



To: Nancy Hirsch, State Forests Division Chief

From: Doug Decker, State Forester 

Date: July 19, 2011

Subject: Approval of Forest Grove and Astoria Implementation Plans



Introduction & Context

This memo conveys direction related to implementation plans for approximately 250,000 acres of state-owned forest land in the Astoria and Forest Grove districts. In January 2010 the Oregon Board of Forestry established clear direction to the Department for the Clatsop and Tillamook State Forests to increase harvest revenue from these lands 5-15 percent over the next ten years. In addition, the Board approved 2010 forest management plan established a long-term goal of creating stands with complex forest structure across 30 to 50 percent of the landscape. Revision of these implementation plans, done according to the process defined in administrative rules, provides an opportunity to reflect this new direction in the context of these 10-year implementation plans.

There has been significant interest from the public, stakeholders and the counties in these 10-year implementation plans as evidenced by attendance at public meetings and public comment on the draft Implementation plans. The ODF staff Analysis and Response to Public Comments may be found at:

http://egov.oregon.gov/ODF/STATE_FORESTS/District_Implementation_Plans.shtml

Early drafts of the IPs benefited from involvement and comment from the State Forests Advisory Committee, which resulted in changes even prior to the official public comment period.

In addition to the interest in these IPs specifically, the Board of Forestry recently commissioned a review from the Institute for Natural Resources (INR) that provided suggestions and critique of the analytical basis used to evaluate various forest management plan strategies. INR also provided suggestions about improving Board of Forestry Performance Measures. The Board of Forestry and the agency are committed to continuous improvement and will continue work on state forest management policy adjustments and strengthening of resource management strategies.



Direction and Intent

Based on the Board's direction to the Department related to revenue and stand structure goals, and recognizing the ongoing work on policy elements, performance measures and responding to the INR report and public comments, I am providing the following approval and direction:

1. I approve these two implementation plans with a phased in approach that defers for up to two years some harvest activity. The intent of this direction is to retain flexibility towards future development of complex forests, while addressing Board direction to achieve a revenue increase. More specifically, flexibility is retained by deferring some of the 2012 harvest operations to provide an opportunity to reevaluate how they may contribute to the future landscape design, wildlife and aquatic habitats.
2. This approval of the Forest Grove and Astoria 2012 Implementation Plans is consistent with Oregon Administrative Rules 629-035-0030, 00600105¹.
3. These two IPs also represent each district's share of possible contribution towards achieving the Board of Forestry Performance Measures and are aligned with State Forests Division policy. The plans include a landscape design that represents 30% of the forests on a trajectory towards more complex forests structure (more than the current condition) over time and they are expected to achieve 20% complex forest structure in twenty years (with at least half of the increase occurring within the first ten years). Harvest level increase opportunities associated with these two plans will be phased in beginning with the 2012 Annual Operation Plan.

Phase-in approach retains flexibility

In order to retain flexibility to respond to potential policy changes and other information, harvest level increase opportunities under these two plans will be phased in. The phase in will capture about half of the harvest level increase opportunity, consistent with each district's 2011 Implementation Plans. The phase is reflected in an update to the harvest objectives guidance for the 2012 Annual Operation Plan (AOP) provided by the State Forests Division. This moderate increase, from the base (5-year average AOP objectives by district – 2002-2006) provides a clear step toward achieving the Board's target of a 5-15% revenue increase expected over the next decade. Other performance measures/targets for these forests will be maintained or improved.

The phase in approach on implementation will delay capturing approximately 4 million board feet of timber with an estimated gross value of \$1 million from the previously planned 2012 AOP. Given the current performance measure language there will still be time within the 10-year span of these

¹ OAR 629-035-0030 Forest Management Planning, OAR 629-035-0060 Changes to Forest Land Management Classifications, and OAR 629-035-0105 Adopted Forest Management Plan Documents

plans to capture these harvest opportunities (meet BOF’s target of 5 to 15% within 10 year span of these plans).

As part of our continuous improvement process, any policy adjustments by the Board or new information gained from on-going scientific analyses, research or monitoring will be incorporated at the appropriate planning level.

Context – Clatsop & Tillamook State Forests

Often, much of the public interest is focused on our Clatsop and Tillamook State Forests located in the north coast. To provide some context on sustainable harvests levels, the recent ten-year average (2002-2011 harvest objectives) for these forests combined was 183 million board feet (MMBF) per year. This number represents a total for the Astoria, Forest Grove and Tillamook Districts. Moving forward under the 2010 revised Forest Management Plan; we have only two districts that have completed updating their IPs. The 2011 approved Astoria and Forest Grove IPs combined with the current 2009 Tillamook IP (Not yet revised) represent a sustainable harvest level of 181 MMBF, just slightly under the ten-year average.

Specifics on what the 2012 phase in will mean for the Astoria and Forest Grove Districts harvest objectives follows:

<i>District</i>	<i>Baseline (02-06) MMBF</i>	<i>Approved IP harvest level MMBF</i>	<i>2012 Planned Harvest MMBF</i>
<i>Astoria</i>	65.7	73.0	69.7
<i>Forest Grove</i>	56.6	61.0	59

This change in harvest objectives will result in some planned harvest units (reflected in the final 2012 AOP) being removed, modified and/or deferred. More detail on this is provided in the 2012 AOP document – appendix C.

[http://egov.oregon.gov/ODF/STATE FORESTS/Annual Operations Plans.shtml](http://egov.oregon.gov/ODF/STATE_FORESTS/Annual_Operations_Plans.shtml)

Mid-term Work: Clarifying Performance Expectations and Considering different management approaches

Since Board adoption of the NW and SW Forest Management Plans in 2001, there has been on-going debate about this integrated “structure based management” approach to managing state forests in NW Oregon. In addition, current revenue projections indicate that expenditures to implement this plan will continue to outpace revenue.

While I believe the current management plan is a creative and innovative approach to achieving policy objectives on state forests, it has not, as yet, produced the desired level of understanding, acceptance and support among those interested in State Forests. In this context, I will be recommending the Board of Forestry consider a pathway in the mid-term that:

1. Accepts and affirms GPV administrative rule direction;
2. Embarks on a clarification and re-articulation of expected outcomes from these lands in the form of revised performance measures;
3. Considers alternative forest management approaches/strategies that are aligned with expected outcomes and that deliver on revised performance measures.
4. Pursues this work in a context of public involvement, consistent with the Board's values expressed in the *2011 Forestry Program for Oregon* and pertinent administrative rules.



Astoria District
Final Implementation Plan
July 19, 2011

Executive Summary – 2011 Clatsop State Forest Implementation Plan

The 2011 Implementation Plan for the ODF Astoria district is the next step in translating the state's 2010 update of the NW Oregon Forest Management Plan into management goals and objectives that will guide forest management on the district over the next decade.

The goal of the NW Oregon Forest Management Plan is to provide balanced management of the 636,000 acres of State Forest lands that are located in northwest Oregon consistent with direction in the Oregon Revised Statutes to secure "greatest permanent value" on these lands. This state land ownership includes about 500,000 acres located in the Forest Grove, Tillamook and Astoria Districts, (primarily the Clatsop and Tillamook State Forests) with the remainder of these lands located in the Santiam State Forest, east of Salem and scattered state forest ownership in the coast range near Corvallis and Eugene. The 2010 NW Forest Management Plan is an integrated approach to forest management that strives to actively manage the forest, integrate often competing forest values and seek compatibility among values over time and across the landscape. This Implementation Plan for the Astoria District is a customized decade-long plan to meet the needs and situation of the District.

The Astoria District includes approximately 137,000 acres with an interesting history. Most lands were acquired in the 1930s, 1940s and 1950s when the counties deeded over tax-foreclosed lands to the state in exchange for a portion of future revenues. The properties include soil types that are highly productive for growing trees but were largely cut-over, sparsely stocked and covered with brush and grass. Forest management activities began in the 1950s and continue today. During the 1970s, thousands of acres of naturally regenerated forest stands were commercially thinned. These stands are now 60 to 80 years old and comprise about 40 percent of the total forest area.

This plan is a 10-year look to the future. It is designed to move the forest from its current condition towards its 'desired future condition'. The future condition described in the Plan includes a diversity of forest structures, which provide a broad array of habitat for native fish and wildlife, diverse outdoor recreation opportunities, and a sustainable predictable flow of timber and revenue in support of counties and local government. Revenues from management are also expected to support reinvestment in the forest.

State Forests in the Astoria District are a product of both natural and man-caused disturbance – whether from historic logging, tree mortality from insect or disease outbreak, destructive wind storms that frequent the north Pacific coast and changing geology. Nature changes the shape of the forest, which is why ODF relies on adaptive management. Adaptive management is a system of making, implementing and evaluating decisions recognizing that forest ecosystems, and the social values of Oregonians, are always changing. In adaptive management, ODF learns from management actions and decisions, research and monitoring (science) and accommodates change at the appropriate planning level. This 10-year plan will likely evolve between now and 2021 based on this principle.

New Information Requires Plan Revision

The Oregon Board of Forestry in 2010 approved changes to the 2001 NW Oregon Forest Management Plan and revised performance measure targets for the Clatsop and Tillamook State Forests. The 2010 Forest Management Plan changes are related to the amount of complex structure (layered and older forest structure) that will exist on the landscape,

addresses how compliance with the federal Endangered Species Act will be achieved and expands strategies for species of concern. The Board's long term goal for "complex" forest structure shifts from 40 to 60 percent to 30 to 50 percent.

The Board decided to not pursue a Habitat Conservation Plan (HCP) for these forests at this time, as a result of further analysis which was required when the 2001 Forest Management Plan was adopted. The Department will continue to implement a take-avoidance policy consistent with implementation over the past decade. Due to this change, the Board included a Species of Concern Plan. These changes resulted from new information and data modeling that projected lower than expected sustainable harvest levels from the 2001 NW Forest Management Plan. In addition, the Draft HCP developed in the late 1990s was no longer relevant to specific locations or numbers of threatened species such as the Northern Spotted Owl.

The Board's performance measures include targets for the Clatsop and Tillamook State Forests to increase revenues by 5 to 15 percent in the next ten years and increase the percentage of the landscape in complex structure to at least 17 to 20 percent of the forest over the next 20 years (see the "Introduction" section of full Implementation Plan). Targets for the remaining performance measures that address other social, environmental and economic benefits are to "maintain or increase" consistent with other performance measure targets. The result of the forest management plan changes and the expected outcomes expressed by the Board result in further contributions to local economies and support of local public services through timber harvests and revenue, while also retaining most of the existing "bank" of stands that have become complex forest structure while developing more over time.

Since Board of Forestry adoption of the 2010 Forest Management Plan, ODF staff used data modeling and field expertise to determine how to best achieve this policy direction at the Implementation Plan level. These analyses suggest that the revenue increases could be met across the Tillamook and Clatsop State Forests when the long term goal for complex structure was established at **30 percent** for the Astoria District. Establishing a 30 percent goal was necessary to meet the performance measure targets established by the Board and is consistent with the approved Forest Management Plan.

