reforested where trees infected with *Phellinus weirii* have been removed, forming small openings in the stand approximately one-quarter to five acres in size.

5. The acres shown represent a range dependent on annual workloads and budget levels. In years of low fiscal budget levels, these estimates could fall to zero.

Step 1. Allocate the District Acreage into Categories.

In Step 1 the acres in roads, streams, special stewardship, and other lands not available for commercial harvest were subtracted from the total district acreage to determine the acreage of stands capable of supporting a commercial operation.

Table 5-43. Determination of Stands Capable of Supporting a Commercial Operation

Category	Acres
Total District Acres	47,714
Roads and Streams [1]	4,940
Non-Commercial[2]	4,202
Commercial Conifer	37,950
Commercial Hardwoods	622

1. **Roads and Streams –** Acres in roads were determined by multiplying the total road length of all roads on the district by the an average right-of-way width of 40 feet. Acres in streams represent special stewardship stream buffers and were calculated from GIS.
2. **Non-Commercial Opportunities** – Acreage that would not support a commercial operation in the foreseeable future due to non-silviculturally capable designation, special stewardship other than aquatic-riparian (i.e., northern spotted owl clusters, northern spotted owl core areas outside of clusters, and marbled murrelet management areas), very low site or bad terrain, or because the site is grass, brush, or a noncommercial hardwood vegetation type. Non-merchantable Douglas fir stands are included in this category.

Step 2. Determine Annual Conifer Harvest Objectives.

Conifer Partial Cut Harvest Objective

The Santiam Unit of the Cascade District estimates that 75 percent of the current conifer stand acres are sound candidates for partial cutting. Sound partial harvest candidates are stands with good growth characteristics that can maintain or increase growth in a reasonable time following harvesting. These are also stands considered to be operable in a cost-effective manner, and capable of attaining desired structural components.

The Santiam Unit has done considerable partial cutting since the mid-1970s. It is anticipated that stands will be re-entered about every 15 years, at the earliest. On poor sites, high elevations, and where previous thinnings were heavy, entry intervals will be significantly longer. An average entry interval of 20 years is used for this analysis.

The annual conifer partial cut harvest objective is estimated to be 1,423 acres/year (75 percent of 37,950 acres, divided by the average entry interval of 20 years).

Conifer Clearcut Harvest Objective

The remaining 25 percent of conifer acres are not considered to be good partial harvest candidates. These include:

- Over-dense stands that would take too long to regain structure;
- Stands inoperable for partial harvesting;
- Stands with disease problems; and
- CSC stands that are surplus to desired future condition needs for OFS and LYR stand structure types.

Stands planned for clearcuts and conversion into REG structure on the Santiam State Forest are made up of three general groups. One group is dense conifer stands. The inventory classifies these stands as being dense or over-dense conifer stands. These are generally over 50 years old. Another group is conifer stands over 60 years old. These stands are excess to our needs for CSC and UDS stands and are reaching financial maturity. Some of these have disease problems. The last group is understocked stands. These stands are overly sparse and are under-productive in terms of growth and value. Existing conditions make most of the stands considered for conifer clearcut poor candidates for development into complex stands.

The total conifer clearcut harvest candidate pool is estimated to be 9,488 acres (25 percent of 37,950 acres).

The annual conifer clearcut harvest objective is estimated to be 271 acres/year (9,488 acres divided by the 35-year planning period). A planning period of 35 years was selected to allocate clearcut candidate stands over time. The level of clearcut harvest associated with this period will also accomplish the amount of regeneration stand type specified in the district's landscape design.

Step 3. Determine the Annual Hardwood Harvest Objectives.

Pure hardwood stands are a very small component of the Santiam State Forest. Only 622 acres are classified as hardwood stands. Some of these are high elevation alder stands in marshy areas. Others are small islands within much bigger conifer stands.

These stands are currently classified as CSC stands. They will be evaluated when adjacent conifer types are considered for partial or clearcut harvests. They may be partial harvested or clearcut depending on location, structure components, and desired future condition of the area. Stands with desirable structure components will be maintained.

No annual harvest level is determined for these hardwood stands.

Step 4. Adjust Gross Objectives for Availability Factors.

Availability — Availability issues on the Santiam State Forest are dominated by northern spotted owls. There are 17 owl circles affecting the management activities on the Santiam Forest. The amount of state forest land within these circles varies from 1 to 99 percent. A

minimum of 40 percent of the land within these circles must be kept in suitable habitat. After thinning, stands are NOT considered suitable habitat for an unknown period of time. The district estimated how many acres had to remain unthinned in each owl circle during the implementation plan period. In partial harvest areas, the total for unthinned owl circle acres is about 4,000 acres or 400 acres per year for the 10-year period. This is 28 percent of the "Partial Cut Gross Annual Mean." In clearcut harvest areas, this is about 15 percent of the area or about 40 acres/year. These acres are considered "Unavailable" for T&E reasons.

