



Astoria District

Implementation Plan

June 2009

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Introduction

The *Astoria District Implementation Plan* guides forest management for all forest resources on the Astoria District beginning July 1, 2009. This implementation plan is a major revision of the plan approved by the State Forester in March, 2003. The reasons for the revision include:

- Incorporating New Information – Forest inventory (Stand Level Inventory), yield tables, harvest modeling, and watershed analysis.
- Reflecting Changes in Condition – Land exchanges, threatened and endangered species locations.
- Adjusting Forest Land Management Classifications (FLMC) – The FLMC maps are undergoing a “major change” as defined in OAR 629-035-0060 (3).
- Better Achieving the *Northwest Oregon State Forest Management Plan (FMP)* goals – Current implementation of the plan has not produced the level of volume anticipated when it was approved in 2001.

This implementation plan includes a new landscape design that designates 40 percent of the district for the development of Layered and Older Forest Structure (complex structure) over time. This landscape design will provide better economic performance while placing complex structure in areas it is anticipated to provide the greatest benefit to wildlife.

The implementation plan describes the management approaches and activities that the Astoria District will pursue in order to carry out the *Northwest Oregon State Forests Management Plan (FMP)* and the northern spotted owl strategies of the draft *Western Oregon State Forests Habitat Conservation Plan (HCP)*. In addition, the management activities conducted under this plan will be consistent with the following State Forests Operational Policies and strategies:

- Northern spotted owls;
- Marbled murrelet;
- Swiss Needle Cast Strategic Plan;
- Salmon Anchor Habitat Strategies¹; and
- Forest Roads Manual.

The specific operations and management activities necessary to carry out this implementation plan will be described in annual plans, beginning with the *2010 Astoria Annual Operations Plan* and will guide us through June 30, 2019.

The implementation plan contains a number of format changes to ensure the information is more appropriate for this level of planning. The changes can be found in the following areas: roads, management basins, and harvest calculations.

- Out dated definitions are removed from the Roads sections under the Human Uses and Proposed Management Activities sections

¹ The harvest limits by basin identified in the Salmon Anchor Habitat Strategies will remain in effect through the 2011 AOP and the remaining Salmon Anchor Habitat Strategies will remain in effect through the 2013 AOP.

- The Management Basin Descriptions are changed in several ways:
 - The Basin Summary Tables are removed due to redundancy with the Information Summary for All Management Basins Table.
 - Estimates for harvest and other management activities by basin are expressed more generally because accurate estimates at the basin level of the acres associated with these activities are difficult to predict. Factors such as northern spotted owl locations and market conditions can cause management activities to shift between basins, without affecting the overall level of activity on the district (see Table 6).
 - The Information Summary for All Management Basins Table combines the Desired Future Condition Estimate for Regeneration, Closed Single Canopy, and Understory into a single figure. These structures can transition from one to another in relatively short periods of time (10 to 20 years). Therefore, predicting the specific amount each structure in each basin at a date more than 50 years in the future is challenging and does not assist in operational planning.
 - The method of calculating the harvest levels is based on a robust computer model. The district analyzes the outputs of this model to identify a sustainable and predictable flow of timber that also achieves the stand structure goals identified in this implementation plan. The range of regeneration and partial cut harvest are used to achieve both the structure and volume goals of the implementation plan.

District Overview

Land Ownership

Astoria District is comprised of approximately 136,950 acres of state forest lands, the vast majority (more than 98 percent) of which are within Clatsop County, at the northwest corner of Oregon. Also, 1,544 acres are in Tillamook County, and 40 acres are in Columbia County, as shown in Table 1 below. The lands within Clatsop and Columbia counties are part of the Clatsop State Forest. The state forest lands located in the southeastern corner of Clatsop County (Sunset Wayside Area) and remaining state lands in Columbia County are technically part of the Clatsop State Forest, but are administratively managed from the Forest Grove District. In addition, the state lands located in the Cronin Creek area of south Clatsop County are technically part of the Clatsop State Forest, but are administratively managed from the Tillamook District.

About 98.5 percent of these lands are Board of Forestry (BOF) lands, with the remainder being Common School (CSL) lands. State forest lands are interspersed among other forest lands throughout the county, in ownership blocks ranging from several hundred to over 50,000 acres. Other forest lands in the county are predominantly held by large private timber companies: Weyerhaeuser, Longview Timberlands, Hampton Tree Farms, Matoaka & PH Timber (Managed by Green Crowe), Port Blakely Tree Farms and Stimson Lumber

Company. Individuals and families (non-industrial private landowners) hold a small percentage of the forest lands.

The Clatsop State Forest surrounds agricultural lands located in the Nehalem Valley (central, east Clatsop County) and Columbia River Area (north, east Clatsop County).

In addition, state forest lands border the city of Astoria and rural residential areas in: lower Highway 53 area, the Elsie-Jewell area along the Nehalem River Valley, and the northeast county area in the Knappa-Brownsmead-Wauna communities. A portion of state forest lands are also found near the city of Cannon Beach.

Table 1. District Acreage Breakdown by County and Fund

County	Board of Forestry	Common School	Total Acres
Clatsop	133,359	2,008	135,367
Tillamook	1,544	0	1,544
Columbia	40	0	40
Total	134,943	2,008	136,951*

*Acres were generated using Geographic Information System (GIS) and the Astoria District ownership layer updated August, 2008.

Forest Land Management Classification

Below are tables summarizing the Astoria District Forest Land Management Classification (FLMC). The FLMC has been implemented in accordance with OAR 629-350-005, an administrative rule on state forest management adopted by the Board of Forestry in 1998. Tables 2 and 3 below show the Astoria District’s land management classification revised June 2009. Table 2 shows the classified acres in each of the three stewardship classes. Table 3 shows the acres in the Focused Stewardship and Special Stewardship subclasses, including overlapping acres.

The FLMC is a method of describing the management emphasis of 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. It also identifies when a particular forest resource may need a more focused approach in its management, or possibly an exclusive priority in its management.

The framework of the FLMC places all state forest land within one of three land management classifications. The classifications are: (1) General Stewardship, (2) Focused Stewardship, and (3) Special Stewardship. Subclasses are assigned for 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 that are used 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 lands classified as General Stewardship.

One or more of the following characteristics exist on lands classified as Special Stewardship:

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 which require a level of protection that precludes the integrated management of all forest resources

Lands are committed to a specific use and management activities are limited to those that are compatible with the specific use.

The Forest Land Management Classification (FLMC) includes some overlapping classifications, defined as areas where two or more classifications occur on the same parcel of land. Overlap may occur within classifications or between classifications. Where overlaps occur between classifications, the resource requiring the highest level of protection will determine the management approach. Also, overlapping classifications cause the double counting of acres. As a result, if the acres in Table 2 or 3 were totaled, the total would be greater than the actual number of acres in the district. Some lands may be “special” for one reason and “focused” for another reason.

Table 2. Astoria District Acres, by Stewardship Class and Fund

Classification	BOF	CSL	Total Acres
Focused Stewardship	61,242	1,809	63,051
Special Stewardship	37,009	290	37,299
General Stewardship	58,476	420	58,896

Table 3. Forest Land Management Classifications for Astoria District – Focused and Special Subclasses (Acres)

	Focused	Special
Administrative Sites	0	34
Agriculture, Grazing	0	9
Aquatic & Riparian	17,384	9,451
Cultural Resource	9	0
Domestic Water Use	1,345	0
Energy & Minerals	0	299
Operationally Limited	0	165
Plants	0	55
Recreation	382	138
Research/Monitoring	217	0
Transmission	0	259
Visual	10,609	70
Wildlife Habitat	44,963	37,279

*Acres in Table 2 and Table 3 include overlapping classifications.

History

Most state forest lands in Astoria District were acquired during the 1930s, 1940s, and 1950s when the counties deeded over tax-foreclosed timberlands to the state. These lands were largely cutover, sparsely roaded if at all, and were covered with brush, and grass. Forest management activities began in the 1950s in the form of commercial timber sales, and have continued to the present. During the 1970s many thousands of acres of young, naturally regenerated conifer stands were commercially thinned. These stands are now 60 to 80 years old. In contrast, much of the present-day commercial thinning is in stands that were hand-planted in the 1960s.

Physical Elements

Geology and Soils

The Astoria District is located in the northern Oregon Coast Range. The rocks in this part of the Coast Range were generally formed by volcanic eruptions associated with the creation of an offshore volcanic island chain and by deposition of sediments in the surrounding shallow seas. These rocks have since been accreted to the continent, uplifted, and eroded to form the rugged topography of the current-day Coast Range. The predominate rock types on the district are basalt flows and breccias and tuffs of the Tillamook Volcanics and Cole

Mountain Volcanics (extrusive igneous rocks), marine mudstones and siltstones and sandstones (sedimentary rocks), and Columbia River Basalt flows (invasive intrusive igneous rocks). The rocks are mostly Eocene and Miocene in age and were formed 15 to 45 million years ago. They have experienced significant amounts of folding and faulting since then due to tectonic activity. The erosion-resistant Columbia River Basalt flows cap many of the high ridges in the Astoria District.

The rugged topography and wet climate combined with the forces of ongoing tectonic uplift and stream down-cutting make the Coast Range inherently prone to landslides. The Coast Range experiences many types of landslides, but in general two types worth noting:

1. Shallow landslides
 - typically less than 10 feet deep and often much less than one acre in size
 - primarily occur on steep slopes (greater than 60%) with shallow soils
 - movement is usually rapid (feet per second)
 - often form debris flows that can increase orders of magnitude in volume and travel long distances (1000's of feet), especially when they enter steep, confined channels
 - generally hard to predict at a site-specific level, so landforms and steep slopes prone to these failures are identified and treated instead
2. Deep-seated landslides
 - typically at least 10 feet deep and up to 100's of acres in size
 - primarily occur on gentle to moderate slopes, often with deep soils
 - movement is usually slow (inches a day) and intermittent with years going by in between episodes of movement
 - many are ancient features that have not experienced movement for hundreds or thousands of years and are relatively stable
 - debris flows can occur on the margins of these landslides, especially where there are critical slope breaks with steeper topography and/or confined channels below
 - are often identifiable on soil, geologic, and topographic maps and movement is often a reactivation of a pre-existing landslide feature, however movement may still be hard to predict at a site-specific level

Deep-seated landslides are common on the Astoria District given the predominance of weak marine sedimentary rocks prone to such landslides. Shallow landslides are common on those portions of the district dominated by steep slopes.

The dominant soil associations within the Astoria District include Astoria, Mist, Aldrich, Wauna, Tillamook, Grindstone, and Pinochle (ODF, 1978). The majority of these soils are deep, well-drained, colluvial soils, characterized by high clay content and very high productivity. The average site index for the district is 130 (high Site II). Some of the higher elevation soils have a high rock content and exhibit poorer productivity.

Topography

The majority of the district lies on low, rolling topography on the western and northern flanks of the Coast Range. Elevation ranges from sea level in the Astoria area to over 3,000

feet on Nicolai Ridge. Approximately 49% of the district is below 1000 feet, 46% lies between 1000 and 2000 feet, 5% lies between 2000 and 3000 feet, and less than 1% is above 3000 feet. The district is dominated by gentle to moderate slopes with steep slopes generally associated with incised stream channels. Steep slopes are more widespread in a few areas including the Fishhawk Creek watershed and along the Nehalem River in the southern portion of the district. Approximately 67% of the district has slopes less than 30 percent, 29% has slopes between 30 and 60 percent, and 4% has slopes over 60 percent (USGS 10 m DEM's).

Water

Major streams that drain these forest lands are: Gnat Creek, Plympton Creek, and the Klaskanine River, which flow into the Columbia River; and the Nehalem, North Fork Nehalem, and Necanicum Rivers, which flow directly into the Pacific Ocean. Some of the larger streams that feed the Nehalem and North Fork Nehalem Rivers include: Fishhawk Creek, Beneke Creek, Northrup Creek, Sager Creek, Buster Creek, Humbug Creek, Fall Creek, and Sweethome Creek. These major watershed basins define the basin planning areas in the section entitled **Management Basins**. There are also several shallow lakes on state forest lands, the largest of which is Lost Lake. Beaver ponds and other wetlands are scattered throughout the district. One community watershed is located in the northeast corner of the district encompassing about 1,300 acres of state forest land, serves the Columbia River community of Westport. The Fishhawk Basin contributes to the Fishhawk Lake community water system. Some springs in the Osweg Creek Area of the Buster Basin, supplies the community water for the Elderberry Area residents.

Climate

Astoria District's lands are in the hemlock zone. West of the Coast Range summit, the climate is characterized by cooler summer temperatures and frequent fogs during the growing season. The remaining half of the district is east of the Coast Range and mostly in the Nehalem Valley; this area is dominated by Douglas-fir and hardwoods, and warmer, drier summers, with less fog. Rainfall averages 80 inches annually in lower elevations and 120 inches annually in the Coast Range area. Heavy rainstorms and windstorms are common occurrences during the winter and cause significant natural disturbances.

Natural Disturbances

Natural disturbances such as wildfire, windstorms, floods, landslides, and insect and disease outbreaks have influenced and will continue to influence the forest condition. These disturbances often result in increased forest diversity and complexity. Windstorms are the most common of these disturbances in the Astoria District.

Biological Elements

Vegetation

The Astoria District is located within the hemlock zone, in which western hemlock, western red cedar, and Sitka spruce are the major climax tree species. Within this zone are large

stands of Douglas-fir, hemlock, hemlock/spruce, Douglas-fir/spruce, Douglas-fir/hemlock, and Douglas-fir/spruce/western red cedar. There are also numerous acres of hardwood-dominated stands, characterized mainly by red alder.

Most of these hardwood stands also have clumps of conifers and large, individual, emergent conifers intermixed. In the western part of the district, Sitka spruce, western hemlock, and western red cedar commonly grow beneath red alder stands, and emerge gradually into the overstory once the alder are about fifty years old and begin to decline.

The eastern portion of the district is characterized by pure stands of Douglas-fir and mixed stands of Douglas-fir and hardwoods. Once again, these hardwoods are dominated by red alder, but big leaf maple can also make up a large component of hardwoods.