The Implementation Plan – where are we now, where we will be in 2021

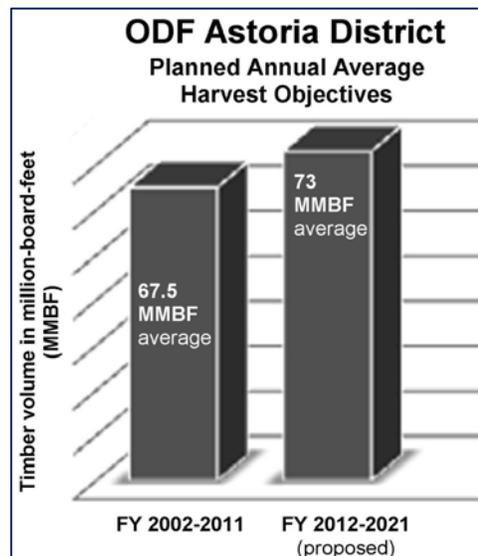
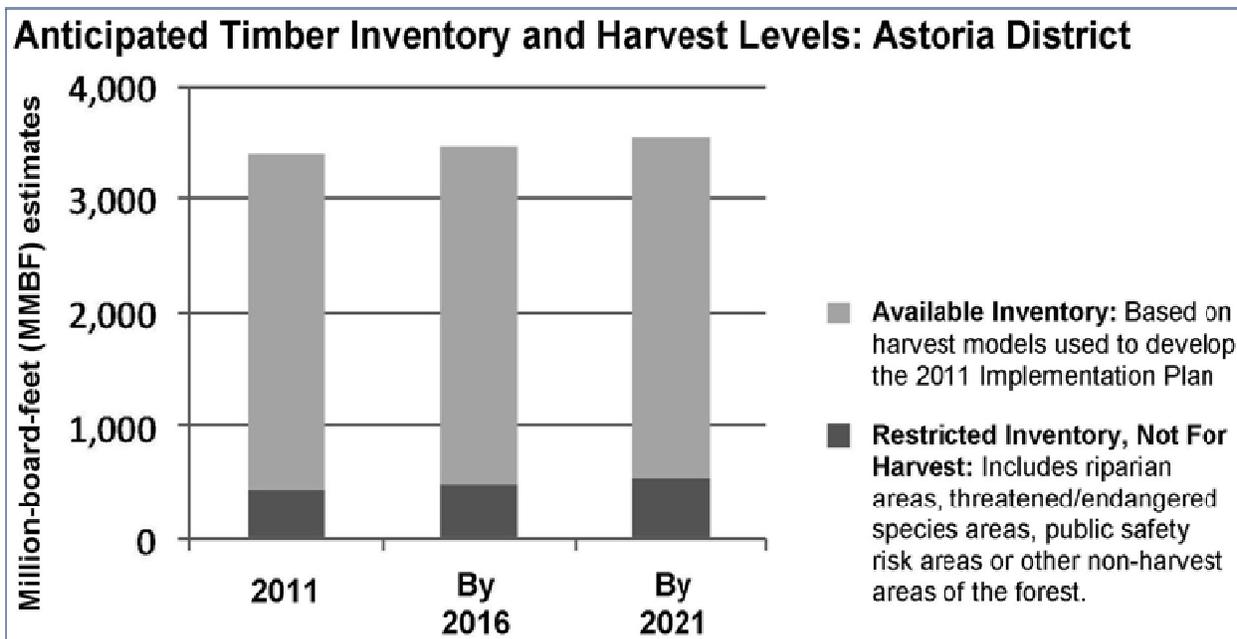
The purpose of the Implementation Plan is to explain how the management strategies of the Oregon Department of Forestry will create the condition of the forest and the output levels that are desired by 2021. Such a vision was achieved by following a careful, thoughtful, collaborative and analytical process that included input from ODF field and staff specialists, consultation with counties and involvement from state partners (for example ODF&W), science and data modeling, and public input from the State Forests Advisory Committee, a group that provides advice on implementing state forest plans. A public review and comment period will be provided prior to this plan being approved.

The Plan identifies the forest resources, geologic factors in the forest, watershed and wildlife data, scenic and recreation assets of the Tillamook and Clatsop State Forests. Each forest is managed for a mix of environmental, economic and social benefits in alignment with the 2010 NW Forest Management Plan, Board of Forestry Performance Measures and other legal requirements.

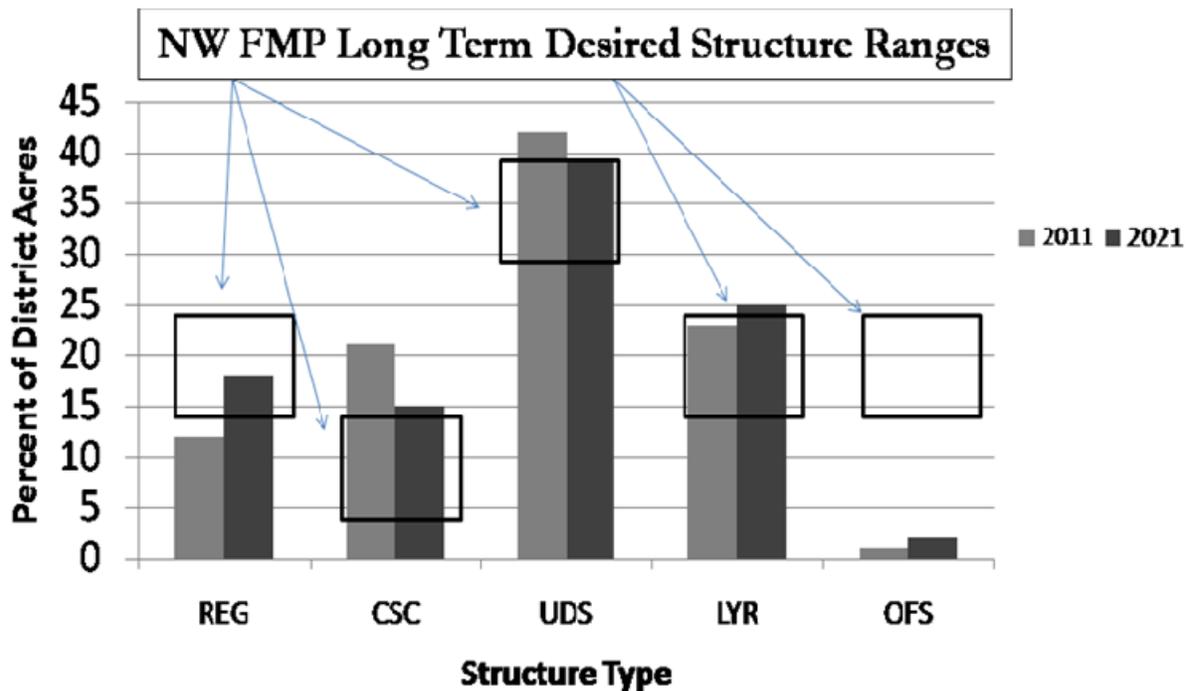
The Implementation Plan also acknowledges the important role the forest plays in recreation. ODF will continue to explore opportunities to sustain and increase enjoyment of the Clatsop State Forests by hikers, bicyclists, Off-Highway Vehicle fans, hunters, fishermen and others.

ODF also sees the value of trying new approaches to provide stewardship of recreation resources. During a difficult economic climate, the Department will continue to partner with Oregon Parks and Recreation and private contributors to maintain and improve public access to the forest. ODF will also continue to encourage volunteer services to help with keeping the forest safe and accessible to the public. During 2009, almost 16,000 hours of service were contributed by volunteers in both the Clatsop and Tillamook State Forests.

When examining the timber inventory, forest growth and projected harvest level there a clear observation that emerges – **this is a sustainable harvest level (averaging about 73 million-board-feet per year) which obtains revenue benefits but allows for continued growth and harvest of the forest for future generations**



Projected Stand Structure Changes 2011 through 2021



How this plan matters to Oregonians

Conservation values are enhanced while still meeting economic needs

By establishing a twenty-year deadline for achieving certain levels of complex structure (spatially designated on the landscape), the net effect is to move more quickly toward the goal of having a 'mosiac' of stand structure types across the landscape while also providing certainty. In addition, the ODF operation policies to protect federally-listed species and the Species of Concern strategies provide focused management in certain areas to ensure protection of threatened or sensitive fish and wildlife species. Inherent in the 2001 Forest Management Plan and continued in the 2010 Forest Management Plan is a suite of protection and restoration measures for fish and wildlife. These include retaining at least 5 live trees and 2 snags per acre following timber harvest, and ensuring an adequate amount of downed logs are retained for soil building and providing habitat to a host of smaller insect and wildlife species. Stream protection standards in these plans require "buffering" of streams systems and include strategies to minimize sediment reaching a stream.

Timber harvest maintains revenue to local governments.

About two-thirds of the revenues from state forest timber sales fund services at the county, and local taxing district level, including schools in Clatsop County. Over the last 10 years the Clatsop County revenue from state forest timber sales has provided \$ 169 million dollars. Based on proposed timber harvest levels in this Implementation Plan, county revenues are likely to increase over the next 10-year period, subject to timber market prices. There are also local jobs provided by logging and transportation of timber to mills – while data is not available for Clatsop County, about 57,000 jobs across Oregon are in the forest industry. The remaining one-third of the revenue is used by ODF to reinvest in the forest for activities like tree planting, research and monitoring, recreation services, silvicultural activities, road maintenance, stream improvement and a host of other activities that contribute to a healthy, productive and sustainable forest.

The timber harvest is on a sustainable path

One of ODF's goals is to provide a predictable, sustainable supply of timber and revenue for the state, counties and local taxing districts. In the 2011 Plan, annual harvest levels are sustainable: timber harvest is less than the annual amount the forest is growing. Harvest levels are carefully set to allow for no decline in the flow of forest products over time, increasing the predictability of revenues to counties, and providing stable reinvestment in the forest.

This 10-year Plan for the Astoria District represents an adaptive approach that is based on the best knowledge, experience and information that we have at this time, but acknowledges that there will likely be changes and adjustments that need to be made. In this context, ODF has adaptive processes and procedures in place to allow for change over time.

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Introduction

The *Astoria District Implementation Plan* (IP) guides forest management for all forest resources on the Astoria District beginning July 1, 2011. This implementation plan is a major revision of the plan approved by the State Forester in June 2009. It is prepared to describe the operations, activities and projects that will achieve the intent of the long-range vision of the April 2010 *Northwest Oregon State Forests Management Plan* (FMP).

To provide further background, the 2010 FMP revision increased the forests' ability to contribute to local economies while also developing older forest conditions on 30-50 percent of the landscape. This reduced the long-term goal for developing older forest types from the previous 40-60 percent of the landscape.

Additionally, the 2010 FMP revision replaced the draft Habitat Conservation Plan (HCP), with a Species of Concern policy that the department developed for species that depend on older forests, or are rare in Oregon's forests. For the Tillamook and Clatsop state forests, this is a list of 40 species identified by the Oregon Department of Fish and Wildlife and ODF.

The FMP changes described above play a large role in the changes you will see in this IP.

In 2007 the Board of Forestry (BOF) adopted nine Performance Measures (BOF PM's) to gauge the success of implementing the FMP. The performance measures encompass the economic, environmental and social outcomes to be provided under Greatest Permanent Value (GPV) over the next 20 years. The performance measure targets were also used in the development of this IP. Two of the PM's that warrant more specific introduction now are PM's Nos. 3 and 6. For a complete list of all the BOF PM's see Appendix C.

Performance Measure No. 3: Directs an increase in the annual revenues (five-year average)¹, adjusted for inflation, produced by BOF lands to 5 to 15 percent within the next ten years, and to meet or exceed that level for the subsequent ten years. This target was built upon the assumption that timber harvest volume may be used as a surrogate for revenues.

Performance Measure No. 6: Directs increasing the percent of the landscape in complex structure (Layered and Older Forest Structure) to at least 17 to 20 percent over the next two decades, with at least half of the increase to occur within the first ten years. Within the portion of the landscape providing complex structure, it is to be developed and maintained in complex structure in those areas where it is anticipated to result in the greatest benefits to both aquatic and terrestrial Species of Concern.

This IP includes a new landscape design that designates 30 percent of the district for the development of complex structure over time. The 30 percent target was selected to achieve both the PM 3 revenue target and the complex structure range in the FMP. This change in the proportion of complex structure development is coupled with additional policy direction from the Board of Forestry: Develop complex structure in those areas where it is likely to

¹ The baseline is the 5-year average annual revenues from 2002-2006 on the Tillamook and Clatsop State Forests.

produce the greatest benefits to both aquatic and terrestrial Species of Concern as described in PM No. 6. As a consequence of these changes, some existing complex structure, particularly layered stands, will need to be harvested to achieve PM No. 3.

Timber harvest objectives to achieve PM No. 3 are derived from harvest modeling, which is intended to produce the highest level of non-declining, even flow of timber, while simultaneously achieving the habitat target for PM No. 6 and the longer term structure goals defined in the FMP.

In summary, this landscape design has a twofold aim:

1. Retain benefits to wildlife through more precisely targeted development of complex structure.
2. Provide better economic performance.

Additionally, this IP has an updated recreation section which replaces the Astoria District Recreation Management Plan, September 2000. The outdated plan was approved as a standalone document prior to the approval of the 2003 IP. It was intended to serve as a tool for recreation management and development for approximately ten years. Recent review of this plan concluded that its usefulness was exhausted and it would be most appropriately updated by inclusion in this IP. Upon approval, this IP shall formally supersede the Astoria District Recreation Management Plan, September 2000.

A more comprehensive section on aquatic habitat restoration now exists in this IP. The NW Forest Management Plan (NW FMP) establishes an Aquatic and Riparian Strategy for habitat restoration projects on State Forests (FMP 2010). State Forest's commitment to habitat restoration is further supported in the Species of Concern Policy (ODF 2010) which lists habitat restoration projects as an aquatic strategy. The **Aquatic Resources: Habitat Restoration** section of this IP provides the context and approach that State Forests will use for habitat restoration activities.

In addition, the management activities conducted under this plan will be consistent with the following State Forests Operational Policies and strategies:

1. Species of Concern
2. Northern spotted owls;
3. Marbled murrelet;
4. Swiss Needle Cast Strategic Plan;
5. Salmon Anchor Habitat Strategies²; and
6. Forest Roads Manual.

The specific operations and management activities necessary to carry out this IP will be described in annual plans, beginning with the *2012 Astoria Annual Operations Plan (AOP)*.

² 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.

District Overview

Land Ownership

Astoria District is comprised of approximately 136,846 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: The Campbell Group, Inc., Longview Timberlands, Hampton Tree Farms, Weyerhaeuser Co., 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.