Step 5. Adjust Gross Objectives for Operability Factors.

Operability — Harvesting areas have small patches that are not operable because they are in unstable areas, marshy areas, wide steep V-draws, or in other areas that make them unavailable for harvesting. This is estimated to reduce the harvest area by about 2 percent or 28 acres/year of the partial cut and 5 acres/year of the clearcut.

Step 6. Adjust Gross Objectives for Logistical Factors

Logistical — Over the next 10-year period the district intends to structure harvest patterns to avoid logistical problems. No reduction is taken for logistical reasons.

After determining the harvest objective averages and considering availability and operability, annual harvest levels for the next 10 years are estimated to be 1,000 acres/year partial cut and 230 acres/year clearcut.

Table 5-44. Summary of Availability, Operability, and Logistical Reduction Factors in Acres and Percent (%).

Harvest Objective	Gross Annual Objectives	Availability Reduction	Operability Reduction	Logistical Reduction	Net Annual Objectives
Conifer Clearcut	271	15%	<1%	0	226
Hardwood Clearcut	N/A	N/A	N/A	N/A	N/A
Conifer Partial Cutting	1423	28%	2%	0	995
Hardwood Partial Cutting	N/A	N/A	N/A	N/A	N/A

Step 7. Estimate the Annual Rehabilitation Acreage.

The Santiam State Forest does not have any areas that require an investment to control existing vegetation and establish a new stand.

Step 8. Estimate the Annual Reforestation Acreage.

Initial planting — All clearcut acres will be planted.

Estimated Initial Planting: 180 - 270 acres/year

Underplanting — In addition to this initial planting, some of the partial harvests in areas where OFS and LYR are desired will be underplanted. This will help develop the desired structural components where they would not otherwise develop. An estimate of this acreage is a quarter of the yearly partial harvest acreage that moves stands towards LYR and OFS. As the district learns more about developing structure, underplanting strategies will be adjusted accordingly.

Partial harvests in areas moving toward LYR and OFS total approximately 800 acres/year.

Estimated Underplanting: 800 acres/year * 1/4 = 200 acres/year

Interplanting — Some acres may need to be interplanted to achieve desired stocking levels. These are places where initial planting failed.

Estimated Interplanting: 0 - 100 acres/year

Step 9. Determine the Annual PCT Estimate.

Generally, precommercial thinning can increase value of future harvests, and maintain or change a stand's species mix. There are about 2,000 acres in the likely age category that may need PCT in the next ten years, or 200 acres/year.

Step 10. Determine the Annual Fertilization and Pruning Estimate.

Pruning —Pruning is used to prevent spread of white pine blister rust or to increase stand value. At this time the district plans to prune only white pine and red alder. This is a very small amount of pruning.

There are about 200 acres of white pine stands that need to be protected from blister rust. This is about 20 acres/year, over the next 10 years.

The district plants a few alder stands in root rot pockets and other sites where red alder is desirable. Pruning is potentially a good investment in these stands. This may be about 100 acres over the next 10 years, or about 10 acres/year.

At this time no pruning is planned on Douglas-fir to increase value. If future conditions show that pruning Douglas-fir is a desirable treatment, acres will be added into this category.

Estimated Pruning (White Pine and Alder): 30 acres/year

Fertilization — Fertilization can be used to increase growth and value of the overstory, and also to encourage understory development and layering. Stands that are harvest candidates in 7 to 12 years are current fertilization candidates. These candidates includes both younger stands in the 20 year age class as well as older stands. Some of these candidates have been thinned previously and other candidates are coming up on their first thinnings.

Annual Fertilization Opportunity Level: 1,000 – 1,400 acres/year

Step 11. Adjust Estimates for Logistical, Operability, and Availability Factors.

Activity levels depend on budget levels, analytical tools, and amount of acres that are final harvested each year. The predicted activity levels are adjusted to account for this yearly variation. All of these activities are subject to budget constraints. Adjusted activity levels are summarized in Table 5-45.

Table 5-45. Adjusted Activity Levels (Ranges)

Activity	Estimated Objective (Adjusted)
Initial Planting (+/- 50% of midpoint)	115 - 345 acres/year
Underplanting (+/- 50% of midpoint)	100 – 300 acres/year
Interplanting	0 – 100 acres/year
PCT	150 – 250 acres/year
Pruning	0 – 50 acres/year
Fertilization	1,000 - 1,400 acres/year

Appendix B

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Map Section

1. **Cascade District Overview**
2. **Cascade District: Current Condition Stand Structure**
3. **Cascade District: Desired Future Condition Stand Structure**