At the higher elevations of the Coast Range, noble fir and silver fir stands are found. These species are also found in association with hemlock and Douglas-fir stands at the mid and higher elevations, generally above 1,500 feet.

Shrub species range from dense salal and salmonberry near the coast to vinemaple, sword fern, huckleberry, elderberry, cascara, and bitter cherry over much of the district. These shrubs generally flourish under open stands or in regeneration stands, but die out under the low light conditions of closed conifer stands.

According to the Oregon Natural Heritage Database, listed plant species may exist on these lands as shown in the **Plants** section.

Noxious weeds occur throughout the county. The most common are: gorse, English ivy, tansy ragwort, purple loosestrife, Himalaya knotweed, Japanese knotweed, giant knotweed, spartina grass, Scotch broom, and Canadian thistle. The two that occur regularly on ODF lands are Scotch broom and tansy ragwort. The *Clatsop Weed Management Area Committee (CWMAC)* is a multi-agency and multi-landowner committee formed to coordinate and address the problems associated with noxious weeds in Clatsop County, and the district participates on the committee.

Forest Health

Laminated root rot (*Phellinus weirii*) is a moderate concern throughout the district. It is unknown exactly how widespread the disease is. However, surveys have detected it in most basins, with some basins believed to be seriously infected. The disease spreads by root contact with an infected host and can be devastating to younger stands of Douglas-fir. The disease usually kills patches of trees, not entire stands. The disease destroys the roots of Douglas-fir and some true fir trees. Western hemlock, noble fir, and Pacific silver fir are often infected but rarely killed. Most pines and western redcedar are seldom infected and are rarely killed, and red alder is immune. In stands where this root rot is prevalent, a more resistant species than was originally there is replanted after harvest of the infected trees. It appears that the change in species reduces the spread of the disease as the newly introduced species is strong enough to resist infection.

Swiss needle cast (SNC) disease is a concern throughout the district, particularly within about 12 miles of the Pacific Ocean and/or within about 8 miles of the Columbia River. It is unknown exactly how widespread this disease is or if it is cyclic in its life history. It affects only Douglas-fir and slows diameter and height growth reducing wood volume production significantly.

While there is a positive growth response to both pre-commercial and commercial thinning, the severity and effects of SNC infected stands are evaluated to determine the appropriate silvicultural treatment to meet management objectives. Reforesting areas in high risk SNC areas with conifer species other than Douglas-fir and planting a mix of SNC tolerant Douglas-fir and other conifer species in the lower risk areas will help reduce the effects of SNC on future forest stands.

The district will manage stands documented to have Swiss needle cast in accordance with Department's SNC Strategic Plan and the Board of Forestry's intent statement concerning the disease.

Fish and Wildlife Resources

The forest lands on Astoria District are host to a variety of wildlife species, including Roosevelt elk, black-tailed deer, black bear, coyote, bobcat, mountain lion, and many smaller mammal and bird species. The integrated forest management strategies, as well as the aquatic and riparian strategies, of the *Northwest Oregon State Forests Management Plan*, will contribute to diverse habitats that are likely to accommodate most native fish and wildlife species and contribute to the maintenance and restoration of biodiversity on the forest.

Threatened and endangered (T&E) wildlife species within the Astoria District include northern spotted owls, marbled murrelets, and bald eagles. Currently, there are 4 spotted owl sites being managed on the District. The protection measures for the northern spotted owl are described in the *State Forest Program Operation Policies for: Northern Spotted Owls (2008)*, and the *Agreement for the Conservation of Northern Spotted Owls (2001)*. Surveys have been conducted since 1992 for the Marbled Murrelet. Approximately 1,025 acres are designated as Marbled Murrelet Management Areas. The protection measures for the Marbled Murrelet are described in the *State Forest Program Operation Policies for: Marbled Murrelet (2005)*. Bald eagle protection occurs through the *Oregon Forest Practices Act (July 2008)*. The presence of T&E species and their potential habitat require annual surveys to determine species presence, location, and breeding status.

Streams and rivers within the forest are home to important fish species, such as coastal cutthroat trout, which is found in most streams in the forest; and coho salmon, chum salmon, and Columbia fall Chinook which are listed as a federally threatened species. In addition, other locally present species, including lower Columbia steelhead, and Pacific lamprey which are listed as state sensitive/critical. Most streams also host varying populations of sculpin. It is unknown if any of the various warm water fish species are present in the lakes on state forest land. Approximately 302 miles of streams with known fish use are present on the district. Protection measures for listed fish species are described in the *State Forests Salmon Protection Policy (2001)*.

One watershed analysis has been conducted on the Astoria District: The Upper Nehalem Watershed Analysis. This watershed analysis covers 75,428 acres on Astoria District, or roughly 55% of the district. Astoria and Forest Grove districts prepared an action plan in response to watershed analysis recommendations; this may be accessed at http://www.oregon.gov/ODF/STATE_FORESTS/docs/Watershed/Upper_Nehalem_WIT_action_plan.pdf. The districts have completed many of the activities described in the action plan.

The gentle topography of the Upper Nehalem watershed lends itself to low gradient streams with abundant pools, which are favored by coho. Thus, this watershed has a much higher proportion of streams (29%) with high intrinsic potential for coho winter rearing than is the case for most other watersheds in ODF ownership. That is, under unimpaired conditions, ODF land in the Upper Nehalem watershed should be able to support more coho than other watersheds. There are also sufficient steep streams to provide high intrinsic potential for steelhead (32%), which is comparable with other watersheds in ODF ownership.

Overall, current management of the watershed is considered to be managed well. Most current detrimental effects are considered to be the result of prior management practices.

The Watershed Action Plan identified the priority actions and management basins (where these actions are most significant), including:

- Consider potential to improve coho habitat: Areas of greatest potential for coho included Fishhawk Creek in the Hamilton Management Basin, Sager and Deep creeks in the Sager Management Basin, and Buster Creek in the Buster Management Basin.
- Augment key pieces of instream wood: Areas of low key piece density were scattered through most management basins, with the exception of the Fishhawk, Lousignont, and Crawford basins.
- Improve near-term wood recruitment potential: Wood recruitment potential was lowest in the Northrup, Sager, and Crawford management basins.
- Improve long-term (50-100 year) wood recruitment potential by addressing hardwood senescence: Greatest potential issues are in Beneke, Hamilton, and Quartz management basins.
- Reduce road hydrologic connection: The highest proportion of hydrologic connection is found in Fishhawk and Crawford management basins. (See **Human Uses – Roads**)

This District is working to address these findings and will continue to look for opportunities to improve watershed health in the Upper Nehalem Watershed. Specific operations that address these actions will be described in the Annual Operations Plans.

Human Uses

Forest Management

The Astoria District has been operating under the Astoria District Implementation Plan, approved in March of 2003. Below summarizes the past eight Annual Operations Plans which were planned according to the Implementation Plan specifications. The 2010 AOP column lists acres planned according to the revised Astoria District Implementation Plan, approved in June of 2009.

Table 4. Silvicultural Management Activities

Activity	2010 AOP (Acres Per Year)	Eight-Year Average ² (Acres Per Year)
Implementation Plan	June 2009	13

Regeneration Harvest ¹	1,222	1,114
Partial Cut	892	2,263
Reforestation (all planting)	2,226	1,422
Pre-commercial Thinning	475	800
Fertilization	0	110

1. Under Oregon Department of Forestry management, this refers to a regeneration harvest (modified clearcut or retention cut) that removes most trees, but leaves specified numbers of green trees, snags, and down wood to provide structure (habitat) in the new stand.
2. The eight-year average is comprised of the 2002-2009 Annual Operations Plans.

Roads

The Astoria District's road network is an established system that has been in place for 10 to 50 years. It provides access for forest management activities, fire suppression, and public travel.

The State Forests program is nearing completion of specific guidance for conducting transportation planning. The Forest Roads Manual will be revised when this guidance is complete. District priorities for transportation planning are described in Management Basin Descriptions under Resource Considerations and Management Opportunities. Transportation planning will be a priority for basins or blocks determined to have limited or inadequate access.

The district's road system consists of 985 miles of single-lane roads. Some of the roads were originally built as railroads and then converted to truck roads. Over the past couple of decades many of these roads have been upgraded and now have improved drainage structures, crushed rock surfacing and improved alignment.

Table 5 shows the approximate number of miles by road classification.

Table 5. Astoria District Road System

Road Use Classification	Miles
Mainline	43
Collector	263
Spur	670
Administrative	6
Abandoned	3
Total Miles	985

Nearly 95 percent of the road miles are surfaced with gravel. The type of surfacing is split between old rock (usually this is natural quarry or pit run rock) and new, crushed rock. Additional crushed rock will be applied to roads, particularly those surfaced with old rock, as part of the district's ongoing work to upgrade roads.

The Board of Forestry has adopted performance measures for State Forests concerning stream crossings and hydrologic connectivity. There are 130 stream crossing structures installed in known fish-bearing streams. Of these, 39 are bridges and 56 are culverts which allow all fish to move upstream and downstream. Another 5 culverts will allow adult salmonids and trout to move upstream, but may block upstream passage of juveniles during high water events. Thirty culverts are presently barriers to all fish passage, these are on small Type F streams. There are plans in place to restore fish passage, at some of these locations by installing new structures to current fish passage standards; or by vacating the stream crossing and constructing roads in locations to avoid stream crossings. The remaining culverts will be examined for the possibility of mitigating the passage issues during this planning period.

Hydrologic connectivity measures the proportion of overall road length that drains to streams versus draining to and infiltration into the forest floor. As part of the Upper Nehalem Watershed Analysis (December 2005), 607 miles were assessed, 16 percent were found to have hydrologic connectivity. This is very close to the State Forests performance measure of 15 percent. Road improvements during this IP period are expected to reduce hydrologic connectivity below the 15 percent target, over the District.

Recreation

The Clatsop State Forest is within two hours of Portland, via Highway 30 or Highway 26. Highway 202 crosses through the forest. Recreation resources on the forest are primarily used by Clatsop County citizens, many of whom value the freedom of unregulated settings. Users from out of the county often use the forest for camping, hunting, or fishing, or visit on their way to the coast.

Limited financial resources in the foreseeable future necessitate that recreation related resources and workloads be focused primarily on maintaining the existing infrastructure. This is a useful time for recreation policy clarification and recreation planning activities.

The Clatsop State Forest has three designated campgrounds: Henry Rierson Spruce Run Campground in the Sweet Home Basin, Gnat Creek Campground in the Davis Basin, and Northrup Creek in the Northrup Basin. A day use area at Lost Lake is also available.

Management of Henry Rierson Spruce Run Campground was relinquished from Clatsop County back to ODF in May 2002 and has undergone major renovation over the past 4 years. The campground offers car camping, walk in tent camping, and fishing on the Nehalem River. The campground also offers access to a new 2 mile hiking trail that leads to Spruce Run Lake.

Gnat Creek Campground, adjacent to Gnat Creek and Highway 30, offers camping, and fishing opportunities; this campground also offers access to a 4 mile hiking trail from the campground to the Gnat Creek Fish Hatchery and upper Gnat Creek. .

Northrup Creek Campground provides opportunities for car tent camping and equestrian camping. This campground also offers a large day use area and provides access to a 7 mile looped equestrian trail system.

The Lost Lake day use area was recently acquired from Longview Fibre. Lost Lake provides day use and fishing opportunities and is extremely popular with the general public.

The lake is located near Henry Rierson Spruce Run Campground and campers frequently travel to Lost Lake for fishing opportunities.

The 2 mile Soapstone Lake hiking trail, the 2 mile Bloom Lake hiking trail, and the 1 mile Demonstration Forest trail complete the hiking trail system on the district.

The 7-acre demonstration forest and established arboretum, located adjacent to the district office, are managed as an outdoor classroom for local schools and groups interested in forest related issues. The site provides nature trails accessible to all people, and interpretive signs.

Much of the forest is used for dispersed recreation. Dispersed camping, hunting, fishing, mounting biking, and horseback riding on forest roads are popular activities.

Off-highway vehicle (OHV) trails exist across the forest landscape. These trails were developed with no department involvement or planning. The recently completed recreation program Second Party Assessment identified management of the ongoing ATV use on the district as a red flag issue of high priority. The Astoria District has engaged with the local ATV user group in plans for developing the Nicolai Mountain area as a future ATV riding area.

The district has applied for an Oregon Parks and Recreation ATV grant and is awaiting funding. If obtained, the grant will be used for employee wages, planning and on the ground development of the District's ATV program.

Continued development of this ATV opportunity will be dependent upon available of funding through program budgets, ATV grant opportunities, and other funding sources as available. See **Proposed Management Activities — Recreation**, for more information.

Scenic

Scenic resources are found generally along the highways that traverse the forest. Highways 101, 26, and 30 are designated in the Forest Practices Act (FPA) as scenic highways. Highways 103 and 202 also provide scenic views of the forest. Some of the Astoria Basin forest land is also visible from the city of Astoria and the Astoria Column viewpoint.

Cultural Resources

Cultural resources are scattered throughout the forest, mostly from the early logging that took place on the Clatsop State Forest. Cultural resources are defined as any human-created sites, structures, or objects that are of historical significance to the local area, region, state, or nation, in providing information and education of ethnic, religious, or social groups, activities, or places.

The *Clatsop State Forest Recreation and Cultural Resource Inventory and Assessment Report* provides the first inventory of cultural resources on the Clatsop State Forest (ODF, 2000b). This inventory is not absolutely complete and accurate; however, it provides a foundation of information the district can use in management planning. See **Proposed Management Activities — Cultural Resources**, for more information.

Forest Stand Structure: Current Condition

The current stand condition is summarized in the graphs on the next page, and displayed in the second map in the **Map Section**. Figure 1 shows the current stand structure, acreage, and percentage, using the structure-based management definitions for structure types. The stand structure abbreviations are given below.

Stand Level Inventory (SLI) is the current inventory system that the Department is using. To date, the Astoria District has conducted SLI on approximately 70% of the District. It is a goal to achieve a complete inventory of the District, however, the remaining 30% will be inventoried as time and money allows. As forest management continues on the District the inventory will constantly be changing. A yearly update to the inventory is scheduled to be completed to reflect harvest operations for the previous year.