Table 1. District Acreage Breakdown by County and Fund

County	Board of Forestry	Common School	Total Acres
Clatsop	133,254	2,008	135,262
Tillamook	1,544	0	1,544
Columbia	40	0	40
Total	134,838	2,008	136,846*

*Acres were generated using Geographic Information System (GIS) and the Astoria District ownership layer updated January, 2011.

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 December 2010. 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, both tables include 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

Special stewardship 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. Also, overlapping classifications cause the double counting of acres. As a result, if the acres in Tables 2 and 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	78,889	1,646	80,535
Special Stewardship	19,404	231	19,635
General Stewardship	46,849	289	47,138

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

	Focused	Special
Administrative Sites	0	33
Agriculture, Grazing	0	9
Aquatic & Riparian	49,204	11,159
Cultural Resource	8	0
Domestic Water Use	1,338	0
Energy & Minerals	0	299
Operationally Limited	0	164
Plants	0	55
Recreation	378	136
Research/Monitoring	217	0
Transmission	0	231
Visual	10,339	60
Wildlife Habitat	47,139	8,394

*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. 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

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 risk associated with active management in a landslide prone landscape is mitigated using the processes described in Aquatic and Riparian Strategy 6 in the FMP.

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

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 Biodiversity Information Center, 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 exists 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.

Implementation of a diversity of tree species at the time of reforestation can minimize the levels and severity of pest outbreaks while diversifying the forest both structurally and compositionally and minimizes potential impacts from SNC. Enhancing the diversity of native species contributes to habitats and conditions suitable for the many natural dynamics that keep pest populations and damage within acceptable levels, while providing a hedge against changing timber markets in the future.

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, amphibian, reptile, and bird species. Wildlife strategy species identified by ODFW in the Oregon Conservation Strategy (ODFW 2006) that are known or thought to occur on the Astoria district include the Cope's giant salamander, coastal tailed frog, Columbia torrent salamander, clouded salamander, western toad, bald eagle, peregrine falcon, spotted owl, marbled murrelet, band-tailed pigeon, olive-sided flycatcher, little willow flycatcher, red tree vole, California myotis, fringed myotis, long-legged myotis, hoary bat, silver-haired bat, Townsend's big-eared bat. ODFW Conservation Strategy fish species that are likely or known to occur on the Astoria district include Lower Columbia fall Chinook, Coastal and Lower Columbia Chum, Coastal and Lower Columbia cutthroat, Coastal and Lower Columbia coho, Western Brook and Pacific Lamprey and Coastal winter Steelhead. The north end of the district borders the Lower Columbia which supports runs of winter and summer Steelhead. Coastal spring and fall Chinook while not ODFW strategy species are considered ODF species of concern. 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 3 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 1,225 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 (2011)*. Bald eagle protection occurs through the *Oregon Forest Practices*

Act (January 2010) and through the Species of Concern (SOC) policy. The presence of T&E species and their potential habitat require annual surveys to determine species presence, location, and breeding status. Lower Columbia fall Chinook, Lower Columbia Chum, and Coastal and Lower Columbia coho are all listed as federally threatened. Habitat for these species is protected with SOC policies and FMP and aquatic and riparian strategies.

Species of Concern Strategies, adopted in 2010, specifically identify fish and wildlife species of concern on the Clatsop State Forest. Species of concern include those on federal or state ESA lists, state sensitive species, and Strategy species for the Coast Range ecoregion (Oregon Conservation Strategy). Strategies to address these species are identified in policy. These strategies include

- Identification of Terrestrial Anchor (TA) Sites which are areas intended to benefit terrestrial wildlife species of concern, especially those associated with older forest or interior habitat conditions, sensitive to forest fragmentation, or do not readily disperse across younger forest conditions. Management within TAs is intended to be limited, to emulate natural small-scale disturbance patterns, and to minimize short-term negative impacts to habitat. Harvest will likely be limited to thinning projects with the possibility of some small retention cuts. ODF biologists will be involved in development of management prescriptions within TAs.
- Identification of Aquatic Anchor (AA) sites which are watersheds where salmon and aquatic amphibian conservation is of concern. This specific strategy will take effect after the Salmon Anchor Watershed (SAH) strategy expires in 2013. The AAs are the same basins as the SAHs, with the exception of Fishhawk, which will be replaced by Northrup. Riparian management strategies beyond those described in the FMP will be applied within AAs.
- Site-specific Strategies apply for a subset of Species of Concern. Where known sites exist, plans will be developed to address protection of habitat and/or prevention of disturbance. For spotted owls, following the expiration of the Agreement for the Conservation of Spotted Owls, 250 acre core areas will be identified for known pair sites.
- Additional strategies exist for stream restoration projects and creation of snags in some regeneration harvest areas to benefit two SOC that require snags in openings for nesting.

Human Uses

Forest Management

The Astoria District has been operating under the Astoria District Implementation Plan, approved June 2009. Prior to that, the original IP was in place from March of 2003 to June 2009. Table 4 summarizes the past ten Annual Operations Plans which were planned according to the Implementation Plan specifications. The 2012 AOP column lists acres planned according to the revised Astoria District Implementation Plan, approved in June of 2011.

Table 4. Silvicultural Management Activities

Activity	2012 AOP (Acres Per Year)	Ten-Year Average² (Acres Per Year)
Regeneration Harvest ¹	1,554	1,124
Partial Cut	1,269	2,126
Reforestation (all planting)	1,200	1,570
Pre-commercial Thinning	0	688
Fertilization	0	88

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 ten-year average is comprised of the 2002-2011 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. Note: these roads are designed and maintained for forest management activities, so the public should use extreme care when traveling on these roads.

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.

There are 134 stream crossing structures installed in known fish-bearing streams. Of these, 43 are bridges and 58 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. Twenty-eight 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.

Recreation

The Northwest Oregon state forests play an important role in providing a wide variety of recreational opportunities, both to local residents and to visitors from outside the counties where they are located. In addition, these forests offer an opportunity to link the public to natural resource management through educational and interpretive programs.

Recreation Goals

The following are the primary goals for recreation on the Clatsop State Forest:

1. Provide the citizens of Oregon with a place to have fun in a forested environment.
2. Provide diverse forest recreation opportunities that supplement, rather than duplicate, opportunities available in the region.
3. Provide opportunities for interpretation and outdoor education on state forest lands.
4. Manage recreational use of the forests to minimize adverse impacts to other resources and adjacent ownerships.
5. Minimize conflict among user groups.
6. Maintain compatibility with Oregon's Statewide Planning Goal 8 (Recreational Needs).

The Clatsop State Forest is within two hours of Portland, via Highway 30 or Highway 26. Traditionally recreation uses on the forest have included dispersed hunting, fishing, camping, and off-highway vehicle use primarily by Clatsop County citizens, many of whom value the freedom of unregulated settings. Since the development and implementation of the 2000 Clatsop Recreation Plan, many aspects of the recreation program on this state forest has evolved and changed. The demand and level of use for most activities has increased and a number of new facilities have been constructed. The demographics of users have also changed over time as additional people discover what this state forest has to offer. All of these changes have resulted in a much more complex recreation management program than what existed when the original plan was created.

Recreation Resources

The Clatsop State Forest has three designated campgrounds: Henry Rierson Spruce Run Campground in the Quartz 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. The campground offers car camping, walk in tent camping, and fishing on the Nehalem River. The campground also offers access to a 2 mile hiking trail that leads to Spruce Run Lake and is a short 3 mile drive from the popular Lost Lake Day Use Area.

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 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, mountain biking, and horseback riding on forest roads, trail systems and across the forest are popular activities.

Off-highway vehicle (OHV) trails have existed for some time across the forest landscape. Nineteen miles of ATV trails were designated in 2010 as the official motorized trail system in the District. Local ATV user groups continue to be important collaborators in the planning and development of the Nicolai Mountain motorized riding area.

The Role of Clatsop State Forest as a Recreation Provider

State Forests use an integrated approach to forest management that seeks to achieve a broad range of resource goals and provide a balance of social, economic and environmental benefits over time. With the development of a variety of stand types through active management, the local and regional economies will benefit from opportunities for recreational hunting as well as wildlife viewing. Recreational and commercial fisheries will also be enhanced by aquatic and riparian strategies that maintain and restore properly functioning habitats for salmonids and other native fish and aquatic life.

Existing forest recreation opportunities on the Clatsop State Forest are diverse. Many existing recreational uses such as angling, hunting horseback riding and off-road vehicle use are highly compatible with active forest management and have co-existed with these activities for decades. These activities as well as hiking, mountain biking and interpretive and educational programs will continue to be provided as available funding and resources allow.

Designation of Activity Zones

The designation of activity zones is a method commonly used to allocate recreational use, facilities, and settings throughout a working forest. The goal for activity zone designations is to minimize resource impacts, reduce conflicts between different users, and to strive to accommodate recreation demands.

Both motorized and non-motorized activities affect other forest resources. Some of the affects are increased water turbidity, soil compaction, erosion, sanitation problems, litter, reduction of understory vegetation, and reduced site productivity. Designating activity zones will contribute to the minimization of these affects across the forest. In addition, it will focus certain activities in areas that are most suitable for a particular activity. The following criteria were used to develop activity zones:

- Existing use patterns
- Protection of natural resources
- Soil and topography constraints
- Consideration of private landowners and in-holdings
- Location and level of activity zoning in adjacent state forests
- Equitable balance among users
- Location of sensitive, threatened, or endangered wildlife species

The current designations of the zone boundaries involve many components. Areas of topography and soil conditions least sensitive to motorized use were zoned for motorized activities. Whereas, areas sensitive to motorized activity due to soil conditions were zoned for non-motorized activities. In addition, areas of the forest known to contain sensitive, threatened, and/or endangered wildlife species will be managed in a manner to protect those species, and were zoned for non-motorized activities. In some areas of the forest, consideration for private landowners and residents was weighed heavily in designating the area for non-motorized activities to reduce the noise levels that are associated with motorized activities.

The activity zone boundaries include three categories: (1) non-motorized, (2) motorized, and (3) not designated. Trails developed and designated in a non-motorized zone will only be for hiking, mountain biking, and equestrian riding. Opportunities exist for all non-motorized uses to occur on a single trail, however, there are special occasions where use is limited to a single activity. Motorized use in the “non-motorized zone” of the forest is to be confined to gravel roads only.

Trails designated in a motorized zone will focus on motorcycles, all-terrain vehicles (ATV) and four-wheel drive vehicles. Trails may be designated for all three activities or ATV and motorcycle only. Motorized use in the “motorized zone” of the forest is to be confined to gravel roads and officially designated, signed trails.

The Astoria Basin and isolated scattered parcels surrounded by private land have not been designated as motorized or non-motorized zones. Consideration of zoning will be done in the future, after issues concerning access and impacts to private landowners are resolved. Motorized use in areas not designated (unzoned) will be confined to gravel roads only.

For more information on specific recreation opportunities refer to the **Proposed Management Activities — Recreation section.**

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 figures 1 through 5 illustrate the current condition of the Clatsop State Forest. Charts have been created to show: Age Class, Structure, Site Index, Tree Species, and Volume per Acre. The stand structure abbreviations are given below.

These charts have been created from Stand Level Inventory (SLI) data. 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. The remaining 30% of the stands not inventoried have been imputed to a stand with similar inventory information. This is how we derive our best estimate of what the entire forest looks like. 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 1. District Age Class