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

Abbreviations for Forest Stand Types

REG	Regeneration
CSC	Closed Single Canopy
UDS	Understory
LYR	Layered
OFS	Older Forest Structure
NSC	Non-Silviculturally Capable/Non-Forest

Figure 1 shows the current stand structure acreage, and percentage for Astoria District forest lands. Also see the current stand structure map in the map section.

Figure 1. Current Stand Structure, by Acres and Percent

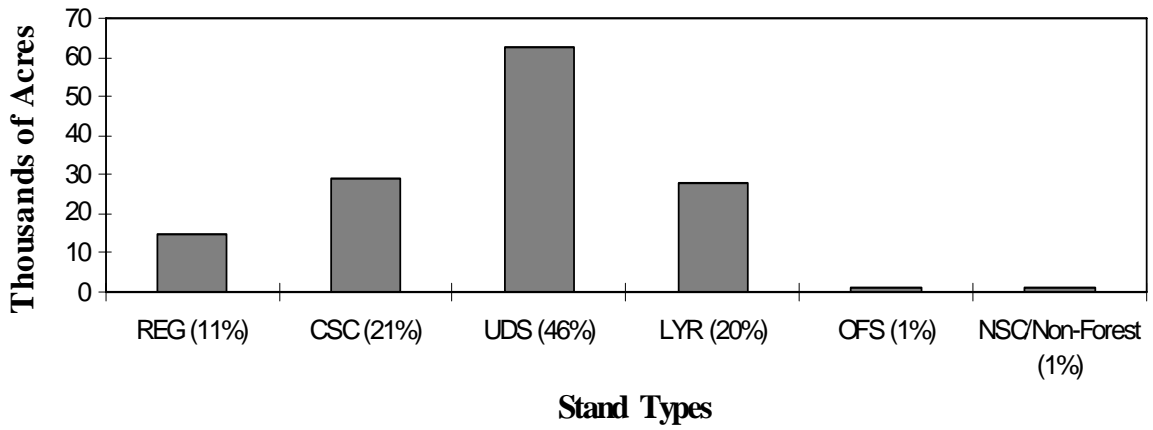
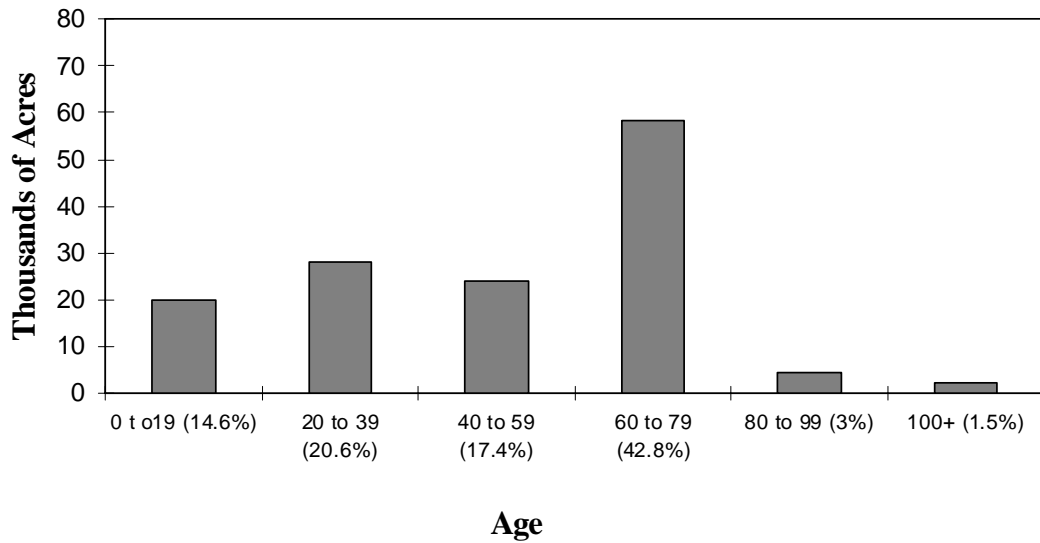


Figure 2 shows the current age distribution of the forest on Astoria District, regardless of stand structure.

Figure 2. Forest Stand Age Distribution, by Acres and Percent



Management Activities

Current Condition Analysis

Most forest lands in the Astoria District were logged in the early to mid-twentieth century, while privately owned, and then allowed to revert to county ownership due to non-payment of taxes. The county eventually deeded these lands to the state. When timber harvest began in the early 1950s on state forest lands in Astoria District, almost all the forests were already second-growth forests.

During the 1950s and 1960s, most timber harvest consisted of clearcut harvesting and salvage of windthrown and insect-killed trees. A big salvage harvest was done after the 1962 Columbus Day windstorm, which toppled thousands of acres of trees on the forest. Clearcut harvesting continued throughout the 1970s, 1980s, and 1990s. Significant partial cutting was done in 40- to 60-year-old Douglas-fir (and some hemlock) stands during the 1970s. Due to unfavorable economic conditions, partial cutting was largely discontinued during the 1980s, but resumed again in the 1990s after a rebound in timber prices.

Currently, about 89 percent of the Astoria District lands have conifer stands, with the remainder in merchantable hardwood stands. There are about 1,700 non-forested acres, either non-silviculturally capable or in other uses (e.g., transmission lines, administrative sites).

Regeneration

The regeneration (REG) stand structure comprises about 14,600 acres, or 11 percent of the district. Management practices for young stands will be applied to these areas in order to obtain the greatest value of this structure, including rapid tree growth, big game forage, and wildlife habitat. Refer to the next section, entitled **Management Activities in Each Stand Type** for an expanded discussion of young stand management activities.

Closed Single Canopy

The closed single canopy (CSC) structure covers approximately 29,000 acres or 21 percent of the district. This structure is characterized by the closed crowns of the overstory trees that prevent light from reaching most of the forest floor. This low light level precludes the introduction of both brush and shade-tolerant conifers in the understory, thus leaving the forest floor sparsely vegetated.

This stand structure is the third most common structure on the forest. Thinning over the last ten years within these stands has led to the increase of the UDS structure as the stands have been opened up allowing more light to enter, promoting understory growth.

Understory

The understory stand structure, which accounts for about 62,600 acres or 46 percent of the district, is the most predominant stand structure. This structure occurs where normal tree mortality, previous density management, poor stocking, low growth sites, root disease, or a combination of these factors have prevented the overstory canopy from fully closing. As a result, an understory of herbs, shrubs, and small conifer trees has developed. On good sites

in this structure type, large, healthy conifer trees with large crowns characterize the overstory. Some of these stands began in a low stocked condition with the overstory canopies eventually closing enough to shade out some of the brush and allow young conifer regeneration to occur.

Poor site class also contributes to the occurrence of this structure across the forest landscape. Site class is usually lowest on rocky, south-facing slopes where both water and nutrients are limited to support forest tree species.

Diseased stands with advanced degeneration caused by *Phellinus weirii* root rot may fall into the UDS structure category. These infected stands are characterized by the presence of both standing and fallen dead trees with a brush understory, surrounded by the surviving forest canopy. The fallen trees, dead from root disease, usually do not have roots attached to their trunks.

Finally, previous partial cutting also contributes to the presence of this structure. In stands managed through partial cutting, tree density was reduced enough to allow for understory vegetation development. The residual trees have increased growth in girth and crown size. In most cases, this structure provides better wildlife habitat, provides more recreation opportunities, is more scenic, provides better tree growth, and stimulates forest health better than the CSC stand type.

Layered and Older Forest Structure Stand Types

For the last nine years the majority of the partial cuts have been conducted to promote and enhance the development of complex forest structure. As shown in Figure 1 and illustrated in the current condition map, layered (LYR) and older forest structure (OFS), or complex structure, combine to comprise approximately 28,800 acres, or 21 percent, of the district. Since the extent of LYR is currently at 20 percent, the landscape goal of developing OFS across 20 percent of the District is concluded to be an achievable goal.

Some of these current stands have achieved their structural components due to *Phellinus weirii* root rot infection. The stands are sparse, with abundant snags and dying trees.

Hardwoods

Hardwoods are classified along with conifer stands in one of the five stand structure types. Hardwoods may be managed on the landscape for a variety of reasons, such as to obtain economic benefits from hardwood products, to manage tree diseases in the stand, or to introduce or maintain additional vegetative diversity within conifer-dominated landscapes.

It is important for a variety of biological reasons to have hardwood trees across the landscape in a properly functioning and healthy forest. Hardwoods are naturally found on certain soils, typically soils that are wetter, usually occurring near a water feature or riparian area. Hardwoods, particularly red alder, develop easily through natural regeneration in disturbed soil if there is a seed source nearby.

Planting hardwoods occurs in stands that have a soil type not conducive to conifer establishment or in ground where diseased trees existed and a resistant species is desired. When young stand management activities are conducted, such as pre-commercial thinning,

hardwoods are regularly retained in the stands for biological diversity. Common hardwood tree species include red alder, big leaf maple, bitter cherry and cascara.

Non-Silviculturally Capable and Non-Forest Types

Approximately 1% of the lands in the district (or about 1,700 acres) is categorized as Non-Silviculturally Capable or as Non-Forest types. Non-Silviculturally Capable lands are not capable of growing forest tree species, as defined in OAR 629-035-0040. Non-Forest lands are those areas, greater than 5 acres, which are maintained in a permanently non forest condition, such as: administrative sites and power line right-of-ways.

Management Activities in Each Stand Type

Regeneration Stands

Reforestation

Reforestation promptly follows all regeneration harvests and patch cuts. Spacing, species, and stock type depend on site-specific conditions and availability. Site preparation and vegetation management activities are done in conjunction with stand establishment and maintenance. These are very site-specific prescriptions and may include herbicide treatments, manual release, or mechanical work.

REG stands also contain standing green trees, and both new and old down woody material and snags from the previously existing stand. These components will add structure for future stands. REG stands should have the potential to move through all the stand types to OFS, depending on the stand location in the landscape design. Within the Swiss Needle Cast zone, recently harvested areas will be replanted with a variety of species, including hemlock, spruce, true firs, and alder, to minimize future growth reductions due to Swiss Needle Cast.

Precommercial Thinning

Precommercial thinning (PCT) is an important practice, which thins young trees to provide more water, light, and nutrients to the residual trees. Also, PCT keeps the canopy from closing, thus preserving the growth of herbaceous vegetation required by big game. Within the Swiss Needle Cast zone, PCT will be conducted so as to favor non-Douglas-fir conifers. This strategy is intended to reduce future growth losses and accelerated infection caused by the SNC disease.

Closed Single Canopy Stands

For CSC stands, there are two management options:

Partial Cut

First, past management experience has found that the majority of the conifer stands respond very well to partial cutting. Not only do the residual trees grow faster, but also complex structures and diverse habitats develop more rapidly with the retention of snags and down

wood, and the creation of space for a shade-tolerant conifer understory, including western hemlock and western red cedar. Site-specific prescriptions will be developed for each stand. Prescriptions may specify the deliberate creation of snags and down wood, based on the existing condition of the stand and its desired future stand structure type. The effects of partial cutting improve forest health by increasing stand vigor, and lowering susceptibility to damage from insects and disease. This management option also produces timber, revenue, and enhancements to other resources like scenic and wildlife resources.

Regeneration Harvest

Regeneration Harvest (modified clearcut or retention cut) refers to a harvest that removes most overstory trees but leaves an average of 5 green trees per acre, at least 2 hard snags per acre, and 600 to 900 cubic feet of hard conifer logs per acre, to provide structure (habitat) in the new stand. It is important to note that the green tree, snag and downwood requirements are based on a landscape level not on a stand level. In less complex stands with smaller average trees, additional trees (above the 5 per acre average) may be maintained where necessary to supplement snag or down wood recruitment goals. Results will be monitored in accordance with the State Forests Monitoring Program Strategic Plan (Dec. 2002). The following five subheadings further define the CSC stands that may be considered for regeneration harvesting as a silvicultural treatment.

- ***Phellinus weirii*-infected stands** — One management option for conifer CSC stands is to cut areas infected with diseases. The *Phellinus weirii* root disease, which can be found in a variety of stages and spatial configurations in all stand structures, is fatal to Douglas-fir, true fir, and western hemlock. Infected stands may gradually develop significant openings and patches dominated by hardwoods and/or brush. A management alternative is to treat patch-sized infected areas by removing all diseased trees and planting the opening with disease-resistant tree species, such as western red cedar, western white pine, red alder, or big leaf maple. One benefit of treating root rot disease pockets will be increased habitat diversity through the creation of small patches or openings and the incorporation of more diverse tree species into Douglas-fir-dominated stands.

However, it is not intended nor practical that all *Phellinus* patches will be treated. Small amounts of the disease will continue to exist across the landscape, and will contribute snags and down woody debris to the forest.

- **Swiss needle cast-infected stands** — The second management option for conifer CSC stands is to harvest stands infected with Swiss needle cast. This needle fungus has the effect of drastically slowing the growth of Douglas-fir trees in the coastal areas of the western hemlock zone. In the most extreme areas of infection, Douglas-fir stands may slow so dramatically in growth as to never reach merchantable harvest size. In accordance with the principles and assumptions contained in OSU model run 1C-2, the district plans to aggressively treat Swiss Needle Cast, consistent with the *SNC Strategic Plan*. Therefore, in these areas of extreme infection, the district plans to harvest these immature stands, retaining any viable conifers of resistant species, such as hemlock, spruce, and red cedar, and to reforest these stands with resistant conifers or red alder. Most of these harvest units will be less than 50 acres. However, if the disease continues to decimate older Douglas-fir plantations, larger units may be planned for harvest.

- **Overdense stands** — The third management option for conifer CSC stands is to harvest stands that have been left too dense for too long. Stands in this category have small crowns, are less vigorous, and are susceptible to poor health conditions. Based on historical evidence, these dense stands have a low likelihood of being able to respond to partial cutting. Partial cutting these stands usually leads to a high percentage of mortality due to windthrow and breakage. Trees that do not die take a long time to respond to the additional light and nutrients available after the partial cut. In these overly dense stands, any gains made by partial cutting are usually negated by the increase in mortality and the slow growth response.
- **Big game foraging habitat opportunities** — The fourth management option for CSC is to create openings for big game species and other open area-dependent wildlife species through regeneration harvesting. This management option will be used where landscape design and habitat analyses indicate the need for regeneration (REG) habitat types. This management option, in conjunction with forage seeding, is important for the health of big game populations.