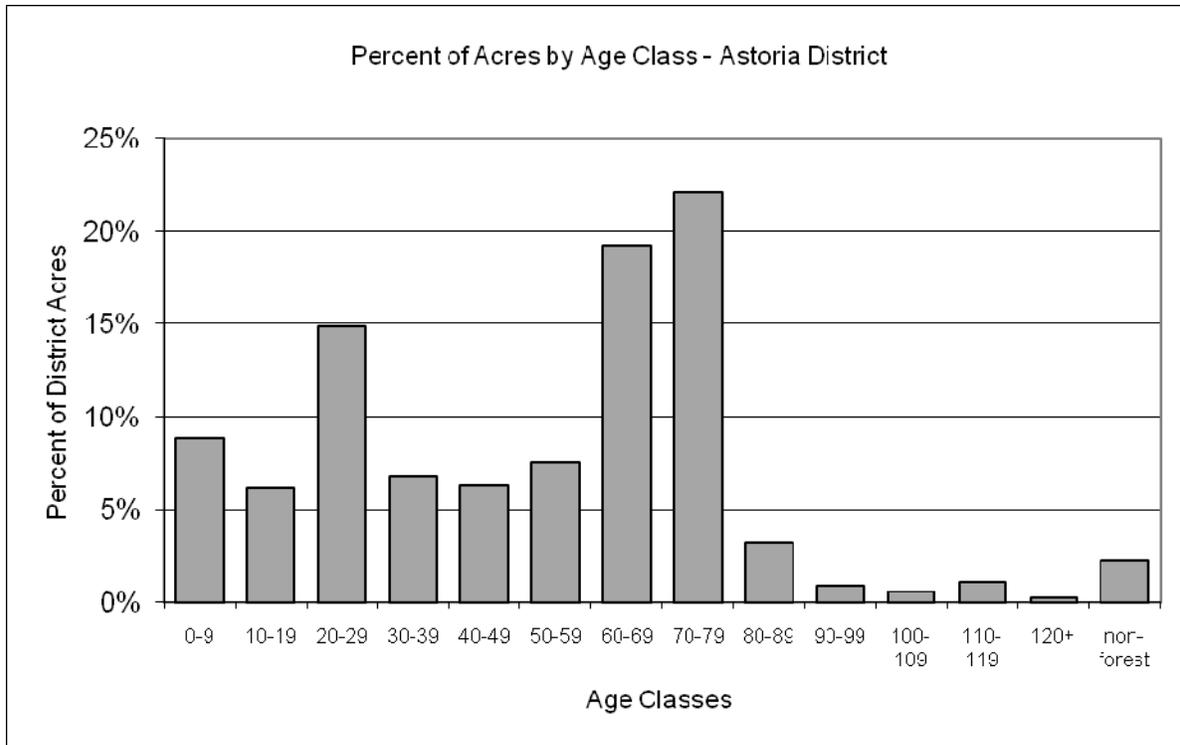
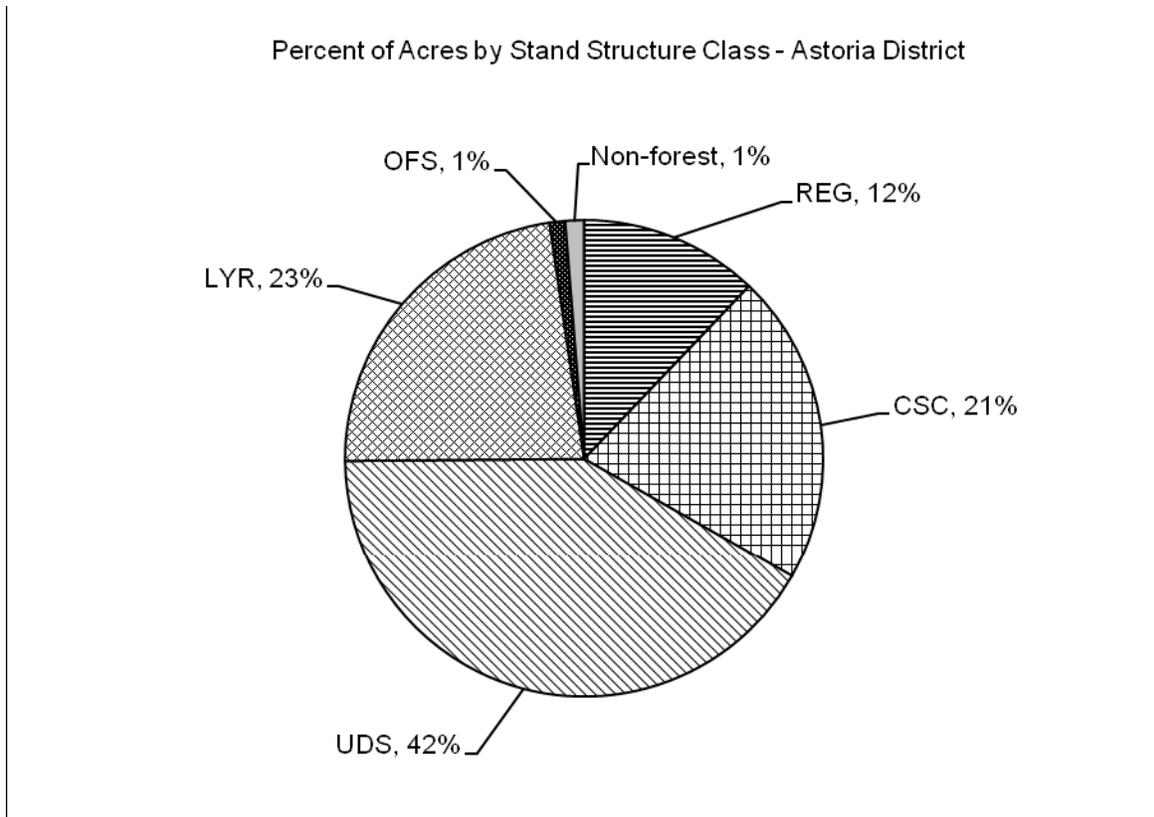


Figure 2. District Stand Structure



Abbreviations for Forest Stand Types

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

Figure 3. District Tree Species Groups

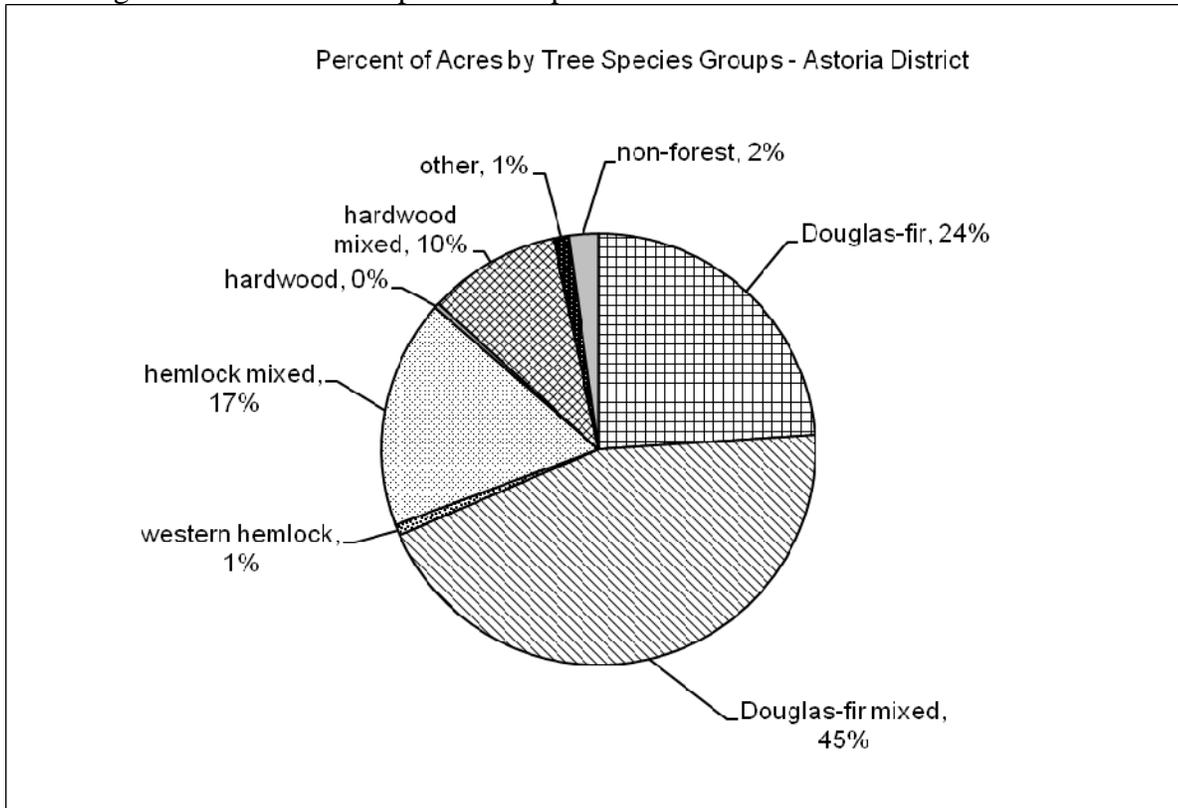
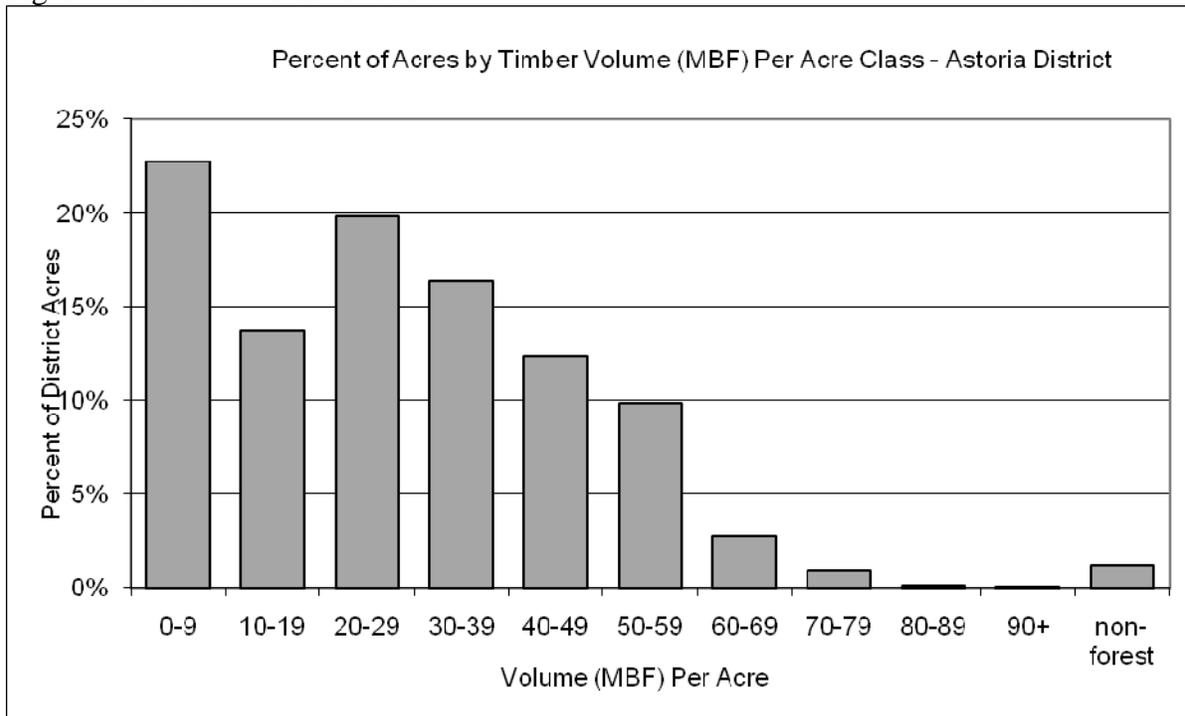


Figure 3. A single species stand is defined as one that has 80% or more (by basal area) of that species within the stand.

Figure 4. District Volume Per Acre Class



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 87 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 16,500 acres, or 12 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 28,700 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 57,300 acres or 42 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.

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.

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.

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 2 and illustrated in the current condition map, layered (LYR) and older forest structure (OFS), or complex structure, combine to comprise approximately 35,500 acres, or 24 percent, of the district.

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

The issues surrounding forest management are ecologically, socially, and economically complex. This complexity, along with our limited understanding of forest ecosystems and the unpredictable character of many natural events, contributes to uncertainty about the outcomes of forest resource management decisions. Changing social values and goals further increase uncertainty and contribute to controversy. Adaptive resource management is presented as the conceptual and operational framework to address these issues in the context of the *Northwest Oregon State Forests Management Plan*.

Adaptive management is an approach to resource management that explicitly acknowledges uncertainty about the outcomes of implementing management policies, and deals with this uncertainty by treating management activities as opportunities for learning how to improve management. Management activities are not just modified as a result of new information. Rather, they are deliberately designed to increase understanding about the system being managed.

Adaptive management is more than simply altering objectives and practices in response to new information. It is a formal, rigorous approach to management where activities are treated as opportunities for generating information about the system being managed. With traditional approaches to management, learning is haphazard, and improvements in management are slow and incremental, often because of inadequate or inappropriate monitoring and failure to incorporate results into future planning and decision-making.

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 important activities for successful stand establishment and maintenance. These are very site-specific prescriptions and may include herbicide treatments, manual release, slash burning, 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 be protected during stand establishment activities, because they 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, so that the growth of the individual trees increases. 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

Management activities in CSC stands during this IP will be variety of partial cut harvest and regeneration harvest. Management reasoning for both is described for both.

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. Partial cutting in near coastal locations require extra diligence while considering species mix, aspect, predominant wind direction, height to diameter ratio, and past history of young stand management. 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. 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. 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. These stands are great candidates for both partial cutting and regeneration harvest as they respond well to partial cutting to either promote LYR or to increase volume and can be of age, and size that is conducive to regeneration harvest. Approximately half of the partial cutting proposed in this IP will be conducted in UDS stands.

Partial Cut

UDS stands with a healthy conifer understory are generally the result of: partial cutting, lower site soils or a poorly stocked stand. 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

LYR stands currently within the landscape design will be left to grow during this IP. Some LYR stands outside of the landscape design will be either partial cut to quicken the pathway to OFS or regeneration harvested for reasons described below.

Partial Cut

Layered stands are characterized by having: trees 18 inches DBH or larger and the predominant overstory reaching 100 feet or more in height. Thirty percent of stand must be 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. 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. 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.

Older Forest Structure Stands

There are very few stands of older forest structure on the district. Currently, there are approximately 1,400 acres classified OFS. Regeneration harvest will not occur in any of these stands unless unforeseen circumstances transpire. 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 year starting in 2012. Refer to **Appendix A** for a detailed discussion of how these activities were calculated.

Table 6. Proposed Annual Silvicultural Activities Starting in Fiscal Year 2012

Activity	Estimated Annual Acres
Partial Cut ⁴	605 – 3,430 ¹
Regeneration Harvest ⁴	285 – 1,615 ^{2,3}
Reforestation	600 – 2,100
Precommercial Thinning	0 – 1,300

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. See Appendix A for additional information on the rationale and method applied to determine the proposed partial cut and regeneration harvesting ranges.

Reforestation acres are higher than regeneration harvest acres because some of the partial cut acres may be interplanted and the District may have a larger need to replant after catastrophic events such as windstorms. Additionally, timber sale contracts are for 2-3 years and completion of each fiscal years sales is generally staggered with some overlap of different fiscal year sales being completed at the same time. The reforestation foresters need to have the flexibility to be able to plant anything that is available for planting in any given year. They have two years after harvest to re-plant the parcel that has been cut.

The pre-commercial thinning 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.

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.

The Board of Forestry Performance Measure #5 directs that the Clatsop State Forest will: Reduce the miles of hydrologically connected roads to less-than 15 percent of the road network within the next ten years, and maintain or improve that level of reduction for the following ten years. Reduce the number of road crossings that are barriers to fish passage to less-than 2 percent within the next ten years, and maintain or improve that level of reduction for the subsequent ten years.

- a. Percent of State Forests roads that have hydrologic connection to stream networks
- b. Percent of State Forests stream crossings on fish streams with barriers to adult or juvenile migration

Actions taken to pursue the goals of PM #5 are addressed in **Aquatic Resources: Habitat Restoration**.

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 2011, by Road Activity and Miles

Road Activity	Miles
Road Construction, Rocked	13.0
Road Construction, Dirt	2.8
Road Improvement	29.2
Road Vacating	4.7

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 in order to protect:

- Public safety by applying the FPA Shallow, Rapidly Moving Landslides and Public Safety Rules (OAR 629-623-0000 through 0800); and
- Natural resources by applying Aquatic and Riparian Strategy 6: Slope Stability in the FMP.

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

Primary funding for forest recreation is dependent upon timber sale revenues. In recent years the Oregon Parks and Recreation Department has provided a transfer of funds to be used as primary funding for the District's ATV program (which includes funding for the District's motorized recreation staff, planning and trail construction). While current funding levels are low for the recreation program, this IP looks at opportunities beyond the immediate fiscal situation. This includes grants and partnerships with user groups. Based on a regional recreation assessment, ODF recognizes that the demand for forest recreation is generally increasing. In alignment with policies and available funds we will strive to contribute to meeting these increased demands.

The opportunities listed below are known projects that district staff would like to pursue. They are considered to be realistic opportunities that could be completed or addressed in the next ten years. They are described in two categories, motorized, and non-

motorized. Activities are not listed in any priority and as always new opportunities can be suggested through public comment, the State Forests Advisory Committee, and the Recreation Advisory Committee.

Recreation Management Objectives

Objective #1- Integrate recreation opportunities with active forest management. Key considerations include timber harvesting, transportation system management, fire protection, wildlife, and adjacent landowners.

Objective #2- Informing and educating district recreational users of the forest about recreation opportunities, safety, rules, and a general orientation to the forest.

Objective #3- Enforce statutes and rules governing recreation use of state land.

Objective #4- Develop and maintain recreational facilities in compliance with the Facilities Standards Manual.

Objective #5- Increase user group and volunteer participation.

For the near term of this Implementation Plan, the District will be following the State Forest Bulletin: “Near Term Direction for Recreation Management and Investment on State Forests”. This bulletin will serve as interim guidance and new ideas or opportunities during this Implementation Plan period will be evaluated based on goals in the FMP, Area Direction, State Forest Division policy and near term opportunities will be pursued as funding is available.

The Bulletin Directs:

The District will provide for recreation opportunities by following these investment strategies:

1. Align with District State Forests Fiscal Budgets and Annual Operation Plans.
2. Expansion of existing recreation programs, facilities, and trails systems must be cost neutral to the State Forests Forest Development Fund.
3. New recreation programs, facilities, trail systems or new types of recreation will be specifically authorized through the AOP or the exception process that involves approval from the Area Director and State Forest Division Chief.
4. Continue to work with volunteer groups.
5. Continue to develop partnership opportunities.

Motorized Recreation Opportunities

The following is an array of likely opportunities that will be considered or pursued during this implementation plan:

- Dispersed camping sites in conjunction with motorized trails near the Nicolai OHV Area.
- Construct, upgrade, or re-route OHV trails.
- Development of an OHV trails inventory and comprehensive trails plan.

- Designation of 4-wheel drive (Class IV) vehicle trails.
- Resolve or reconsider activity zoning in management basins as appropriate.
- Staging area and facility development at the Nicolai OHV Area.

Non-Motorized Recreation Opportunities

The following is an array of likely opportunities that will be considered or pursued during this implementation plan:

- Seasonal road closures to improve quality of hunting experience and escapement for animals.
- Coordinate with ODF&W to provide animal damage hunts where appropriate.
- Additional areas for ODF&W fish stocking on or adjacent to ODF recreation sites.
- Work with archers to develop future strategies for management of archery range.
- Designation of a mountain bike trail system.
- Water trail system along the Lower Nehalem River connecting Henry Rierson Spruce Run Campground with other state forests lands.
- Dispersed camping sites in conjunction with non-motorized trails near Soapstone Lake.
- Development of drift boat sites on the Nehalem River.
- Parking area expansion at Lost Lake Day-Use Area and construction of a vault toilet.
- Overnight camping sites adjacent to the Lost Lake Day-Use Area.
- Construct, upgrade, or re-route equestrian trail system.
- Designation of high use dispersed camp sites.
- Expand forest interpretation.

Managers will apply the following general approaches when developing facilities for recreation:

1. Campgrounds

- fees are charged for overnight use
- all have barrier-free vault toilets or privy, designated campsites, and ADA compliant trails where feasible
- drinking water is available from a centralized well with a hand pump where ground water and geology allow
- campsites are equipped with fire grates, picnic tables, tent pads, and site markers

2. Designated Dispersed Campsites

Designated dispersed campsites are typically areas of historic or high use located across the Clatsop State Forest. Campers are required to adhere to the Oregon Department of Forestry regulations regarding placement of campsites, campfires, sanitation, and stay limits. During the regulated use portion of fires season, outside of the fee campgrounds, campfires are only permitted in the “Designated Dispersed” campsites.

- designated by an ODF installed metal fire pit
- no fees charged for overnight use

3. Day-use Areas

Day-use areas are located to maximize a specific recreation opportunity unique to an area. They are physically separated from camping areas using available terrain and natural and placed barriers.

- generally include space for parking, information boards, and picnic tables
- vault toilets may be available at heavily used areas

4. Staging Areas

A staging area is a facility for accommodating a specific trail-oriented recreation activity. The area meets the minimum requirements of a campground but generally does not have drinking water. Fees may be charged for overnight use.

Off-highway Vehicle Staging Area:

- Parking area large enough for turn around space for OHV trailers
- Vault toilet facilities
- Campground area is designed for OHV use

Equestrian Staging Area:

- Parking area large enough for turn around space for stock trailers
- Vault toilet facilities
- Provide day-use access to equestrian trail
- Campground area is designed for equestrian use – pull through sites, corrals, and manure bins

Trailheads:

- A developed area, which includes a parking area, trail information, trash receptacles, and vault toilet facilities at heavily used sites.

Recreation Advisory Committee

The purpose of the Clatsop Recreation Advisory Committee (RAC) is to provide a forum for recreation users to have direct input into the development, review, and implementation of specific recreation policies, plans and projects for the Clatsop State Forest. The committee's input will help ensure that the recreation program benefits from a variety of creative ideas. It also allows different user groups to interact with each other in a setting that fosters better integration among competing recreational uses. It will also assist in establishing priorities that reflect both the needs of users, and the broad range of forest resource goals and strategies.

Aquatic Resources: Habitat Restoration

The NW Forest Management Plan (NW FMP) establishes an Aquatic and Riparian Strategy for habitat restoration projects on State Forests (FMP 2010). State Forest's commitment to habitat restoration is further supported in the Species of Concern Policy (ODF 2010) which lists habitat restoration projects as an aquatic strategy. The FMP and Species of Concern Policy establish several principles that provide the context and approach that State Forests will use for habitat restoration activities. The purpose of this document is to describe how these habitat restoration goals for the Astoria district and how restoration activities will be prioritized and reported for the Astoria District.

Habitat Restoration Approach

The overarching approach to habitat restoration is described in the NW FMP (page 4-67 through 4-68) and summarized below:

- Eliminate human-induced conditions on the forest that may contribute to aquatic habitat deficiencies, or that may limit the timely recovery of desired aquatic habitat conditions.
- Promote aquatic habitat conditions that will support the short-term survival needs of depressed salmonids, in order to reduce the potential for further declines in these populations.
- Attain properly functioning aquatic habitat conditions in a timely manner.
- Encourage forest conditions that will support the ecological processes necessary to naturally create and maintain complex aquatic habitats on a self-sustaining basis.

Landscape and site-specific strategies will improve levels of aquatic function in the short term to meet the immediate habitat needs of depressed species and place aquatic habitats on a trajectory toward desired conditions. At the same time actions are carried out to restore the ecological processes and functions that create and maintain self-sustaining habitats over the long term. Restoration strategies include completing assessments to identify limiting factors (FMP Strategy 3a) and identify, design, and implement projects to remedy identified problems (FMP Strategy 3b). Projects should mimic natural process, use multidisciplinary approach, and consider site-specific as well as watershed scale processes and disturbance regimes. Projects will be designed to re-establish natural physical and biological processes.

Limiting factors (FMP Strategy 3a above) have largely been identified in the ODFW conservation strategy, the 2005 State of Oregon Coastal Coho Assessment (OCCA) (State of Oregon 2005), and ODF watershed analyses. Therefore the task is to identify, design, and implement projects to address the limiting factors. This document is intended to address these elements of the restoration strategy for the Astoria District over the next 10 years.

District Goals

Contribute to Ecological Benefits through Stream Habitat and Water Quality Improvement

The Astoria District will implement restoration projects to improve aquatic habitat, riparian function, and water quality. The ecological value of potential projects will be evaluated using a “Restoration Screening Tool” described later in this document (under “Ecological Benefits”).

Several principles for evaluating ecological benefits are established in the Coho Conservation Plan (CCP). Examples that are consistent with State Forest policies and information base include (but are not limited to):

- Conservation investments that achieve desired status goal for coho ESU.
- Work that supports remediation of population-scale limiting factors identified for coho populations in the 2005 OCCA.
- Work that is based on watershed assessments and limiting factor analysis conducted by local watershed conservation entities (or others) at scales finer than the population-scale limiting factors in the 2005 OCCA.
- Work that supports restoration of ecological processes rather than providing a short-term substitution for ecological processes.

- Work that supports conservation of multiple native fish and wildlife species.
- Work that supports maintenance or enhancement of life-history diversity in coho and other native fish and wildlife species.
- Work that supports conservation of unique or rare functioning habitats and habitat diversity.
- Work that capitalizes on time-sensitive opportunities (e.g., willing landowners, time-association with land-use action, etc.).
- Work that is likely to produce a large increase in productive capacity of coho salmon.

In the Coastal and Lower Columbia coho and Steelhead ESUs: Projects will be implemented that contribute to measureable restoration goals established for coho in the CCP (Table 1) with a priority to work in streams/watersheds with high to moderate intrinsic potential for coho or steelhead.

Table 8. Goals for the amount of high quality habitat in each independent coho population in the Oregon Coast Coho Evolutionary Significant Unit for watersheds in the Astoria District. (Source: Oregon Coast Coho Conservation Plan Appendix 2 page 21)

Population	3% Marine Survival				High Quality Habitat Miles			
	Spawner Goal ¹	Adult Recruitment Goal ²	Observed Spawner ³	Estimated Observed Recruits ⁴	Total Needed ⁵	Current ⁶	Additional ⁷	Current % of Total Needed
Necanicum	3,545	4,171	628	739	50	9	41	18%
Nehalem	28,091	33,048	5,857	6,891	393	82	311	21%

- ¹ Spawner goal @ 1.1% marine survival (Table 2) divided by 0.03/0.011.
- ² Spawner goal @ 3% marine survival. 15% is maximum allowable harvest rate under Amendment 13 during periods of 3% marine survival.
- ³ The average number of spawner observed during years with a 3% marine survival rate from 1990 to 2003.
- ⁴ Observed spawners @3% marine survival.
- ⁵ The adult recruit goal divided by 0.03 (marine survival) to obtain an estimate of the number of smolts needed. The number of smolts needed was then divided by 2,800 (smolts/mile produced by HQ habitat -based on Nickelson 1998).
- ⁶ The observed recruits divided by 0.03 (marine survival) to obtain an estimate of the number of smolts needed. The number of smolts needed was then divided by 2,800 (smolts/mile produced by HQ habitat -based on Nickelson 1998).
- ⁷Total miles high quality habitat needed – current miles high quality habitat.