Understory Stands

Due to the various ways that UDS stands have developed and the differing vegetation compositions of the understory, a variety of stand management options will be pursued in order to address stand-specific conditions.

Partial Cut

Some UDS stands with a healthy conifer understory are poorly stocked, are on lower site soils, or are the result of partial cutting. In these stands, the preferred management option will be to manage these stands to develop them into the layered structure. In some cases, these stands will be monitored until the overstory begins to shade out and suppress the understory. At that time, a partial cut will be implemented to release the understory while maintaining the health and vigor of the remaining overstory. This prescription will maintain the growth rates of both the overstory and understory, while advancing the stand into the next level of structure complexity. Where appropriate, snags and down woody debris will be developed in accordance with the *Northwest Oregon State Forests Management Plan* strategies.

Regeneration Harvest

Some stands classified as UDS, may be clearcut if they are not in a location consistent with the desired future condition landscape design strategy. In UDS stands infected with *Phellinus weirii* or Swiss needle cast, which have an understory of tree species susceptible to disease, harvesting and regenerating with a healthy stand of resistant trees may be the most efficient way to develop complex forest conditions.

Layered Stands

Partial Cut

Layered stands are characterized by having trees of 18 inches or larger DBH and reaching 100 feet or more tall predominant in the overstory; and 30 percent of stand is comprised of layered patches, these patches must have 60 percent or more of the vertical space in the

forest filled with foliage. During the last ten years of inventory (SLI), the layered stands have been more accurately identified than in the past. Layered stands are the second most common structure on the forest. Layered stands will be partial cut to enhance tree growth and biodiversity within the stand, or to move stands toward OFS stand structure goals in an efficient and timely manner.

Regeneration Harvest

Some stands classified as LYR, may be clearcut if they are not in a location consistent with the desired future condition landscape design strategy. In LYR stands infected with *Phellinus weirii* or Swiss needle cast, which have an understory of tree species susceptible to disease, harvesting and regenerating with a healthy stand of resistant trees may be the most efficient way to develop complex forest conditions. Additionally, if the percentage of LYR stands exceeds the desired future condition and the LYR stands are not needed to produce other stand structure types or are not consistent with the landscape design strategy, they may be clearcut.

Swiss Needle Cast Disease

Some layered stands may be infected with Swiss Needle Cast (SNC) disease. In LYR stands which may have high level of SNC infection present, the district plans to aggressively treat these stands, consistent with the SNC Strategic Plan. Such treatment may include light to very heavy partial cutting to remove infected Douglas-fir, patch cuts, or even clearcutting of seriously infected LYR stands

Older Forest Structure Stands

There are very few stands of older forest structure on the district. Currently, there are approximately 1,000 acres classified OFS. None of these stands are currently planned for any regeneration harvest. However, some stands may be partial cut to improve or maintain their ability to function as OFS stands over time.

Proposed Management Activities

Silvicultural Activities

Table 6 lists silvicultural activities for Astoria District lands for fiscal years 2010 to 2019. Refer to **Appendix A** for a detailed discussion of how these activities were calculated.

Table 6. Proposed Annual Silvicultural Activities
for Fiscal Years 2010 to 2019

Activity	Estimated Annual Acres
Partial Cut	600 – 3,250 ¹
Regeneration Harvest	350 – 1,400 ^{2,3}
Reforestation	600 – 2,100 ⁴
Precommercial Thinning	0 – 1,300 ⁵

1. 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 regeneration harvest.
3. Patch cuts greater than five acres will count toward the annual regeneration harvest total.
4. Reforestation acres are higher than regeneration harvest acres because some of the partial cut acres may be interplanted and the District may have larger need to replant after catastrophic events such as windstorms.
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 6 above.

Roads

To accomplish the district's silvicultural objectives, it is estimated that between 150 and 200 miles of road construction and between 250 and 300 miles of road improvement will be necessary over the entire district during the planning period. It is estimated that between 40 and 60 miles of road will be vacated over the entire district during the planning period. Road construction and improvement identified in this plan will be primarily achieved through project work connected with timber sales. Approximately 70 percent of the roads to be constructed will be spurs within timber sale areas. These spurs will have lengths between 0.1 and 1.5 miles. Collectors that connect these sale areas to the mainline system make up the remaining 30 percent, and in most cases, will access other future timber sales. Many of these same roads will be used for numerous management activities over the next several decades. Roads will be maintained as necessary to protect water quality and the road system asset value. Road maintenance activities will follow the maintenance guidance in Chapter 7 of the Forest Roads Manual.

Average yearly road work activities were computed by analyzing reported accomplishments and, are summarized in Table 7.

Table 7. Average Yearly Road Work Activities for the Astoria District from Fiscal Year 2003 through Fiscal Year 2008, by Road Activity and Miles

Road Activity	Miles
Road Construction, Rocked	15.5
Road Construction, Dirt	2.5
Road Improvement	28.0
Road Vacating	4.6

Slope Stability

Landslides occur naturally throughout the district. Sediment delivered by landslides to streams can have adverse short-term effects on water quality and fish habitat. However, large wood, boulders, and gravel delivered by landslides to streams can have positive long-term effects to fish habitat by providing increased structure. The Forest Management Plan

recognizes the importance of ensuring that landslides deliver large wood to streams when they occur.

Landslide hazards may be exacerbated by management activities. Timber harvest may reduce root strength affecting overall soil strength and increasing susceptibility to shallow landslides. Timber harvest may also reduce canopy interception of rainfall affecting slope hydrology and increasing susceptibility to shallow landslides and potentially deep-seated landslides as well. Standing timber, as well as large downed wood, tends to reduce debris flow travel distances. Roads may affect slope stability by altering slope geometry with cuts and fills and by altering slope hydrology.

Many existing landslides as well as areas with potential for future landslides are identified in available soil surveys and geologic maps. They can also be identified using topographic maps and data. LiDAR-generated topographic maps and data are especially useful for identifying and assessing landslide hazards.

The Area Geotechnical Specialist provides technical consultation to the district on slope stability issues so that they can make good management decisions. The Area Geotechnical Specialist reviews all planned road and harvesting operations during the annual operations planning process and conducts landslide hazard and risk assessments for the protection of natural resources and public safety. This is done through a combination of map and photo review as well as field reconnaissance and investigation. Potential landslide issues are also identified by the district during field reconnaissance, operation layout, and during administration of active operations and the Area Geotechnical Specialist is consulted as necessary.

Depending on the level of hazard and risk, existing landslides and potential landslides are avoided during road and harvesting operations. If they cannot be avoided, then the district consults with the Area Geotechnical Specialist to assess their options and to better understand the hazard, risk, and potential mitigation strategies associated with each option. The Forest Management Plan refers to specific mitigation strategies including leaving trees along streams prone to debris flows. The Area Geotechnical Specialist documents the assessment, including findings and recommendations.

Recreation

During 2009-2010, the District will be working with the State Forests Division to address recommendations that stem from the *Second Party Recreation Assessment* and the subsequent *Recreation Action Plan*, which will include:

- carefully examining the role that State Forest recreation plays in a regional context of outdoor recreation opportunities and providers;
- developing goals commensurate with the agency's role and capabilities;
- defining the commitment of State Forests to provide recreation opportunities for local and regional users;

- conducting a recreation program workload analysis that can help ensure that individual Districts have properly identified the resources they need to achieve objectives and commitments;
- addressing specific gaps in existing standards, policies and procedures;
- embarking upon on a process to articulate a clear vision of the role of State Forest lands to provide recreation, with participation from the Board of Forestry

In the near-term however, financial resources are limited, necessitating that recreation related resources and workloads be focused primarily on maintaining the existing infrastructure. New projects or those being eyed for the foreseeable future will depend heavily on successfully securing grant funding and volunteer assistance. Reliance upon established and committed partnerships with local user groups and advisory committees will continue in an effort to try and meet recreation related needs and demands.

Existing Facilities and Programs

Public Safety and Law Enforcement

Public safety on the forest and especially in recreation sites such as campgrounds will be achieved through use of the Clatsop County Sheriff. Currently ODF contracts with the county sheriff for one full-time officer to provide security and law enforcement on the Clatsop State Forest and will continue this practice in the future as funding is available.

To enhance safety for recreation users travelling over forest roads, the district posts CB channels used for most mainline routes, providing a means to monitor vehicle traffic and easy communication between drivers.

Providing information and education to the public through a wide range of recreation guides, maps and brochures is also an important component of public safety. As identified in the *Astoria District Recreation Management Plan (2000)*, the district will provide updates concerning trail and road closures due to harvest operations, repair needs, or other reasons.

Continuing the law enforcement program and the other associated efforts at current levels is considered vital to providing a reasonable level of public safety and protection to the resource and recreation facilities.

Management and Maintenance

The recreation program management and maintenance will be at minimal levels, mostly to provide safety for our campground hosts and the general public.

Incorporating alternative funding opportunities for motorized recreation, as in ATV grants, will be essential to the development of the ATV program on the District. Development of an ATV recreation area will continue to be a main focus for this planning period utilizing

available grant funding from Oregon Parks and Recreation Department, and local user groups to the maximum extent to help maintain the ATV opportunity at Nicolai Mountain.

Informational kiosks will be maintained at day-use areas, and campgrounds. The Clatsop State Forest website will be used to communicate to the public recreation opportunities within the forest.

Volunteer and Recreation Advisory Committee

An ongoing recreation advisory committee was established in spring 2001 to assist the district in the implementation of the approved Recreation Management Plan. This citizen's advisory committee reviews site development plans and proposed policy changes, assists with prioritizing actions identified in a short-term action plan, reviews activity zoning designations, and assists in developing a volunteer program to maintain sites, facilities, and trails.

The Recreation Advisory Committee meetings will be used to solicit advice about the implementation of the recreation action plan. The volunteer program will be administered with user groups to maintain sites and facilities, and patrol trails and other high use areas.

Aquatic Resources: Stream Enhancement Projects

The District will include the ODFW in the yearly review of each Annual Operations Plan. . During the review meeting, all upcoming sales will be discussed in regards to streams near the operation and the need for restoration or enhancement. In order to decrease the cost and increase the efficiency of the project; efforts are made to conduct stream enhancement when the logging is being conducted; reducing move in and felling costs. All projects will be conducted in accordance with the Forest Practices Act, Army Corp of Engineers requirements, the *Oregon Plan for Salmon and Watersheds*, and in consultation with the Oregon Department of Fish and Wildlife (ODFW). As always these projects are based on need and financial impact to the District. Past practice has typically completed approximately 1-3 stream enhancement projects per Annual Operations Plan. It is unknown how many projects will be conducted in the future; however, the yearly review process with ODFW will not change.

Cultural Resources

An updated cultural resource inventory was established by the Departments Public Use Coordinator in 2007. A GIS layer was created and given to the Districts for planning purposes. To date, inventoried cultural resource sites have been 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

Most of the Clatsop State Forest has been surveyed for the presence of natural gas reserves, and a few wells have been drilled. However, commercial quantities of natural gas or other minerals have not been removed from these state forest lands. If commercial quantities are discovered, they will be available for sale and removal, under strict controls by the Department of Forestry for the protection of forests, soils, water quality, fish, wildlife, and other surface resources.

Hard rock is removed from state forest lands for road surfacing on an ongoing basis. These sites, called rock pits or quarries, are in specific locations, generally less than three acres. They are used for ten or more years before being exhausted of suitable surfacing rock. Most often the hard rock from these sites is crushed to produce surfacing rock of specific size and grade for forest roads. This crushed rock is either applied directly to existing or newly constructed roads, or is stockpiled at a nearby location for future application. When quarry sites are exhausted, they are vacated by providing water drainage, reducing the slope of the quarry walls, and sometimes filling them in with topsoil and reseeded the surface with annual and perennial plants.

The potential for wind energy exists on the District. A test site on Nicolai Mountain is being explored for future use.

Lands and Access

In December of 2008, the Board of Forestry approved the Astoria District Land Acquisition and Exchange Plan. The general objectives of the plan are as follows: 1) Exchange or acquire lands to improve management efficiency for ODF and our exchange partners by minimizing conflicts caused by scattered forestland ownerships; 2) Exchange or acquire lands to increase the amount of land available for public use; 3) Exchange or acquire BOF lands to secure Greatest Permanent Value; 4) Meet the requirements of the Land Board's AMP; 5) Work cooperatively with DSL's Asset Management Section to implement the land acquisition and exchange program consistent with the AMP and DSL land sale and exchange rules. It is anticipated that the plan will be revised/reviewed every ten years.

In addition, the District conducts a yearly analysis of land survey work needed to be done. Contingent on funding, the work is prioritized and contracted out to a licensed surveyor who completes the work.

Activities needed to develop and maintain the District roads and access system is discussed under **Proposed Management Activities - Roads**.

Scenic Resources

Scenic resources within the Astoria District include land adjacent to Highways 30, 26, and 101, which are designated scenic highways in the Forest Practices Act (FPA). Other visually sensitive areas include recreation areas such as Henry Rierson Spruce Run Campground and the Lower Nehalem River; the Fishhawk Lake community viewshed; Jewell Wildlife Meadows; the Astoria basin viewshed from the Astoria Column; Highways 202, 103, and 53; and major forest roads that are driven recreationally.

Management Opportunities

Scenic resources are site-specific viewsheds that can be seen from highways, major access roadways, trails, waterways, community viewsheds, and viewpoints. Viewshed management opportunities will exist when timber sale harvests are planned for areas near scenic resources. Timber sale harvests may also be planned that enhance scenic resources.

Special Forest Products

Special forest products include major resources such as: mushrooms, ferns, moss, salal, cascara, firewood, small alder poles, vinemaple, and noble fir boughs. Currently, these products are managed using an in-district policy and a price list compatible with other northwest Oregon districts. Customers either call or come to the office with information on the area where they want to harvest special forest products. Most permits cannot be issued on a same-day basis, with the exception of certain free use permits. Customers must wait until their permit is processed, usually within 5 to 7 work days. Once the customers are issued a permit, they are on the honor system to record the date and time of activity, and amount of materials harvested. Once they have finished harvesting, they are to call the district and inform the sale administrator that they have finished. Free personal use permits are issued on a case-by-case basis.

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 8) 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*.

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.

Table 8. Astoria District Endangered, Threatened or Candidate Plant Species

Genus	Species	Common name ¹	Status	Potential Record to be present ²
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Threatened and Endangered Plants

<i>Erythronium elegans</i>	Coast Range fawn-lily	ST	✓
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Plants of Special Concern

<i>Castilleja chambersii</i>	Chamber's paintbrush	SP	✓
<i>Dodecatheon austrofrigidum</i>	Frigid shootingstar	SP	✓

Candidate Plants

<i>Cardamine pattersonii</i>	Saddle Mt. bittercress	SC	✓
<i>Delphinium oreganum</i>	Willamette Valley larkspur	SC	✓
<i>Filipendula occidentalis</i>	Queen-of-the-forest	SC	✓
<i>Saxifraga hitchcockiana</i>	Saddle Mt. saxifrage	SC	✓
<i>Sidalcea hirtipes</i>	Bristly-stemmed sidalcea	SC	✓

¹Plant names in bold are on the NW FMP list of plants.

²Plants have been observed on or in close proximity to state forestlands.

Status: ST – State Threatened; SC – State Candidate; SP – Special Concern

The NWFMP Forest Health Strategies call for monitoring pest populations, damage levels and trends, to use Integrated Pest Management (IPM) to suppress or prevent damaging pest populations, and to cooperate with other agencies and associations to prevent the introduction of non-native pests. (pg. 4-77 to 4-79). Implementation Plans address how individual Districts will contribute to statewide efforts to reduce the quantity and range of invasive, non-native plant species.

Recent draft Policy and Procedures prepared for the State Forest Division articulates how active Invasive Weed Management should be pursued, and summons the Districts to prepare a weed management plan. District Invasive Weed Management plans will be developed and used to guide the management of invasive weeds on Oregon Department of Forestry managed lands. These plans are meant to be dynamic documents. During their initial development information may be incomplete or lacking, which can be added as it becomes available or management strategies change.

Invasive Weed Management plans are designed to outline a comprehensive approach to the management of invasive plants on both Board of Forestry and Common School Fund lands. It is intended to specifically address the goals, priorities and strategies for prevention, early detection, rapid response, and monitoring of invasive plant occurrences on the District. Additionally, it should address efforts and activities to enhance internal education and awareness.

Additionally, the Clatsop County area has a *Clatsop Weed Management Area Committee (CWMAC)*. The goals of the committee are to address the problems of noxious weeds in Clatsop County in a coordinated effort to: 1. increase public awareness through outreach and education; 2. identify, survey, and map incidence of priority weed species; and, 3. control or eradicate infestations of priority weeds.

Current participants, cooperators, and members of the Clatsop Weed Management Area Committee members: Clatsop Soil and Water Conservation District; Oregon State

University Extension Service; Clatsop County; City of Astoria; USDA Natural Resource Conservation Service; Oregon Department of Forestry; Fort Clatsop Natural Monument; Lewis and Clark Natural Wildlife Refuge; Fort Stevens State Park; Clatsop Watershed Councils; U.S. Coast Guard; Weyerhaeuser Company; and, National Fish and Wildlife Federation.

Several noxious weeds have been identified by the CWMAC as those on which to focus attention. They include: gorse, English ivy, tansy ragwort, purple loosestrife, Himalaya knotweed, Japanese knotweed, giant knotweed, spartina grass, Scotch broom, and Canadian thistle.

Specific conditions and strategies for state forests are:

- **GORSE**- found in small, isolated patches in a few locations throughout the County. The only significant areas of infestation are in the Clatsop Spit area and East and West Sand Island on the northern side of the mouth of the Columbia River.
- **ENGLISH IVY**- is endemic to the urban area of the County. Uncontrolled growth is beginning to affect trees that are slowly being overgrown.
- **TANSY RAGWORT**- present countywide in open areas – roadside, vacant lots, and in particular pastures. Established populations of two bio-control agents – cinnabar moth and the ragwort flea beetle – have kept the infestation at reasonable levels. However, a drop-off in the effort to distribute these bugs in recent years has led to an expansion of tansy ragwort infestations.
- **PURPLE LOOSESTRIFE**- infestations continue to gain ground in the estuary areas of the county along the Columbia River. Intensive mechanical control in the Youngs Bay area has made progress in eradicating the population there. Several of the islands in the Columbia River have been completely taken over to the point where mechanical eradication is impractical.
- **HIMALAYAN, JAPANESE, AND GIANT KNOTWEED**- These knotweed varieties have been found countywide and are rapidly spreading. The most severe infestation are along the Nehalem and Necanicum River where patches reach a quarter acre. Significant patches are found in vacant lots of the urban areas of Astoria, Seaside, Gearhart, and Cannon Beach. Patches have been documented in every watershed of the county.
- **SPARTINA GRASS**- No spartina grass has been documented in Clatsop County. None has been discovered during aerial surveys over the past two years of the most likely beach heads.
- **SCOTCH BROOM**- prevalent throughout the County. Particularly high concentrations exist in the Clatsop Plains Area.
- **CANADIAN THISTLE**- exists throughout the County on open pasture land. Control and eradication is difficult unless adjacent landowners cooperate to eliminate plant infestations at the same time.

The current efforts for controlling noxious weeds on ODF lands are focused on Scotch broom and tansy ragwort. The other noxious weeds in the county are being monitored. Aerial applied herbicides are utilized to target Scotch broom in conifer plantations. In addition, when Tansy Ragwort growing in conjunction with Scotch broom, then tansy ragwort is also controlled. In the past, ODF has cooperated and provided locations for the release of the Cinnabar moths and the ragwort flea beetles to help control ragwort.

Roadside herbicide applications/operations generally target alder and salmonberry, but when Scotch broom and tansy ragwort grow in conjunction with these species then additional control of these noxious weeds is achieved.

Landscape Design Overview

Development of the landscape design is a broad-scale view, and a long-term endeavor. The design is a vision of the desired future condition for the array of stand structures over the district landscape. Its purpose is to serve as a means for achieving landscape objectives set forth in the FMP. To achieve the design, a variety of silvicultural prescriptions will be applied to the diverse set of forest stand types across the District.

The landscape design map represents the district's current vision of where complex structures will be developed over time. The district will use this map in the planning of harvest operations and the designing of silvicultural prescriptions. Generally, harvest operations at locations designated for complex structure will be partial cuts or retention harvests designed to develop complex structure over time. New information about an existing stand (insect or disease presence, stand density, or other conditions) may indicate that a modified clearcut is the most appropriate silvicultural prescription for the stand. In these cases, the Pre-Operations Report for the harvest operation in the Annual Operations Plan will describe why it is not appropriate to develop the current stand into complex structure and how the resulting plantation will be managed to develop complex structure.

Occasionally, the district may identify a location designated for the development of complex structure on the landscape design map that is not currently suitable for the development of complex structure. Examples include: sites that are not suitable for partial cut harvesting; sites that are infected with a root rot and require one or more rotations of alder before complex structure can be developed. In some cases the stand will be harvested and a new plantation established that can achieve complex structure. In other cases the landscape design may be changed, replacing the less desirable site with a site of comparable acreage that is a better location for achieving the landscape design goals. The changes to the landscape design will be fully described in an Annual Operations Plan and will not exceed 240 acres in a year. The landscape design map will be fully reviewed with any major revision of the district implementation plan.

A team of ODF and ODFW fish and wildlife biologists, silviculturalists, planners, and foresters were used to develop the landscape design, which depicts the desired extent and arrangement of future complex structure across the District. It was designed using a two-phase process whereby stands were selected to become complex structure across 40 percent of the District. The first phase was to identify at least 20 percent of the District's acreage where forest stands possess the capability of developing into complex structure in 20 years. These would serve as near-term opportunities for promoting and enhancing the development of long-term functional interior habitats, including those associated with important riparian and aquatic resources. Stands selected in the first phase would be managed to eventually become OFS. The second phase was to identify an additional 20 percent of the area where stands could continue to be developed into complex structure over the next 60 to 70 years. These stands would be managed to build upon the first 20 percent, enhancing patch size, distribution, connectivity, and habitat functionality.

Criteria used in the two-phase process are listed below in no particular order. Based on forest inventory, known conditions were used to identify a stand's potential for contributing to, or meeting the selection criteria.

0-20% Selection Process:

- stands that are, or will develop into complex DFC within the next 20 years
- currently occupied habitat and high habitat potential stands for listed species (northern spotted owl and marbled murrelets)
- Forest Land Management Classification – Certain Special/Focused Stewardship sub groups
- silviculturally capable forestland with operational limitations
- recently thinned stands that had silvicultural prescriptions applied intending to develop either LYR or OFS in the 2003 landscape design
- aquatic habitats important to salmonids
- select stands in aquatic headwaters
- arranging a variety of patch sizes in different elevation ranges and vegetative zones
- provide for connectivity throughout the forest
- recreation areas and certain stands around them
- certain early seral stands with residual complex components (snags, down logs, shrubs)

20-40% Selection Process:

- focus on stands that are capable of contributing to biological goals in areas where existing encumbrances, land use designations, or terrain limit timber harvest options; and where there are additional opportunities to enhance the habitat quality that benefits the 0-20% DFC
 - stands within NSO Clusters that were not previously included in the first mapped 20%
 - include all acres within the proposed Jewell and Sweethome NSO Clusters
 - stands within designated SAH Basins that would provide the greatest benefit toward contributing to mature forest conditions
 - selected stands were typically those adjacent to Type F streams within the SAH Basins, where current stands are mature or nearly so, would enhance FMP buffers.

- stands that we have operated in within the last 10-15 years where harvest prescriptions would accelerate their pathway toward a complex stand structure
 - include recent thinning or retention cuts where current stocking levels are below optimum.
- certain stands that are isolated/older that provide unique habitat or refugia on the landscape
- certain non-operational areas due to terrain limitations, include some of the HLHL areas, steep difficult logging areas above the Nehalem River and Lower Nehalem Road, wetland/swamp inclusions, etc.
- certain unique habitats that could be considered inclusions within a larger patch of DFC complex
- certain stands that would enhance connectivity of DFC and IHA patches across the landscape, also looked at a broader view of how all of these complex structures would be connected across the landscape and tried to establish travel corridors as feasible

Management Basins

Management Basins Overview

In 2000, management basins were delineated by choosing, in consultation with the local fisheries biologist, the medium-sized drainage basins on the district. There are several exceptions to this rule, however. For planning purposes, it was deemed desirable to not exceed a total of 15 to 18 basins for the district (136,951 acres). Therefore, the average basin would be around 8,000 to 9,000 acres. We did not want to designate any land block less than about 4,000 acres as a management basin. In addition, we felt that some boundaries, such as major highways, would serve as better basin boundaries than the actual ridge separating 2 or 3 major stream drainages. For example, the drainage boundary between the Gnat and Davis basins, in the northeast part of the district, would parallel Highway 30, about one-half mile north of the highway. Instead, the district designated Highway 30 as the basin boundary, based on greater ease in planning and management.

The Astoria District has 17 management basins, including one scattered tract basin, ranging in size from a low of 3,658 acres (Scattered) to a high of 18,834 acres (Buster). Information Summary for All Management Basins

Current Condition & Desired Future Condition

In the *Northwest Oregon State Forests Management Plan*, the ranges for the desired future condition of stand structure types were outlined. These ranges are given 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%

Table 9 on the next page shows Astoria District's current condition and desired future condition of the forest. The planned percentages of stand structure types fall within the management plan ranges. Riparian areas will also be managed for mature forest conditions, in addition to the desired future conditions summarized in Table 9.

The time required to achieve the desired future condition depends on site quality and density management. It is anticipated that some of the current stands with a current condition of LYR (20% of the District) will achieve an OFS condition in 20 years. Achievement of attaining 40% complex structure on the District is anticipated to take between 60-80 years.

Table 9. Summary: Current Condition (CC)¹ and Desired Future Condition² (DFC), by Stand Structure and Percentage

Management Basin	Acres	NSC/ Non-Forest ³	REG	CSC	UDS	NON COMPLEX CONDITION ⁴	COMPLEX CONDITION			
							LYR		OFS	
		CC	CC	CC	CC	DFC	CC	DFC	CC	DFC
Astoria	4,270	7	21	24	19	79	29	14	<1	0
Beneke	9,757	<1	10	16	51	48	23	30	<1	22
Buster	18,834	<1	11	16	36	36	37	32	<1	32
Crawford	4,279	<1	0	28	38	15	23	61	11	24
Davis	7,031	2	8	38	42	67	10	18	<1	13
Fishhawk	5,087	<1	9	9	41	58	41	9	<1	33
Gnat	9,990	2	16	19	55	72	8	7	<1	19
Hamilton	6,880	<1	7	29	43	51	19	27	1	22
Klaskanine	6,271	1	27	22	35	84	15	12	<1	3
Lousignot	4,551	<1	21	23	46	88	9	9	1	3
N. Fork Nehalem	8,276	<1	10	42	34	79	13	2	<1	19
Northrup	7,192	4	7	17	55	75	17	7	<1	14
Plympton	10,447	2	9	27	47	78	15	9	<1	11
Quartz	8,582	<1	14	4	65	60	17	3	<1	37
Sager	10,421	<1	3	17	65	67	13	26	2	7
Scattered	3,658	13	17	36	19	86	15	1	<1	0
Sweet Home	11,351	<1	4	19	50	21	26	46	1	33
District Total	136,877⁵	1	11	21	46	60	20	20	1	20

¹ The Current Condition was determined using the latest Stand Level Inventory imputed 6/2/2008.

² The Board of Forestry has set performance measures that target 20% of the District to reach complex structure by 2030. The additional 20% is anticipated to reach complex structure in 60-80 years.

³ 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).

⁴ Non-Complex Condition is defined as REG, UDS & CSC.