Number of Habitat Restoration Projects

Projects can be implemented *opportunistically* (when operating near streams that would benefit from restoration efforts) or with a larger *collaborative* approach both of which will be evaluated for ecological benefits. For the Astoria district the goals are to:

- Implement 2-5 collaborative projects over a 10-year period if resources and partners are available.
- Implement 2-3 opportunistic projects per year if resources and partners are available.
- Contribute to fish passage improvement and hydrologic disconnection. These are the two metrics for measuring improvement towards State Forests Performance Measure

5: Forest road risks to waters quality and fish habitat. The Performance Measure targets” are to:

- “Reduce the miles of hydrologically connected roads to less than 15% of the road network within the next 10 years, and maintain or improve that level of reduction for the following 10 years. Reduce the number road crossings that are barriers to fish passage to less than 2% within the next 10 years, and maintain or improve that level of reduction for the subsequent 10 years.”

Priorities

Within the parameters described above, the principles for prioritizing habitat restoration projects on the Astoria district are as follows:

- Prioritize projects for the best benefit to endangered species
- Prioritize projects that are most cost effective and efficient

The following project types are in order of priority assuming all else is equal. An exception to priorities may occur when projects can be implemented with high efficiency or if the “Restoration Screening Tool” suggests that for a given watershed there is a different order of priorities. For Astoria the overarching priorities are:

1. Fish Passage: This is considered the highest priority when passage project improves or provides access to (a) greater than ¼ mile of habitat and/or (b) high or moderate intrinsic potential for coho and/or (c) high priority restoration reaches for steelhead or Chinook.
2. Road Decommission or Hydrologic Disconnection: Hydrologic disconnection is important for all roads (i.e. including roads with connectivity to Type N or Type F streams) to reduce impacts on water quality. Decommission roads with the following characteristics:
 - a. Stream side roads: roads parallel and within 100 feet of Type F streams
 - b. Roads with several Type F stream crossings
 - c. Roads with significant stream crossing blow-out potential.

Road decommissioning around Type N streams will be a lower priority than instream habitat projects. For Astoria, most roads around small Type N streams are compliant with the Roads Manual and performance measures for roads.

3. Instream Habitat Projects (wood placement, boulders, etc.): The FMP states that a priority will be placed on projects that supplement natural “legacy” elements (large wood) that are lacking due to previous disturbance events, and/or management activities. An emphasis will be placed on projects that re-introduce large “key” pieces of wood to channels in natural configurations. Projects will maximize the functional attributes of large wood, and minimize potential conflicts with public safety in downstream reaches. A priority will be placed on streams with salmon or Steelhead habitat. Where data are available (Coast and Lower Columbia ESU), the highest priority will be to work in areas of “high intrinsic potential” for coho or Steelhead (CLAMS 2005 and 2008).
4. Alternative Plans to Manage Riparian Areas: These projects will promote the desired future condition for riparian areas (MFC or Complex Structure). Such

projects will not be carried out in areas with beaver presence unless plantings can be adequately protected against beaver damage.

5. Beaver: Beaver will be allowed to persist (i.e. not be trapped or moved out of streams) and beaver dams will not be destroyed (FPA OAR 629-660-0050).

Exceptions include:

- a. Beaver pose a risk to stream crossings that cannot be managed with alterations to the crossing design.
- b. Beaver pose a risk to plantation.

Under these exception conditions:

- a. A written plan will be submitted to the District Forester prior to removal.
- b. Relocation following ODFW relocation guidelines (ODFW 2010) will be considered.

Rationale for Priorities:

1. Fish Passage: No matter how good the habitat quality, if fish can't access it, there is little benefit. So a priority is placed on fish passage. Exception: if the projects do not access sufficient or important habitat, other habitat restoration projects may be a higher priority. Placing road work as a priority is consistent with the FMP principle to "eliminate human-induced conditions on the forest that may contribute to aquatic habitat deficiencies".
2. Road Decommissioning or Hydrologically Disconnecting Roads: Roads have the potential to chronically and episodically impact water quality and stream habitat more than any other forest activity. Therefore a priority is placed on decommissioning roads within the context of a district transportation plan. Hydrologic connectivity is a Performance Measure and disconnecting roads reduces potential for road-sediment to get in streams. Placing road work as a priority is consistent with the FMP principle to "eliminate human-induced conditions on the forest that may contribute to aquatic habitat deficiencies".
3. Instream Restoration: Nearly all streams throughout the Coast range have low levels of large wood. Large wood provides complex habitat for fish – a limiting factor identified in the coho habitat restoration plan (OCCP 2007).
4. Alternate Vegetation Plans are an important tool for shifting riparian conditions to a desirable trajectory that will provide large wood recruitment to streams and ultimately replace the need for stream enhancement projects. This is placed as a lower priority because of challenges with successfully achieving reforestation near streams. Typically problems include: creating enough light (large enough opening in the overstory canopy) for the seedlings while minimizing potential negative effects on stream temperature and wood recruitment, controlling weed and brush competition near streams where the usual control tools are more restricted, and overcoming elk and beaver damage. The Astoria District has some current examples of where the Alternative Vegetation Plans are being implemented. Outcomes from these projects will help guide future use of Alternative Vegetation Plans.
5. Beaver: Currently State Forests is taking a passive approach to beaver colonization. We are not actively reintroducing beaver but we will make every

attempt not to interfere with existing beaver and beaver activities. Beaver influence on streams provides key habitat conditions to support recovery of listed fish.

Ecological Benefits

Restoration Screening Tool

The ecological value of restoration projects can be weighed against several existing information sources. The information sources will be compiled in a “Restoration Screening Tool GIS Database” (under development by the Aquatic Specialist). The ODF Aquatic Specialist will review the screening tool when opportunistic (i.e. during the AOP process) or collaborative projects are being considered. This database compiles information from several sources including: Fish habitat distribution (ODFW 2010b); stream size and fish distribution (ODF GIS Data); stream gradient and width; Intrinsic Potential for coastal coho (CLAMS 2005) and coho and Steelhead in the Lower Columbia (CLAMS 2008); road crossings, road segments, and stream reaches identified as good opportunities for restoration in ODF Watershed Analyses (R2 Resource Consultants 2005 and Duck Creek 2008) and ODFW Aquatic Inventory Assessments (ODFW 2005, 2005b, 2006); and OCC measurable criteria for coho recovery. The Restoration Screening Tool may eventually be adapted to track beaver-related information and restoration accomplishments.

Opportunistic Projects: Projects Associated with Timber Sales

By their nature these are not identified in advance of annual operations plans. These projects may not necessarily follow priorities established above. This allowance is made because these projects are typically a highly efficient means to improve the quality of aquatic habitat because the operation includes harvest mechanisms or proximity to streams that facilitate efficient (high benefit to habitat: low cost) implementation. Guiding principles for implementation of habitat restoration projects associated with timber sales include but are not limited to one or more of the following:

- Good access to stream (e.g. either cable over stream or road/tractor ground near stream).
- Trees of sufficient size (meet ODFW diameter and length criteria) or with root wad attached are available in the harvest area.
- Operation is adjacent to a salmon or steelhead stream.
- Operation is adjacent to stream with an active channel width between 10 and 20 feet. Wider channels may work, but are more challenging because of the length of wood required (2 X channel width). Projects in narrower channels can work as well, but are considered a lower priority-especially if the stream is steep and only contains cutthroat trout.
- Personnel are available to administer implementation of the project.
- Address 1 or more of the habitat restoration priorities.

Collaborative Projects: Planned outside of Timber Sales

In addition to meeting ecological priorities, these projects will have substantial community support and collaboration. These projects will be filtered through the Restoration Screening Tool by the ODF Aquatic Specialist and weighed against the established priorities for the district. The Watershed Council Coordinator and/or local ODFW Habitat Biologist

typically will provide leadership in the design, grant requests, and implementation of these projects.

Measure of Accomplishment

The Aquatic Specialist will report progress towards habitat restoration goals using the following metrics:

- Number of projects
 - By type (e.g. barrier removal, hydrologic disconnection, decommission, wood placement, etc.)
- Miles of stream or roads treated or habitat made accessible
 - By type
 - By 5th Field HUC
- Number of miles treated within salmon or steelhead habitat
 - On Coast and Lower Columbia this can be reported as miles of High Intrinsic Potential (CLAMS 2005 and CLAMS 2008).
 - On the coast and for coho this can be reported in terms of miles per watershed with measurable goals established in the coho conservation plan (OCCP 2007).

Reporting System and Timeline

We will utilize Oregon Watershed Enhancement Board's (OWEB) existing habitat restoration reporting system.

- Annually (March): Projects will be reported to OWEB by [ODF/ODFW District Person].

The OWEB database will be queried by the ODF Aquatic Specialist to provide the following reports:

- Annually (August): Summary of annual accomplishments by district by project type for Division purposes.
- Biennially (August-or PM reporting time frame): Maps and narrative of accomplishments to date by watershed
- Annually (August) Establish an annual summary of accomplishments by district by watershed for the county report

Cultural Resources

A 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. No sites are proposed at this time.

Lands and Access

In January of 2009, the State Forester 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 Asset Management Plan (AMP); 5) Work cooperatively with Oregon Department of State Lands (DSL) 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, vinemapple, 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. On average the district issues 1,500 Special Forest Products permits a year. The majority (1,400) are firewood cutting permits.

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 9) 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 Biodiversity Information Center (OBIC) 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 OBIC so that the database is kept updated.

Table 9. Astoria District Endangered, Threatened or Candidate Plant Species

Genus	Species	Common name ¹	Status	Record exists ²	Potential to be present
Threatened and Endangered Plants					
<i>Erythronium</i>	<i>elegans</i>	Coast Range fawn-lily	ST		✓
Plants of Special Concern					
<i>Castilleja</i>	<i>chambersii</i>	Chamber's paintbrush	SP	✓	
<i>Dodecatheon</i>	<i>austrofrigidum</i>	Frigid shootingstar	SP	✓	
Candidate Plants					
<i>Cardamine</i>	<i>pattersonii</i>	Saddle Mt. bittercress	SC	✓	
<i>Delphinium</i>	<i>oreganum</i>	Willamette Valley larkspur	SC		✓
<i>Filipendula</i>	<i>occidentalis</i>	Queen-of-the-forest	SC	✓	
<i>Saxifraga</i>	<i>hitchcockiana</i>	Saddle Mt. saxifrage	SC	✓	
<i>Sidalcea</i>	<i>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 (FMP 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.

Invasive Weed Management

Recent draft Policy and Procedures prepared for the State Forest Division articulates how active Invasive Weed Management should be pursued. This section of the IP serves as the District Invasive Weed Management plan that will be used to guide the management of invasive weeds on Oregon Department of Forestry managed lands. This plan is dynamic document and it may be incomplete or lacking information; however it can be updated through the Annual Operations Planning process as 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.

District weed control measures currently conducted on state forests are:

- Road side spraying
- Herbicide spraying for some species in plantations

- Large equipment washing prior to entry onto state forest lands

Additionally, the district is a member of the *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.

Table 10 lists common invasive species and their known occurrence on the district.

Table 10. Common Invasive Species and their Status on District

Species	Current status	Objective
Garlic Mustard	None known	Prevent
False Brome	None known	Monitor
English Ivy	Isolated patches	Eradication
Gorse	Not present	Prevent
Himalayan Blackberry	All basins & spreading	Control
Yellow flag iris	None known	Prevent
Knotweed - various species	Nehalem Basin	Control
Scotch Broom	All basins- concentrations in Astoria Basin	Contain
Canada Thistle	None known	Prevent
Tansy ragwort	All basins	Monitor
Poison-hemlock	None known	Prevent
Common teasel	None known	Prevent
Herb Robert	None know	Control
English Holly	None known	Prevent
Reed canary grass	Isolated patches	Monitor
Traveler's Joy	None known	Monitor
Curly dock	None known	Prevent
St. Johnswort	None known	Prevent
Purple Loosestrife	None known	Prevent
Spartina Grass	None known	Prevent

Specific conditions and strategies for state forests are:

- ENGLISH IVY- is endemic to the urban area of the County. Uncontrolled growth is beginning to affect trees that are slowly being overgrown.
- HIMALAYAN BLACKBERRY- Occurs throughout the forest, possibly the most invasive non-native variety of blackberry in the Pacific Northwest. Very difficult to control once established.
- 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.
- SCOTCH BROOM- Scotch Broom is prevalent throughout the County. On state forest lands, it is the species that is most prevalent and we have been able to take actions towards eradicating and/or controlling it. If Scotch Broom is adjacent to roads, then it will be sprayed in conjunction with our normal road side spraying project. In cases where it has spread heavily throughout plantations, then aerial applied herbicides are used to target the weed allowing the conifer to grow without the invasive species competition. Particularly high concentrations exist in the Clatsop Plains Area. Some control work has been undertaken to contain.
- TANSY RAGWORT- Tansy Ragwort is 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. The district has done some roadside spraying that has been effective at controlling the tansy along road sides. Additionally, when it grows in conjunction with Scotch Broom in conifer plantations aerial spraying of herbicides can be effective at controlling both species.
- REED CANARY GRASS- Common throughout the Pacific Northwest primarily in wetlands, roadside ditches and river flood plains. Some isolated patches of this invasive species exist on state forests. These patches are being monitored.