⁵ There is a 74 acre difference between the District acres reported on page 4 and this total. This is due to the use of two GIS datasets that don't exactly match.

Basin Descriptions

The following 17 basin descriptions are presented in alphabetical order.

Astoria Basin

This management basin consists of 4,270 acres, and is located in northwest Clatsop County. The majority of these lands are drained by Mill Creek and Crosel Creek into the Columbia River. Elevation ranges from 20 to 650 feet, with an average of 250 feet above sea level. Site index (King's 50-year growth curve) ranges from 130 to 140 and averages 139 for the basin.

This basin is adjacent to the largest populated area in the county (the city of Astoria), and to a designated scenic highway (Highway 30). Therefore, a significant percentage of this basin has visual considerations. In addition, its proximity to urban areas contributes to the high incidence of illegal activities, including garbage dumping and vandalism. There are numerous overhead transmission lines, accounting for about 4 percent of the acreage, precluding growth of mature forests on those lands. Several fish-bearing streams drain directly to the Columbia River or Youngs Bay. This basin is comprised almost entirely of accessible young forest plantations, some of which are infected with Swiss needle cast, on high site quality lands.

This basin receives a high level of recreational use due to its location near Astoria. Both motorized and non-motorized activities use trails established with no department management or planning, which cause resource damage. Illegal garbage dumping is high in this basin.

Key Resource Considerations for Astoria Basin

- Bald eagle and Great Blue Heron nesting sites.
- High use for recreational trail development, and target archery range.
- Level 1 scenic resources.
- Sitka spruce swamps.
- About 9 miles of Type F streams used by coho salmon and steelhead.
- Close to Astoria urban area.
- Swiss needle cast in Douglas-fir stands.
- Hemlock progeny site.
- Demonstration Forest and Arboretum with hiking trails at the District office.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

Much of the Astoria Basin was affected by the Windstorms of 2006 and 2007; thus much of the basin consists of young simple stands. Fourteen percent of the basin is planned to become layered, seven percent is NSC/Non-Forest, and the remaining seventy-nine percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Astoria Basin consists mostly of younger simple stands that are not suited well for a complex desired future condition. Clearcut and Partial Cut opportunities exist, although more clearcutting may be done in this basin than partial cutting due to the age and desired future condition of the basin. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a lower rate than the last ten years.

Beneke Basin

This management basin consists of 9,757 acres located in the east-central part of Clatsop County. The majority of these lands are drained by Beneke Creek and Sarajarvie Creek into the Nehalem River. Elevations range from 720 to 2,000 feet with an average of 1,250 feet above sea level, and site index ranges from 120 to 140, averaging 131 for the basin.

A major focus of management in this basin is a northern spotted owl cluster area, as identified in the draft *Western Oregon State Forests Habitat Conservation Plan*, and a marbled murrelet management area. On over 50 percent of this basin, management goals will be planned to protect and enhance these resources.

The basin receives recreational use for hunting, fishing, wildlife viewing, and dispersed camping.

Key Resource Considerations for the Beneke Basin

- Northern spotted owl cluster area.
- Northern spotted owls.
- Marbled murrelets.
- This basin is designated for non-motorized recreational activities only.
- Remnants of railroad logging trestles.
- About 19 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- Three research sites (SNC, Douglas-fir progeny, and Douglas-fir fertilization study).
- Scenic resources along Highway 202 with a Focused Visual classification.
- The transportation system provides excellent access; a few spurs need construction and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

Approximately half of the Beneke Basin consists of the Jewell Northern Spotted Owl (NSO) Cluster with overlapping portions of the Deliverance NSO Home Range and one Marbled Murrelet Management Area. Fifty-two percent of the basin is planned to become complex, while the remaining forty-eight percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Beneke Basin will be mostly managed to attain a complex condition. Clearcut and Partial Cut opportunities exist in the forty-eight percent of the basin that is not planned for a complex future condition. This basin is a low priority for transportation planning and/or

investments in the infra-structure. Road construction and improvement will be at a lower rate than the last ten years.

Buster Basin

This management basin consists of 18,834 acres, located in the south part of Clatsop County. The majority of these lands are drained by Buster Creek, Klines Creek, and Cow Creek into the Nehalem River. Elevations range from 500 to 2,500 feet, averaging 1,600 feet above sea level, and site index ranges from 100 to 140, averaging 131 for the basin.

A major focus of management in this basin is fish and wildlife habitat. A northern spotted owl cluster management area encompasses over 60 percent of this basin, and portions of two Salmon Anchor Habitat (SAH) areas, Buster Creek and Upper Rock Creek, are located within the basin. Management goals will be planned to protect and enhance these fish and wildlife habitat resources. A designated scenic highway (Highway 26) runs parallel to portions of the southern basin boundary. Therefore, this portion of the basin has additional visual considerations that will be factored into planning. A water system for the Elderberry community is located within this basin.

Fishing and hunting are the prevalent uses in the basin. Dispersed campsites are common throughout the basin and some are highly used. For example, "B" Camp was originally Buster Side Camp for the Kerry Timber Company, and since then has had over 40 years of use as a general camping area, and as a large group elk hunting camp. Additionally, abandoned railroad grades can be found throughout the basin.

Key Resource Considerations for the Buster Basin

- Northern spotted owl cluster area.
- Northern spotted owls.
- Level 1 scenic resources along State Highway 26.
- This basin is designated for non-motorized activities only.
- Highly used for dispersed recreation.
- 1 individual domestic water source and 1 community water system on State land.
- About 43 miles of Type F streams and watersheds important for coho salmon, steelhead, and cutthroat trout.
- About 55% (10,658 acres) of this basin is within the Buster Creek Salmon Anchor Habitat (SAH) area.
- About 8% (1,478 acres) of this basin is within the Upper Rock Creek Salmon Anchor Habitat (SAH) area.
- Two research sites (Douglas-fir progeny site, and a Forest Practices stream temperature monitoring project on Stanley Creek, near the confluence of Buster Creek).
- *Phellinus weirii* infection in portions of the basin, a fungus that causes root rot and is fatal to Douglas-fir.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Buster Basin consists of the Jewell Northern Spotted Owl (NSO) Cluster with overlapping portions of the Strum Creek and Buster Quarry NSO Home Range's and the Buster Creek Salmon Anchor Habitat Area (SAH). Sixty-four percent of the basin is planned to become complex, while the remaining thirty-six percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Buster Basin will be mostly managed to attain a complex condition and will have no clearcuts and very limited amounts of partial cutting done within sixty-four percent of the basin. Clearcut and Partial Cut opportunities exist in the thirty-six percent of the basin that is not planned for a complex future condition. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Crawford Basin

This management basin consists of 4,279 acres, located in the eastern part of Clatsop County. The majority of these lands are drained by Squaw Creek and the West Branch of Squaw Creek into the Nehalem River. Elevations range from 600 to 1,200 feet, averaging 800 feet above sea level, and site index ranges from 126 to 140, averaging 130 for the basin.

The major management focus in this basin is a northern spotted owl cluster management area. Management goals on this entire basin will be planned to develop interior habitats and enhance this wildlife resource. This basin holds some of the oldest stands on the district, many associated with historical use by northern spotted owl. There are abundant scenic opportunities in this basin with large, older trees, old railroad trestles, and plentiful wildlife. Additionally, the Crawford-Squaw Ridge Loop is a highly used route for hunting and scenic day driving.

Key Resource Considerations for the Crawford Basin

- Northern spotted owl cluster area.
- Northern spotted owls.
- This basin is designated for non-motorized activities only.
- About 5 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- Three SNC research sites.
- Remnants of railroad logging trestles.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

Nearly eight-five percent of the Crawford Basin consists of the Jewell Northern Spotted Owl (NSO) Cluster with overlapping portions of the Strum Creek and Deliverance NSO Home Range's. Eighty-five percent of the basin is planned to become complex, while the remaining fifteen percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Crawford Basin has very limited harvest opportunities and will be almost completely managed to attain a complex condition. There is several harvest opportunities within the fifteen percent open for management; those opportunities will more than likely be Partial Cut operations. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Davis Basin

This basin is 7,031 acres and has several rural residential areas (Davis Bottom, Anderson Creek, and Peterson Creek valleys; and the Fertile Valley area). A scenic highway (Highway 30) forms the southern boundary of this basin, and the Columbia River forms the northern boundary. Therefore, a significant percentage of this basin has visual considerations. In addition, its proximity to numerous residences contributes to the high incidence of illegal activities, including garbage dumping and vandalism. The lower reaches of a major Type F stream, Gnat Creek, will be managed for fisheries concerns. These stream reaches are all downstream from the state fish hatchery. Along the Columbia River slopes, there are several bald eagle nesting areas.

Key Resource Considerations for the Davis Basin

- Bald eagle nest sites.
- River shore wetlands.
- Gnat Creek Campground.
- This basin is designated for non-motorized activities only.
- About 15 miles of Type F streams and watersheds for salmon and steelhead habitat.
- There are 5 Individual domestic water sources on State land.
- Two research sites (Douglas-fir progeny and SNC thinning).
- Level 1 scenic resources along Hwy. 30.
- Swiss needle cast in Douglas-fir stands.

- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Davis Basin has less T&E Species concerns than some of the other basins, thus thirty-one percent of the basin is planned to become complex, while the remaining sixty-nine percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Davis Basin will have some partial cut opportunities within the stands planned to become complex. There are both partial cut and clearcut opportunities within the sixty-nine percent of the basin that is not planned for complex; although more clearcut operations than partial cuts may be done. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Fishhawk Basin

This management basin consists of 5,087 acres, located in the northeast part of Clatsop County. The majority of these lands are drained by Fishhawk Lake Creek into the Nehalem River. Elevation ranges from 1,000 to 1,760 feet, averaging 1,200 feet above sea level. Site index ranges from 110 to 140, averaging 126 for the basin. This basin abuts the Plympton Basin to the north, the Northrup Basin to the west, and the Louisignot Basin to the south. To the east is the Clatsop-Columbia county line, and the adjacent forest land to the east is industrial forest land. Fishhawk Lake, a man-made lake surrounded by residences, abuts the southeast corner of this basin. These are generally high site lands, fairly well accessed, with relatively minor identified threatened or endangered species concerns.

Key Resource Considerations for the Fishhawk Basin

- Level 2 scenic resources near Fishhawk Lake.
- About 11 miles of Type F streams and watershed important for coho salmon.
- About 95% (4810 acres) of this basin is within the Fishhawk Lake Creek Salmon Anchor Habitat (SAH) area.
- *Phellinus weirii* infection in portions of the basin.
- This basin is designated for motorized recreational activities.
- The Fishhawk Lake community (about 150 residences) uses Fishhawk Creek as a source of drinking water, with a water intake located about 4 miles downstream of ODF land.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

Nearly all of the Fishhawk Basin is within the Fishhawk Lake Creek Salmon Anchor Habitat Area. Forty-two percent of the basin will be managed to attain a complex future condition. The remaining fifty-eight percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Fishhawk Basin will have some partial cut opportunities and a very small amount of clearcut opportunities. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Gnat Basin

This management basin consists of 9,990 acres, located in the northeast part of Clatsop County. The majority of these lands are drained by Gnat Creek into the Columbia River. Elevation ranges from 100 to 3,000 feet, averaging 1,400 feet above sea level, and site index ranges from 110 to 140, averaging 132 for the basin.

A management focus in this basin is a scenic area along the Highway 30 scenic corridor.

This basin is characterized generally by UDS stands of dense, approximately 60-year-old conifer and scattered alder; interspersed with REG areas resulting from clearcut harvesting during the past 25 years; and LYR conifer stands 60 to 70 years old, resulting from partial cutting over the past 25 years. The Gnat Creek canyon divides this basin roughly in half, east to west, and a fish hatchery is located on the lower reaches of Gnat Creek. The upper reaches have several high waterfalls and a large cedar swamp above the falls. The Bonneville Power Administration overhead power lines cross the northern part of this basin, east to west, cutting a swath 400 feet wide, 3 miles long.

This basin is characterized by accessible conifer plantations on high site land, some of which are infected with Swiss needle cast. It is located near a major state highway, and has a steep creek canyon (Gnat Creek) that drains toward a fish hatchery.

Key Resource Considerations for the Gnat Basin

- About 26 miles of Type F streams and watershed important for salmon, steelhead, and cutthroat trout; and maintaining water quality for downstream salmon hatcheries.
- There are 2 domestic water sources (wells) on State land.
- Level 1 scenic resource along Highway 30.
- Swiss needle cast in Douglas-fir stands.
- Two research sites (Douglas-fir progeny and Stand Mgt. Coop spacing study).
- Approximately 5,028 acres are designated for non-motorized recreational activities only.
- Approximately 4,992 acres are designated for motorized recreational activities.
- The transportation system provides excellent access; a few spurs need construction and the rest of the road system will be maintained as needed.
- Gnat Creek Campground and Hiking Trails.

Landscape Design & Desired Future Condition

The Gnat Basin has less T&E Species concerns than some of the other Basins. Twenty-six percent of the basin will be managed to attain a complex future condition. Two percent of the basin is NSC/Non-Forest type; and the remaining seventy-two percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Gnat Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. More clearcut operations than partial cuts may be done due to the seventy-two percent of the basin that does not have a complex desired future condition. This basin is a low priority for transportation planning and/or investments in infrastructure. Road construction and improvement will be at a lower rate than the last ten years.

Hamilton Basin

This management basin consists of 6,880 acres, located in the central part of Clatsop County. The majority of these lands are tributary to Fishhawk and Hamilton creeks, and drain into the Nehalem River. Elevation ranges from 600 to 1,800 feet, averaging 1,100 feet above sea level, and site index ranges from 90 to 140, averaging 128 for the basin.

A major management focus in this basin is a portion of the Jewell Spotted Owl Cluster, and the West Tidewater Marbled Murrelet Management Area. For this reason, on approximately 35 percent of this basin, management goals will focus on the protection and enhancement of the wildlife habitat resource.

The Hamilton Basin has minimal recreational use. Dispersed camping, hunting, and fishing occur on Hamilton Creek. Jewell Meadows Wildlife Area is adjacent to the basin, which contributes to recreationists viewing wildlife in the basin. There are many railroad-logging lines throughout the basin, including the remains of Tidewater Headquarters Camp and Tideport Logging. Lee Wooden County Park, adjacent to the basin, encompasses Fishhawk Falls and provides day-use activities within the area.

Key Resource Considerations for the Hamilton Basin

- Northern spotted owl cluster area.
- Northern spotted owls.
- Marbled murrelets.
- This basin is designated for non-motorized activities only.
- There are 2 individual domestic water sources on State land.
- About 18 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- One SNC research site.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Hamilton Basin has portions of the basin that overlap the Jewell Northern Spotted Owl Cluster as well as a Marbled Murrelet Management Area. Forty-nine percent of the basin will be managed to attain a complex future condition. The remaining fifty-one percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Hamilton Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Klaskanine Basin

This management basin consists of 6,271 acres, located in the northwest part of Clatsop County. Most of these lands are tributary to the North Fork Klaskanine River, which flows into the Columbia River. Elevation ranges from 400 to 2,500 feet, averaging 1,000 feet, and site index ranges from 100 to 140, averaging 127 for the basin. This basin does not abut any other state forestland basins. The adjacent land is largely forest industry land.

OHV trails have been developed in the basin with no department management or planning. OHV use is high. Hunting, fishing, and dispersed camping are also popular in this basin.

Key Resource Considerations for the Klaskanine Basin

- Marbled Murrelet Management Area.
- About 12 miles of Type F streams and watershed important for cutthroat trout, and maintaining water quality on downstream salmon hatchery.
- There is 1 individual domestic water source on State land.
- Focused Visual Stewardship along Highway 202.
- Swiss needle cast in Douglas-fir plantations.
- This basin is designated for motorized recreational activities — OHV and motorcycle activities.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Klaskanine Basin has several Marbled Murrelet Management Areas that lend to T&E Species protection and awareness. The majority of the basin is smaller sized timber, and several large areas were blown down in the Windstorms of 2006 and 2007. Fifteen percent of the basin will be managed to attain a complex future condition. One percent of the basin is NSC/Non-Forest; and the remaining eighty-four percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Klaskanine Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Lousignot Basin

This management basin consists of 4,551 acres, located in the central east part of Clatsop County. The majority of these lands are drained by Lousignot Creek into the Nehalem River. Elevation ranges from 600 to 1,200 feet, averaging 800 feet above sea level, and site index ranges from 110 to 140, averaging 130 for the basin. A portion of a proposed Salmon Anchor Habitat (SAH) area, Fishhawk Lake Creek, is located within the basin.

This basin is characterized by stands that regenerated naturally after extensive harvest during the 1930s and 1940s. After this time period, the area was grazed by cattle under the oversight of an agricultural experiment station. These stands now provide clearcut harvest opportunities as well as partial cutting opportunities. This basin is bounded by well-used forest roads that provide the public with opportunities to drive, hunt, fish, and cut firewood. This basin is used heavily during hunting seasons. Dispersed campsites are scattered throughout.

Key Resource Considerations for the Lousignot Basin

- This basin is designated for motorized activities.
- About 7 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.

- About 13% (538 acres) of this basin is within the Fishhawk Lake Creek Salmon Anchor Habitat (SAH) area.
- *Phellinus weirii* infection in portions of the basin, a fungus that causes root rot and is fatal to Douglas-fir.
- Three research sites (SNC, Douglas-fir progeny, and Underplanting).
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.
- Focused Visual Stewardship along Highway 202.

Landscape Design & Desired Future Condition

The Lousignot Basin has a small portion of it's acreage that overlaps the Fishhawk Lake Creek Salmon Anchor Habitat Area. Twelve percent of the basin will be managed to attain a complex future condition. The remaining eighty-eight percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Lousignot Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin has less acreage effected by T&E Species and may have more clearcut operations than partial cut operations in the future. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

North Fork Nehalem Basin

This management basin consists of 8,276 acres, located in the southern part of Clatsop County. The majority of these lands are tributary to Fall Creek and Soapstone Creek, which flow into the North Fork Nehalem River. Elevation ranges from 350 to 1,350 feet, averaging 650 feet above sea level. Site index ranges from 110 to 140, averaging 125 for the basin. Adjacent to this basin on the southeast side is the Sweet Home Basin. On the other sides, adjacent lands are largely in forest industry ownership.

This basin is characterized by very high site lands, a well-developed road system, a generally young forest, and a fairly fragmented ownership. The district maintains a one-mile hiking trail to Soapstone Lake. Fishing, OHV, and equestrian use occur throughout the basin. Dispersed camping is popular in this basin.

Key Resource Considerations for the North Fork Nehalem Basin

- About 18 miles of Type F streams and watersheds important for coho salmon, steelhead, and cutthroat trout; maintaining water quality for a downstream salmon hatchery.
- About 58% (4,514 acres) of the basin is within Salmon Anchor Habitat (SAH) area.
- There are 9 individual domestic water sources on State land.
- Scenic resources along Highway 53.
- Swiss needle cast in Douglas-fir stands.
- Three research sites (SNC, Douglas-fir progeny, and Spruce Weevil study).
- This basin is designated for non-motorized recreational activities only.
- High use for dispersed camping.

- Non-motorized trail to Soapstone Lake.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The eastern half of the North Fork Nehalem Basin overlaps the Upper North Fork Nehalem River Salmon Anchor Habitat Area. More than half of the SAH is on land owned privately. Recent thinnings and stands that bordered the upper reaches of the drainages were placed into a complex desired future condition. Twenty-one percent of the basin will be managed to attain a complex future condition. The remaining seventy-nine percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The North Fork Nehalem Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Northrup Basin

This management basin consists of 7,192 acres, located in the eastern part of Clatsop County. The majority of these lands are drained by Northrup Creek into the Nehalem River. A very small portion of the Fishhawk Lake Creek Salmon Anchor Habitat (SAH) area, is located within the basin. Elevation ranges from 500 to 2,000 feet, averaging 1,100 feet above sea level, and site index ranges from 100 to 140, averaging 132 for the basin.

The most common recreation activities include dispersed camping, hunting, fishing, and scenic viewing. There are several meadows adjacent to Northrup Creek that are used frequently throughout the year by people for recreational activities. Maps verify that Big Creek Logging Company had side camps in this drainage, but the sites have not been field checked. Some portions of the railroad trestle that ran along Northrup Creek are still visible.

Key Resource Considerations for the Northrup Basin

- This basin is designated for non-motorized activities only.
- Highly used for dispersed recreation.
- About 14 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- Less than 1% (11 acres) of this basin is within the Fishhawk Lake Creek Salmon Anchor Habitat (SAH) area.
- One SNC research site.
- Remnants of railroad logging trestles.
- *Phellinus weirii* infection in portions of the basin, a fungus that causes root rot and is fatal to Douglas-fir.
- Northrup Creek Horse Camp.

- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Northrup Basin has less T&E concerns than some of the other basins. Twenty-one percent of the basin will be managed to attain a complex future condition; four percent is NSO/Non-Forest; and the remaining seventy-five percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Northrup Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Plympton Basin

This management basin consists of 10,447 acres, located in the northeast part of Clatsop County. The majority of these lands are drained by Plympton Creek into the Columbia River. Elevations range from 100 to 3,000 feet, averaging 1,400 feet above sea level. Site index ranges from 110 to 140, averaging 120 for the basin. In the north portion of this basin, there are about 13 miles of shared property line with a large industrial landowner, and about 5 miles of shared property line with other private landowners. The east boundary of the basin is the Clatsop-Columbia county line; the adjacent landowner in Columbia County is also an industrial forest landowner. The southern 7,500 acres of this basin are blocked in with other state forest ownership. Adjacent management basins are Gnat to the west, and Fishhawk to the south.

OHV trails exist throughout the basin, but were developed with no department management or planning. Dispersed camping, hunting, and fishing are also common activities.

Key Resource Considerations for the Plympton Basin

- Community water system.
- About 22 miles of Type F streams and watersheds important for chinook salmon and cutthroat trout.
- About 2% (155 acres) of this basin is within the Fishhawk Lake Creek Salmon Acre Habitat (SAH) area.
- There is 1 domestic water source on State land that serves several residences.
- Level 1 scenic resources along Highway 30.
- Level 2 scenic resources along Nicolai Mainline; distant viewshed of Highway 30.
- Four ongoing research study sites (Hemlock progeny site, SNC, Uneven Aged Management, and Variable Tree Retention).
- Cultural sites from early to mid-century logging era.
- Bald eagle nest site.
- Northern Spotted Owl site.
- A total of 1,232 acres designated for only non-motorized recreational activities (Taylorville mountain biking area).

- A total of 9,203 acres designated for motorized recreational activities.
- High use for motorized trail development.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The Plympton Basin has less T&E concerns than some of the other basins. Twenty percent of the basin will be managed to attain a complex future condition; two percent is NSC/Non-Forest; and the remaining seventy-eight percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Plympton Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Quartz Basin

This management basin consists of 8,582 acres located in the south part of Clatsop County. The majority of these lands are tributary to Quartz Creek and Rock Creek, which flow into the Nehalem River. A portion of a Salmon Anchor Habitat (SAH) area, Upper Rock Creek, is located within the basin. Elevation ranges from 800 to 2,300 feet, averaging 1,600 feet above sea level, and site index ranges from 100 to 140, averaging 126 for the basin.

This basin is characterized by forest stands that regenerated naturally after wildfires. The majority of stands in the basin range in age from 50 to 70 years.

This basin is used by the public to access Lost Lake, and Bloom Lake. The district maintains a hiking trail to Bloom Lake. Other recreational use includes fishing, camping, OHV use, and wildlife viewing. Because this area is accessed from Highway 26, illegal hunting, vandalism, and garbage dumping occur frequently.

Key Resource Considerations for the Quartz Basin

- Level 1 scenic resource along Highway 26.
- Henry Reirson Spruce Run Campground.
- This basin is designated for non-motorized activities only.
- High level of dispersed recreational use.
- About 11 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- About 30% (1,921 acres) of this basin is within the Upper Rock Creek Salmon Anchor Habitat (SAH) area.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

The south east corner of the Quartz Basin is within the Upper Rock Creek Salmon Anchor Habitat Area. Lost Lake and Henry Rierson Spruce Run Campground are two Recreation Areas within this basin. Forty percent of the basin will be managed to attain a complex future condition; and the remaining sixty percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Quartz Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Sager Basin

This management basin consists of 10,421 acres, located in the southeastern part of Clatsop County. The majority of these lands are drained by Sager Creek into the Nehalem River. A small portion of a Salmon Anchor Habitat (SAH) area, Buster Creek, is located within the basin. Elevation ranges from 500 to 1,400 feet, averaging 900 feet above sea level, and site index ranges from 100 to 140, averaging 131 for the basin.

A major management focus in this basin is a northern spotted owl cluster area. On over 60 percent of the basin, management goals will focus on protection and enhancement of this wildlife habitat resource.

This basin is used by the public primarily for hunting and camping. There are numerous dispersed camping sites throughout the basin. There is significant early logging history in this basin, but only a few sites remain. For example, the existing Buster Camp was a main camp for the Kerry Timber Company, a major railroad logging company that operated from the forest to Vernonia and Kerry along the Columbia River. There are many pictures and stories related to the area, and railroad grades and remains can still be seen. There is potential for the development of interpretive trails. There are many scenic viewpoints that look out over the Nehalem Valley.

Key Resource Considerations for the Sager Basin

- Northern spotted owl cluster area.
- Northern spotted owl.
- *Phellinus weirii* infection in portions of the basin, a fungus that causes root rot and is fatal to Douglas-fir.
- There is 1 individual domestic water source on State land.
- About 21 miles of Type F streams and watersheds important for salmon, steelhead, and cutthroat trout.
- About 2% (206 acres) of this basin is within the Buster Creek Salmon Anchor Habitat (SAH) area.
- Seven research sites (3 SNC, 3 Bear damage control pruning, and 1 White Pine Blister Rust study).
- This basin is designated for non-motorized activities only.

- Highly used for dispersed recreation.
- Remnants of railroad logging sites.
- The transportation system provides good access; a few spurs need construction and collectors/spurs will be assessed for road improvement; and the rest of the road system will be maintained as needed.

Landscape Design & Desired Future Condition

Approximately one third of the Sager Basin is within the Jewell NSO Cluster Area. Thirty-three percent of the basin will be managed to attain a complex future condition; and the remaining sixty seven percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Sager Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. This basin is a medium priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Scattered Basin

This plan addresses 3,658 acres in scattered tracts that range in size from 40 acres to over 1,000 acres, located mostly in the western part of Clatsop County. These lands drain into the Columbia, Nehalem, and smaller rivers, and some are drained by small streams directly into the Pacific Ocean. Elevation ranges from sea level to 3,000 feet, and site index ranges from 80 to 140, representing the wide range of tracts included.

Management considerations include visual concerns, endangered plants, estuaries, and a community water system. An ongoing district land exchange program, with the objective of consolidating state lands, will move some of these scattered tracts out of state forest ownership over time.

Key Resource Considerations for the Scattered Basin

- Community water system (Ecola tract) located adjacent to state land.
- Level 1 scenic resources (Ecola and Hug Point tracts).
- River shore wetlands (Ivy Station, Cooperage tracts).
- Estuaries (Youngs Bay tract).
- Rare plants (Onion Peak tract).
- About 11 miles of Type F streams and watersheds important for coho and chinook salmon .
- About 3% (175 acres) of this basin is within the Coal Creek Salmon Anchor Habitat (SAH) area.
- Swiss needle cast in Douglas-fir plantations.
- A Forest Practices stream buffer study is in place on Fall Creek, near Hug Point State Park.
- The transportation system provides fair access; easements may be needed, with some road relocation and vacating, plus construction of a number of spur roads.

Landscape Design & Desired Future Condition

The Scattered Basin has less T&E Species concerns than some of the other Basins. Due to the scattered nature and smaller size of most of the parcels, one percent of the basin will be managed to attain a complex future condition; thirteen percent is NSC/Non-Forest; and the remaining eighty-sixty percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Scattered Basin will have both partial cut and clearcut opportunities outside of the stands managed for complex structure. There may be more clearcut operations than partial cuts within this basin. This basin is a low priority for transportation planning and/or investments in the infra-structure. Road construction and improvement will be at a rate similar to the last ten years.