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.

In 2009, 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.

Direction for this IP, was to design a complex landscape that would encompass 30 percent of the District. It was agreed with the same collaborators, that the first 20 percent of the previous 40 would remain the same and the second 20 percent would have 10 percent of stands removed. This would result in a 30 percent landscape design.

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 (See Species of Concern policy)
- 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)

20-30% 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 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 habitat 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 (136,846 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)	15–25%
Closed Single Canopy (CSC)	5–15%
Understory (UDS)	30–40%
Layered (LYR)	15–25%
Older Forest Structure (OFS)	15–25%

Table 11 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 11.

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 (23% of the District) will achieve an OFS condition in 20 years. Achievement of attaining 30% complex structure on the District is anticipated to take between 60-80 years.

Table 11. 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	41	22	17	80	13	13	0	0
Beneke	9,757	0	12	18	46	74	24	21	0	5
Buster	18,834	0	11	20	36	57	33	10	0	33
Crawford	4,279	0	0	23	40	71	26	4	11	25
Davis	7,031	3	8	31	36	81	22	5	0	11
Fishhawk	5,087	0	7	15	41	52	37	15	0	33
Gnat	9,990	2	18	25	45	69	8	17	2	12
Hamilton	6,880	0	11	30	25	70	33	7	1	23
Klaskanine	6,271	0	23	23	35	83	19	14	0	3
Lousignot	4,551	0	24	23	42	82	10	15	1	3
N. Fork Nehalem	8,276	0	13	39	31	78	17	6	0	16
Northrup	7,192	1	8	13	61	72	17	12	0	15
Plympton	10,447	1	8	19	47	53	25	38	0	8
Quartz	8,582	0	12	9	56	57	23	33	0	10
Sager	10,421	0	2	19	64	81	13	15	2	4
Scattered	3,658	14	28	30	7	83	20	0	1	3
Sweet Home	11,351	0	8	11	42	66	34	12	5	22
District Total	136,877⁵	1	12	21	42	69	23	15	1	15

¹ The Current Condition was determined using the latest Stand Level Inventory imputed 6/30/2010.

² The anticipated time expected to achieve the desired future condition for complex structure within the mapped landscape design is 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 (examples 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 31 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. Thirteen percent of the basin is planned to become layered, seven percent is NSC/Non-Forest, and the remaining eighty 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.

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

Key Resource Considerations for the Beneke Basin

- 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

One Marbled Murrelet Management Area exists in the Beneke Basin and has been included within the complex condition landscape design. Twenty-one percent of the basin is planned to become LYR and five percent is planned to become OFS. The remaining seventy-four percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Beneke Basin has a variety of management options. Clearcut and Partial Cut opportunities exist in the seventy-four 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 higher 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. Portions of two Salmon Anchor Habitat (SAH) areas, Buster Creek and Upper Rock Creek, are located within the basin. A Terrestrial Anchor Site also exists in this 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

- Terrestrial Anchor Site (TAS)
- 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. This SAH will transition into an Aquatic Anchor site in Fiscal Year 2013.
- About 8% (1,478 acres) of this basin is within the Upper Rock Creek Salmon Anchor Habitat (SAH) area. This SAH will transition into an Aquatic Anchor site in Fiscal Year 2013.
- 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 a Terrestrial Anchor Site with overlapping portions of the Strum Creek and Buster Quarry NSO Home Range’s and the Buster Creek Salmon Anchor Habitat Area (SAH). Forty-three percent of the basin is planned to become complex, while the remaining fifty-seven percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

Over sixty percent of this basin is currently in the UDS or LYR condition. This will lend well to both clearcutting and partial cutting operations. Within the TAS, partial cuts will be the standard management prescription, specifically to move the stand towards a complex

condition, however, small modified clearcuts that mimic natural disturbance are allowed. Management within the TAS will be planned with the assistance of the area biologist. This basin is a medium priority for transportation planning and/or investments in the infrastructure. Road construction and improvement will be at a rate higher than 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.

There are abundant scenic opportunities in this basin with large, older trees, old railroad trestles, and plentiful wildlife such as deer and elk. Additionally, the Crawford-Squaw Ridge Loop is a highly used route for hunting and scenic day driving.

Key Resource Considerations for the Crawford Basin

- 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

Over sixty percent of this basin is in the UDS or LYR condition. Eleven percent is currently OFS. Twenty-nine percent of the basin is targeted for a future complex condition. The remaining seventy one percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

As opportunities arise, partial cut operations will be conducted in stands that need a first entry thinning and in stands that are designated for a future complex condition. The remaining portions of the basin will have more opportunity for clearcuts as the age and condition of the stands will lend well to this type of management. This basin is a medium priority for transportation planning and/or investments in the infrastructure. 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 sixteen percent of the basin is planned to become complex, three percent is non-operable, and the remaining eighty-one 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 and stands that would respond well to a first entry thinning. There are both partial cut and clearcut opportunities within the eighty-one 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 infrastructure. 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.
- Terrestrial Anchor Site. (TAS)
- 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. This SAH area will expire in fiscal year 2013.
- *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. Additionally, a Terrestrial Anchor Site overlaps a portion of this basin. Due to these terrestrial and aquatic sites, forty-eight percent of the basin will be managed to attain a complex future condition. The remaining fifty-two 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. Any operations within the TAS will more than likely be partial cuts that will promote a complex condition; small modified clearcuts will only be done if necessary and must mimic a natural disturbance. Management within the TAS will be planned with the assistance of the area biologist. 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-nine 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 sixty-nine 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 sixty-nine 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.

The West Tidewater Marbled Murrelet Management Area is within this basin and is included in the landscape design for future complex stands.

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

- 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 a Marbled Murrelet Management Area. Thirty percent of the basin will be managed to attain a complex future condition. The remaining seventy 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. Seventeen percent of the basin will be managed to attain a complex future condition. Eighty-three 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 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. This SAH area will expire in 2013.
- *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. Eighteen percent of the basin will be managed to attain

a complex future condition. The remaining eighty-two percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

The Louisnot 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. This SAH will transition into an Aquatic Anchor site in fiscal year 2013.
- 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-two percent of the basin will be managed

to attain a complex future condition. The remaining seventy-eight 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. In fiscal year 2013 the Northrup Creek Aquatic Anchor will replace the Fishhawk Lake Creek SAH and encompass 7,208 acres of this basin.
- 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-seven percent of the basin will be managed to attain a complex future condition; one percent is NSO/Non-Forest; and the remaining seventy-two 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.

Designated OHV trails exist throughout the basin, lending to the only motorized designations in the District. Dispersed camping, hunting, and fishing are also common activities.

Key Resource Considerations for the Plympton Basin

- Bald eagle nest site.
- Northern Spotted Owl site.
- Community water system
- Terrestrial Anchor Site (TAS).
- 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. This SAH will expire in fiscal year 2013.
- 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.
- 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 Ridge NSO Circle and a Terrestrial Anchor Site provide additional species of concern protections in this basin. There is also a slight overlap of the Fishhawk Salmon Anchor Habitat Site in the basin. Forty-six percent of the basin will be managed to attain a complex future condition; one percent is NSC/Non-Forest; and the remaining fifty-three 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. Within the TAS, partial cuts will be the standard management prescription, specifically to move the stand towards a complex condition, however, small modified clearcuts that mimic natural disturbance are allowed. Management within the TAS will be planned with the assistance of the area biologist. 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. This SAH will transition into an Aquatic Anchor site in fiscal year 2013.
- 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-three percent of the basin will be managed to attain a complex future condition; and the remaining fifty-seven 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.

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.
- *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. This SAH will transition into a Aquatic Anchor site in fiscal year 2013.
- 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

A portion of one NSO Home Range is located within this basin. Nineteen percent of the basin will be managed to attain a complex future condition; and the remaining eighty-one 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

- Level 1 scenic resources (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. This SAH will transition into an Aquatic Anchor site in fiscal year 2013.
- 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, three percent of the basin will be managed to attain a complex future condition; fourteen percent is NSC/Non-Forest; and the remaining eighty-three 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 Terrestrial Anchor Site, 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

- Marbled Murrelet management area.
- Terrestrial Anchor Site. (TAS)
- 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. This SAH will transition into an Aquatic Anchor in fiscal year 2013.
- 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

Approximately half of the basin is within the Upper North Fork Nehalem River SAH and twenty percent of the basin is also within a Terrestrial Anchor Site. Thus, thirty-four percent of the basin will be managed to attain a complex future condition; and the remaining sixty-six percent of the basin will be managed for a variety of resource objectives.

Management Opportunities

Partial Cut and Clearcut opportunities will both exist outside of the stands designated for complex structure. Within the TAS, partial cuts will be the standard management prescription, specifically to move the stand towards a complex condition, however, small modified clearcuts that mimic natural disturbance are allowed. Management within the TAS

will be planned with the assistance of the area biologist. This basin is a medium priority for transportation planning and/or investments in the infra-structure. 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 12. Anticipated Stand Structure Development by 2021⁵

	REG	CSC ²	UDS ³	LYR ⁴	OFS
Current Condition	12	21	42	23	1
After Implementation Plan Period¹	18	15	39	25	2
Desired Future Condition⁵	←	69	→	15	15

1. These are estimates based on an average of approximately 1,250 acres of CC/year & approximately 1,450 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 10 to 20 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 13 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 73 MMBF is the average 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.

Figure 1 illustrates how the completion of the AHO over the next 10 years will affect the total standing volume of the forest. Model results charted in Figure 1 show the inventory (standing volume) of the forest increases over the next 10 years. This increase occurs in conjunction with the achievement of the AHO.

The AHOs will be implemented through the district’s Annual Operations Plan, with the volume in the Annual Operations Plans averaging the AHO over the life of this Implementation Plan. Under normal circumstances, the volume proposed in an Annual Operations Plan will be near the AHO target. However, unforeseen events due to dynamic ecosystem processes may result in an Annual Operations Plan volume that is farther from the AHO target. These ecosystem processes may consist of a catastrophic windstorm or fire that would lead to emergency salvage operations and a harvest level above of the AHO. Additionally, an extreme down turn in market conditions could affect the marketing of timber sales, making it a challenge to achieve the AHO volume. The Annual Operations Plan will describe any deviations from the AHO target.

The acres of regeneration harvesting and partial cutting proposed in each Annual Operations Plan will normally be within the ranges identified in Table 13, 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 a 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:

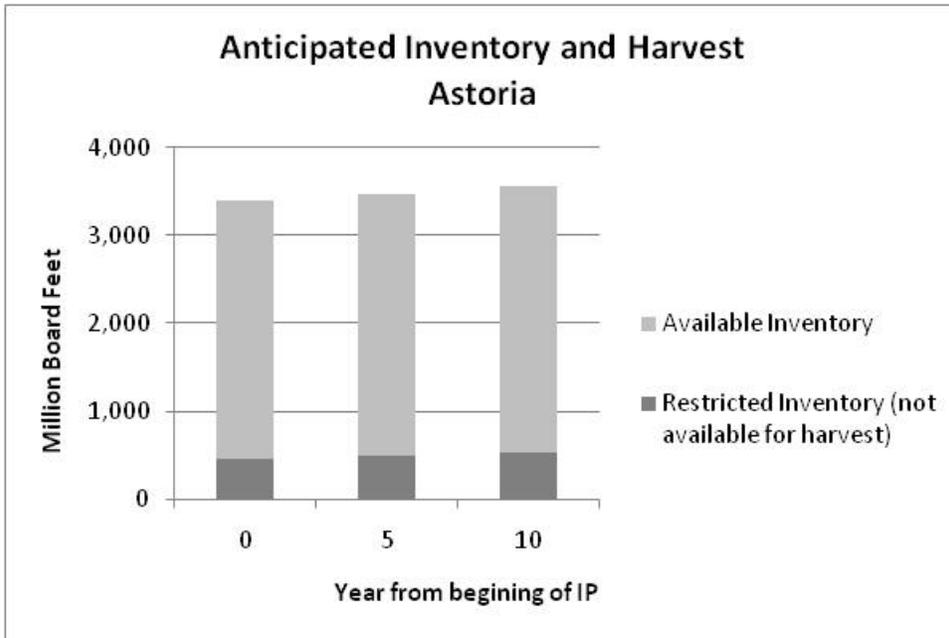
“Revisions that propose changes to the annual harvest level ranges of more than 25% (based on combined acreage of regeneration and partial harvest).”