Sweet Home Basin

This management basin consists of 11,351 acres, located in the extreme southern part of Clatsop County. The majority of these lands are tributary to Sweethome Creek and North Fork Nehalem River, which flow into the Nehalem River. Elevation ranges from 350 to 1,750 feet, averaging 750 feet above sea level. Site index ranges from 110 to 140, averaging 127 for the basin.

A major management focus in this basin is a northern spotted owl cluster area, the Upper North Fork Nehalem SAH area, Marbled Murrelets, and scenic resources along the Nehalem River.

Spruce Run Campground is located in Sweet Home Basin. The campground provides 31 designated RV/camper campsites and 5 walk-in tent sites. During the fall hunters use the campground. Dispersed camping, fishing, and hunting occur throughout the basin. OHV trails exist without any department management or planning.

Key Resource Considerations for the Sweet Home Basin

- Northern spotted owl cluster area.
- Marbled murrelet management area.
- Level 2 scenic resources along the Nehalem River.
- Swiss needle cast in Douglas-fir plantations.
- This basin is designated for non-motorized recreational activities only.
- About 25 miles of Type F streams and watersheds important for coho salmon, steelhead, and cutthroat trout.
- About 51% (5,587 acres) of this basin is within a Salmon Anchor Habitat (SAH) area.
- The transportation system provides fair access; several spurs need construction, road vacating opportunities will be assessed, and in general road improvement will be spread across the basin.

Landscape Design & Desired Future Condition

The Sweethome Basin is almost entirely within the Sweethome NSO Cluster; and approximately half of the basin is within the Upper North Fork Nehalem River SAH. Thus,

seventy-nine percent of the basin will be managed to attain a complex future condition; and the remaining twenty-one percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

Due to both NSO Cluster and SAH management guidelines, no clearcuts will be conducted within this basin, assuming no change in policy. Some partial cuts may be conducted. This basin is a medium priority for transportation planning and/or investments in the infrastructure. Road construction and improvement will be at a higher rate than the last ten years.

Expected Outputs and Achievements

Structure Outputs

The *Northwest Oregon State Forest Management Plan* describes landscape level goals for snags, downwood and green trees. These goals are fully described in Landscape Management Strategy 3 on page 4-52 to 4-55 of the *Northwest Oregon State Forest Management Plan*. Landscape structure outputs include retaining 5 green trees per acre in regeneration harvest units, 2 hard snags per acre at least 15 inches in diameter across the landscape, 6 snags per acre in OFS stands with at least two being 24 inches in diameter; 600-900 cubic feet of conifer logs per acre retained across the landscape in decay class 1 or 2; and in OFS stands retain 600-900 cubic feet per acre in decay class 1 and 2, or 3,000 to 4,500 cubic feet of down logs in all decay classes.

The strategies used to develop snags and down wood will vary according to tree size, age, species, and type of management activity. In first entry commercial thinnings (generally between ages 25 and 40), no prescriptions will be used to develop snags and down wood, as trees this size do not make long-lasting snags or down wood. Some of the trees left in the partial harvest will naturally become snags, due to top breakage. This would also be the case in younger stands harvested early because of Swiss needle cast infections. In older partial cuts, if pre-harvest stand examinations do not indicate sufficient numbers of snags, then some trees may need to be topped or girdled during the operation, to become snags. Harvest prescriptions may also be needed to provide sufficient down wood in these older thinnings. If predicted volumes of defective or down wood do not reach the targeted 600 to 900 cubic feet per acre, then harvest prescriptions may require leaving additional down wood. In clearcuts, to obtain the objective of 2 snags and 600 to 900 cubic feet of down wood per acre, pre-harvest estimates and harvest prescriptions must be used to assure these levels are attained. In hardwood stands, it is often difficult to find enough large down wood and snags after the operation. Therefore, these structural elements must often come from whatever conifer trees are present in the stand. Therefore, it is often necessary to leave most or all conifer trees for green trees, snags, and potential down wood in hardwood harvests. Likely the down wood objectives will have to be deferred in small diameter CSC and hardwood dominated clearcut harvest units. However, additional down wood and/or other structural components will be increased in other harvest units to mitigate the need for lower levels in other stands. Thus, the landscape level objectives will be achieved over time, but not necessarily in every individual harvest unit.

Table 10. Anticipated Stand Structure Development by 2019⁵

	REG	CSC ²	UDS ³	LYR ⁴	OFS
Current Condition	11	24	35	28	1
After Implementation Plan Period¹	18	19	30	30	2
Desired Future Condition	←	59	→	20	20

1. These are estimates based on an average of 1,000 acres of CC/year & 900 acres of PC/year..
2. After partial cutting CSC stands, it takes about 5 to 7 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; and development of trees greater than 32 inches in diameter.
5. The percentage for all stand structures do not equal 100% because 1% of the district is designated as Non-Silviculturally Capable or Non-Forest.

Harvest Outputs

The Annual Harvest Objective (AHO) in Table 11 identifies the sustainable and predictable production of timber (forest products) from the district and the harvest activities “for the ten-year period that will be necessary to move toward the desired future condition” (NW FMP page 5-4). The AHO for this period has been determined through the District Opportunity Analysis described in Appendix A. The Opportunity Analysis determined that 61 MMBF is the maximum sustainable volume that can be produced to meet the goals of the Northwest Oregon State Forest Management as applied through this Implementation Plan. The acre ranges for clearcut (Regeneration Harvest) and partial cut harvest describe the types of harvest activities that will occur over time to achieve the volume objective and desired future condition of stand structures.

The AHOs will be implemented through the district’s Annual Operations Plan. The objective is to achieve the average of the AHO over the expected 10 year planning horizon for the Implementation Plan. Under normal circumstances, the volume proposed in an Annual Operations Plan will be near the AHO target; however, unforeseen, events may result in an Annual Operations Plan volume that is farther from the AHO target. Unforeseen events may consist of, but are not limited to, catastrophic windstorm, fire, or poor market conditions. For example, catastrophic events may that lead to emergency salvage operations that result in harvesting above of the AHO, or poor market conditions preclude meeting AHO volume. When unforeseen factors for one district preclude achieving AHO objectives, the State Forester may re-direct annual harvest levels to another district. The Annual Operations Plan will describe how the volume relates to the AHO volume identified in the Implementation Plan.

The acres of regeneration harvesting and partial cutting proposed in each Annual Operations Plan will normally be within the ranges identified in Table 11, but the mixture of acres will vary from year to year based on the stands selected for harvest, their current condition, desired future condition, and the silvicultural prescription used to move the stand from its current to its future condition. Numerous factors apply to the stand selection process and their relative importance may change from year to year and from basin to basin. Factors that affect the stand selection process include the overall objectives identified in this Implementation Plan, recent harvest activity in the basin, results of threatened and

endangered species surveys, condition of the transportation system, and current market conditions.

If changed conditions, new information, or different strategies indicate that a significant shift in the AHO is necessary; this Implementation Plan will be revised. There are two processes for revisions to the Implementation Plan: major or minor. Page 5-4 of the Northwest Oregon State Forest Management Plan defines a major revision (of the AHO) as:

“Revisions that propose changes to the annual harvest level ranges of more than 25% (based on combined acreage of regeneration and partial harvest).”

The Northwest Oregon State Forest Management Plan prescribes a 30-day public comment period prior to State Forester approval of major revisions. Minor revisions (those that do not meet the criteria of a major revision) to the Implementation Plan may be approved by the District Forester. Minor revisions to the Implementation Plan are described in Annual Operations Plan.

Table 11. Annual Harvest Objective, Volume and Acres

Volume (MMBF)	Clearcut (Regeneration Harvest) Acres	Partial Cut Harvest Acres
61	350 - 1,400	600 - 3,250

Appendix A

District Opportunity Analysis

This Implementation Plan describes the current condition of the resources present on the district, landscape design strategies to achieve a desired future condition, and management activities for a 10 year period, including the Annual Harvest Objective (AHO). This appendix describes the *Opportunity Analysis* the district used to determine the AHO to achieve the strategies described in this Implementation Plan, the Northwest Oregon State Forest Management Plan, the Draft Western Oregon Habitat Conservation Plan, and the other plans, policies or strategies listed in the *Introduction* of this Implementation Plan.

The purpose of the Opportunity Analysis is to identify the highest sustainable flow of timber volume that attains the stand structure goals for the district. The Opportunity Analysis also identifies the acre ranges for clearcut and partial cut harvests necessary to achieve the volume outputs and stand structure goals.

The Opportunity Analysis is based on the volume, harvest acre, and stand structure outputs from a harvest scheduling model. Those outputs have been analyzed by the district using results of recent timber harvest and other information to *ground truth* the model. In this analysis, the district accounts for factors that could not be modeled because of a lack of data (i.e. high landslide hazard locations), as well as factors that do not lend themselves to a computer model (i.e. scenic and recreation resources).

The district's Opportunity Analysis is the source of the AHO and other management activities listed in the following tables in the Implementation Plan:

- Table 6. Annual Silvicultural Activities for Fiscal Years 2010 to 2019
- Table 11. Annual Harvest Objectives, by Volume and Acres

Harvest Scheduling Model

The harvest scheduling model that generated the data for the Opportunity Analysis is based on the models used for the Harvest and Habitat Model Project. These models are designed to simultaneously achieve goals for timber harvest and stand structure development consistent with the principles of structure based management described in the Northwest Oregon State Forests Management Plan. These models are designed to incorporate rules that emulate the strategies and practices contained in plans, policies, and strategies that apply to the planning area. More information on these models can be found in the *Harvest and Habitat Model Project Final Report* (ODF; March 8, 2006) or by contacting the State Forests Operations Coordinator in Salem.

The harvest scheduling model for this opportunity analysis has been updated from the Harvest and Habitat Model to:

- Ensure the model rules reflect the plans, policies, and strategies that are applicable to this Implementation Plan, as described in the *Introduction* section of the Implementation Plan (page 4);

- Incorporate the current spatial data available, including stand boundaries, locations of species of concern and the current landscape design; and
- Revised yield tables developed from most current Stand Level Inventory data.

Harvest Context

There is a significant difference (reduction) in this model run as compared to the four year AOP average. One obvious difference is that there is significantly less volume output in the first two periods than has been planned in the past as compared to the four year average. The model output for partial cutting is within the IP range, averaging below the midpoint in the first two periods. The model output for regeneration harvest is slightly above the midpoint of the IP range. A closer look at the model outputs for the first five periods indicates a dip in three of the five years below the current IP range.

Table 1. Harvest Outputs

	Model Outputs ¹	AOP Average 2005 through 2008	Implementation Plan ²
Volume (MMBF)	61	70	61
Regeneration Harvest Acres	901	1,014	875 350 - 1,400
Partial Cut Harvest Acres	1,514	2,071	1,925 600 - 3,250
Total Acres	2,415	3,084	2,800 2,000 - 3,600

1. Average annual harvest level based on the average outputs from the first two periods of the IP Revision Harvest Model (H&H 7).
2. Annual harvest levels from the modified implementation plan, June 2009. The top number is the mid-point of the range and the lower numbers are the range of outputs.

Partial cut harvest volume of 20.3 MBF/Acre for partial cut harvest is a reasonable estimate if partial cutting will take place in older stands. Since much of the last 5-10 years has been spent thinning stands in the 50 to 65 year age class, it is unclear on how much partial cutting opportunity will exist in stands of this age. The majority of near future partial cutting opportunity will likely be in younger stands that will produce 12-15 MBF/Acre.

Regeneration harvest volumes are reasonable and within expected outputs at approximately 36 MBF/Acre.

Table 2. Average Harvest per Acres

	Model ¹	Actual ²	Difference	Percent
Regeneration Harvest	35.7	35.2	0.5	-1.4%
Partial Cut Harvest	20.3	17.2	3.1	-15.3%

1. Average volume harvest per acre for the first two model periods of the I.P. Run
2. Based on the 5-year average volume harvested per acre using "cut out" or timber cruise information.

Other Factors Affecting Implementation

- High Landslide Hazard Locations are not a significant issue on the Astoria District although there may some areas were HLHL areas are not modeled due to being part of a bigger stand type. Overall it is not believed that this will have a significant impact on volume outputs. Future model runs may incorporate these areas once they are able to be typed out of larger stand types.
- Municipality Adjacency: Another example of harvest activities that may be unacceptable to some stakeholders are the harvest impacts that the model chose adjacent to communities and municipalities. In example, the City of Cannon Beach is adjacent to and directly downstream from a scattered tract known as the Ecola Tract. The City is very interested in the ecological condition of the Ecola Watershed. The City has even purchased property from adjacent industrial landowner to meet their needs and concerns.

Implementation

At 61 MMBF, the Annual Harvest Objective (AHO) is implementable. With the current economic situation the strategy to achieve this object will likely be more regeneration harvest and less partial cutting. The current acreage ranges for regeneration and partial cut harvest offer the flexibility to meet special situations, such as our current depressed economy. These ranges offer the flexibility in how we achieve the AHO while ensuring sustainable harvest due to the narrow range of the AHO.

- Volume: The volume objective averaged over the first two model periods is slightly less than 61 MMBF. Noteworthy is the fact that for the first fifteen period's volume only fluctuates slightly between 58 and 61 MMBF.
- Acres: The mid-point of the AHO partial cut acres is 1,925 which is higher than all model periods. As discussed above, the model outputs of volume/acre for partial cutting is approximately 20.3 MBF/Acre. This volume per acre amount is believed to be approximately 25% higher than what is anticipated from future harvest. In the near future more partial cutting will occur in younger stands (35 to 50 year age class). Over the last ten years a majority of thinning has occurred in a slightly older age class (50 to 65 year age class).

Current "Species of Concern" strategies have a significant impact on harvest availability on the Clatsop State Forest. Any changes to ODF strategies related to species of concern will have an impact on the AHO. Without knowing what future species of concern strategies may be it is currently impossible to evaluate those affects.

Appendix B

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Map Section

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