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 the Annual Operations Plan.

Table 13. Annual Harvest Objective, Volume and Acres

Volume (MMBF)	Clearcut (Regeneration Harvest) Acres	Partial Cut Harvest Acres
73	285 - 1,615	605 - 3,430

Figure1. Astoria District Timber Inventory Over Time.



The (inventory) volumes in this chart are based on the outputs of the harvest model used to inform this implementation plan. These figures are estimates intended to demonstrate the volume trend under this implementation plan rather than absolute values.

Restricted Inventory are those areas that not available for harvest and includes Inner Riparian Zone, designated NSO areas (40 percent of the provincial circle), Marbled Murrelet Management Areas, Administrative Sites, high landslide hazard locations that are a risk to public safety, and some other non-harvestable sites.

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 Species of Concern Strategies, 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 average 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 2012 to 2021
- Table 13. 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 volume increase in this model run as compared to the ten year AOP average. The most obvious difference for this increase is policy shift from pursuing a Habitat Conservation Plan to a new Species of Concern Strategy. This shift made available approximately an additional 18,000 acres for harvest. 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 close to the high end of the IP range for the first two periods.

Table 1. Harvest Outputs

	Model Outputs ¹	AOP Average 2002 through 2011	Implementation Plan ²
Volume (MMBF)	73	67.5	73
Regeneration Harvest Acres	1,236	1,077	285 - 1,615
Partial Cut Harvest Acres	1,427	1,947	605 – 3,430
Total Acres	2,663	3,024	2,220 – 3,715

1. Average annual harvest level based on the average outputs from the first two periods of the IP Revision Harvest Model (H&H).

2. Annual harvest levels from the implementation plan, June 2011. The ranges were calculated allowing the maximum split in harvest to be 85% in one type and 15% of the other.

Based on analysis of actual harvest volumes, partial cut harvest volume of 18.1 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 38.4 MBF/Acre.

Table 2. Average Harvest Volume per Acre

	Model ¹	Actual ²
Regeneration Harvest	38.4	35.2
Partial Cut Harvest	18.1	17.2

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.

Implementation

At 73 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: Noteworthy is the fact that for the first fifteen period's volume only fluctuates slightly between 73 and 75 MMBF and the first ten periods it fluctuates even less, between 73.1 and 73.9.
- Acres: The mid-point of the AHO partial cut acres is 1,925 which is not achieved until the fourth model period. As discussed above, the model outputs of volume/acre for partial cutting is 18.1 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).

Appendix B

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Appendix C

Board of Forestry Performance Measures

Board Intent Statement as adopted November 2007: The timeframe for these performance measures and targets is specific to the next two decades; however management approaches utilized by the department to achieve these targets will establish goals for long-term sustainability of the social, environmental, economic values being provided, consistent with OAR 629-035-0020. The Board shall review the progress made towards these targets every two years through the biennial review of the State Forest performance measures. The reviews of the measures will provide the Board the opportunity to adjust the performance measures, targets, and/or the Department the opportunity to adjust management practices, as warranted, based on the most current information available at the time. Further refinement of the entire set of performance measures and associated targets is anticipated to occur periodically into the future.

#1 Net return on return on asset value (ROAV) on Board of Forestry Lands and Common School Fund land calculated across all state forestlands.

Tillamook and Clatsop State Forests Target: Achieve a ROAV (5-year average) consistent with the achievement of the target established for Performance Measure 3 (financial contributions to government services).

- a. Annual calculation expressed as a percentage (net returns/asset value) compared against a specific target range, and compared over time to a 5- and 10-year average

#2 Direct and indirect financial contributions from the State Forests Division to support communities.

Tillamook and Clatsop State Forests Target: Maintain or improve this measure, consistent with other performance measures targets. At the next performance measure review, present the most recent results and/or progress on the ecosystem services/non-market valuation

- a. Total timber volume harvested (Net MBF) versus a five- or 10-year average
- b. Annual log flow from state forestlands to rural areas (Net MBF) versus a five- and 10-year average.
- c. Average compensation for total number of jobs in mills of rural communities.
- d. Number of direct, indirect, or induced forest industry jobs, and the total and average compensation for those jobs.

#3 Direct & indirect State Forests Division financial contributions to local and state government

Tillamook and Clatsop State Forests Target: Increase the annual revenues (five-year average), adjusted for inflation, produced by Board of Forestry lands by 5 to 15 percent within the next ten years, and meet or exceed that level for the subsequent ten years.

- a. Annual distributions to Trust Land counties and Common School Fund, and compared over time to five- and 10-year average.
- b. Indirect contributions to state and local governments by operators and mills through business income tax, harvest tax, weight-mile.

#4 State forest area affected by or at risk of invasive species, pests, disease and fire

Tillamook and Clatsop State Forests Target: Maintain or improve these three measures, consistent with other performance measures targets. At the next performance measure review, evaluate the most current information relative to these measures and whether or not more specific targets should be considered.

- a. Forest area affected by pests and disease

#5 Forest road risks to water quality and fish habitat

Tillamook and Clatsop State Forests Target: Reduce the miles of hydrologically connected roads to less-than 15 percent of the road network within the next ten years, and maintain or improve that level of reduction for the following ten years. Reduce the number of road crossings that are barriers to fish passage to less-than 2 percent within the next ten years, and maintain or improve that level of reduction for the subsequent ten years.

- a. Percent of State Forests roads that have hydrologic connection to stream networks
- b. Percent of State Forests stream crossings on fish streams with barriers to adult or juvenile migration

#6 Quantity of habitat by forest management plan stand-structure type, habitat components, and the use of those areas by native fish and wildlife.

Tillamook and Clatsop State Forests Target: Increase the percent of the landscape in complex structure to at least 17 to 20 percent over the next two decades, with at least half of the increase occurring within the first ten years. Grow and maintain levels of the other forest types needed to achieve this target. Within the percent of the landscape providing complex structure, achieve the following:

Develop and maintain complex structure in those areas where it is anticipated to result in the greatest benefits to both aquatic and terrestrial species of concern.

- a. Live tree and snag retention and downed wood in harvest units
- b. Stand structure percent
- c. Acres of State Forests by forest management plan structure type
- d. Landscape averages of the number of snags and amount of downed wood

#7 Availability, quality and public use of recreational opportunities and educational programs

Tillamook and Clatsop State Forests Target: Maintain current recreational benefits consistent with existing and anticipated future resources. At the next performance measure review evaluate whether or not more specific targets should be considered.

- a. Number of facilities and trails developed and maintained for interpretation, education, and recreation
- b. Annual visitation to the Tillamook Forest Center compared to five- and 10-year averages
- c. Annual participation in formal educational programs compared to five- and 10-year averages
- d. Annual user days for the various types of recreational use on State Forests

#8 Degree of public and stakeholder involvement in state forestland activities and processes

Tillamook and Clatsop State Forests Target: Maintain or improve these three measures, consistent with other performance measures targets. At the next performance measure review, evaluate the most current information relative to these measures and whether or not more specific targets should be considered.

- a. Hours committed by volunteers, community participants and partners, as well as report on progress on specific volunteer projects
- b. Annual surveys: Forest Trust Land Advisory Committee, State Forests Advisory Committee

#9 Customer awareness and support of the management of state lands

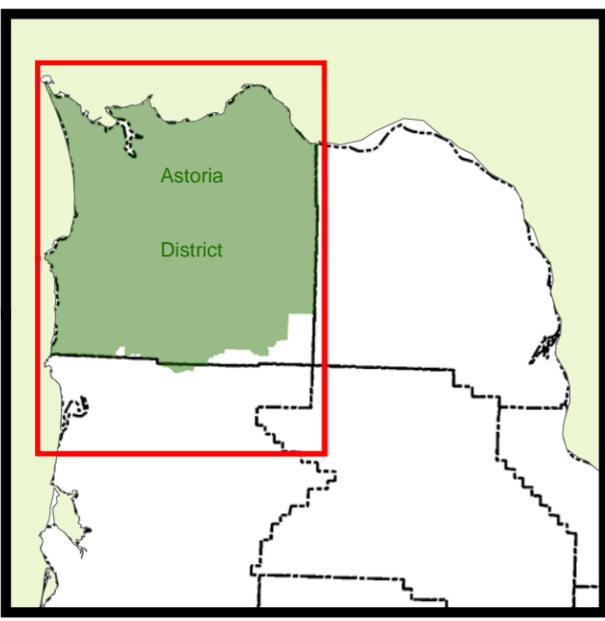
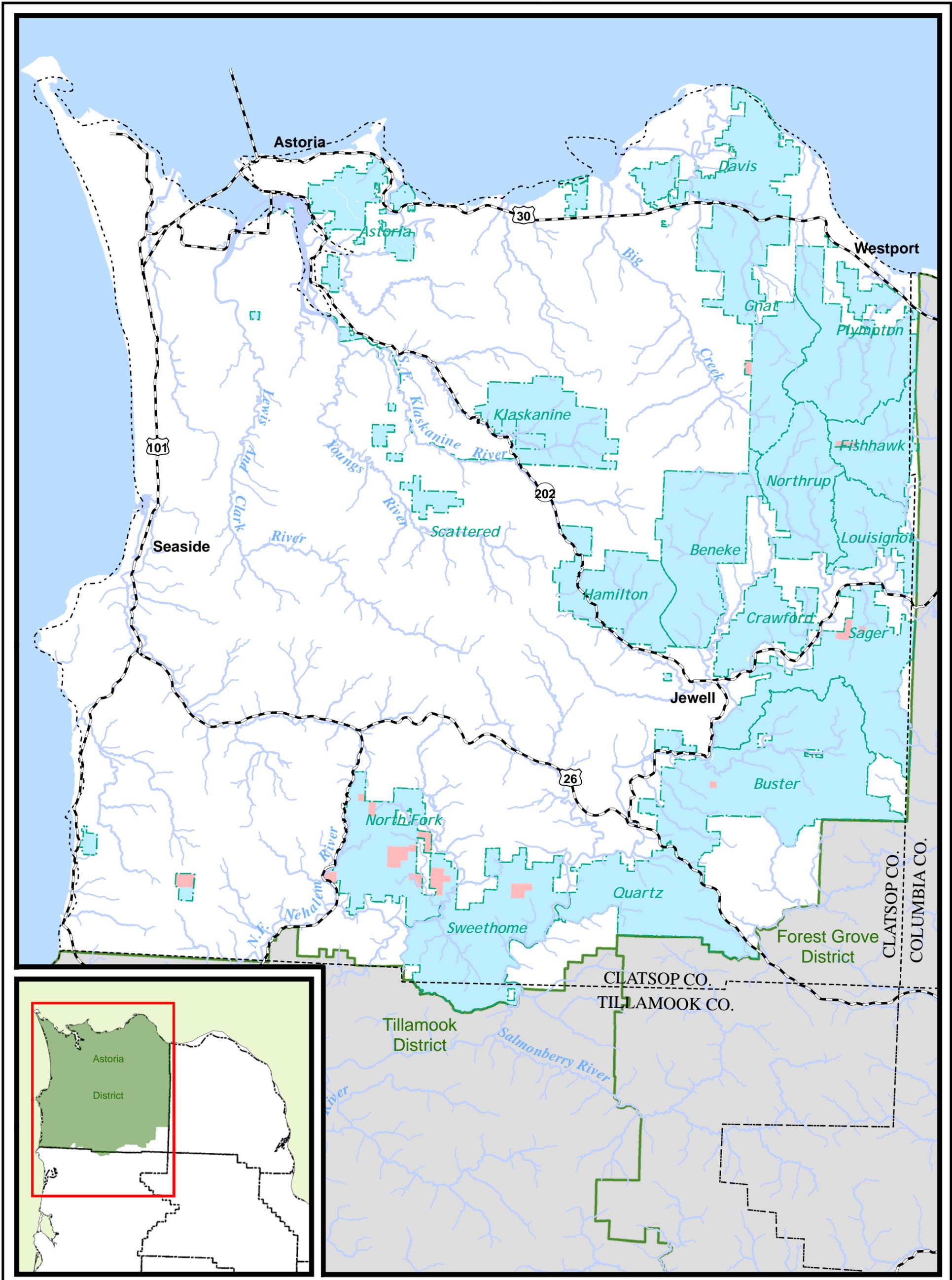
Tillamook and Clatsop State Forests Target: Maintain or improve this measure, consistent with other performance measures targets. At the next performance measure review, evaluate the most current information relative to these measures and whether or not more specific targets should be considered.

- a. Oregonian's responses to biennial survey questions

Map Section

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

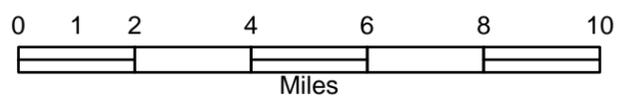
Astoria District Ownership



Ownership

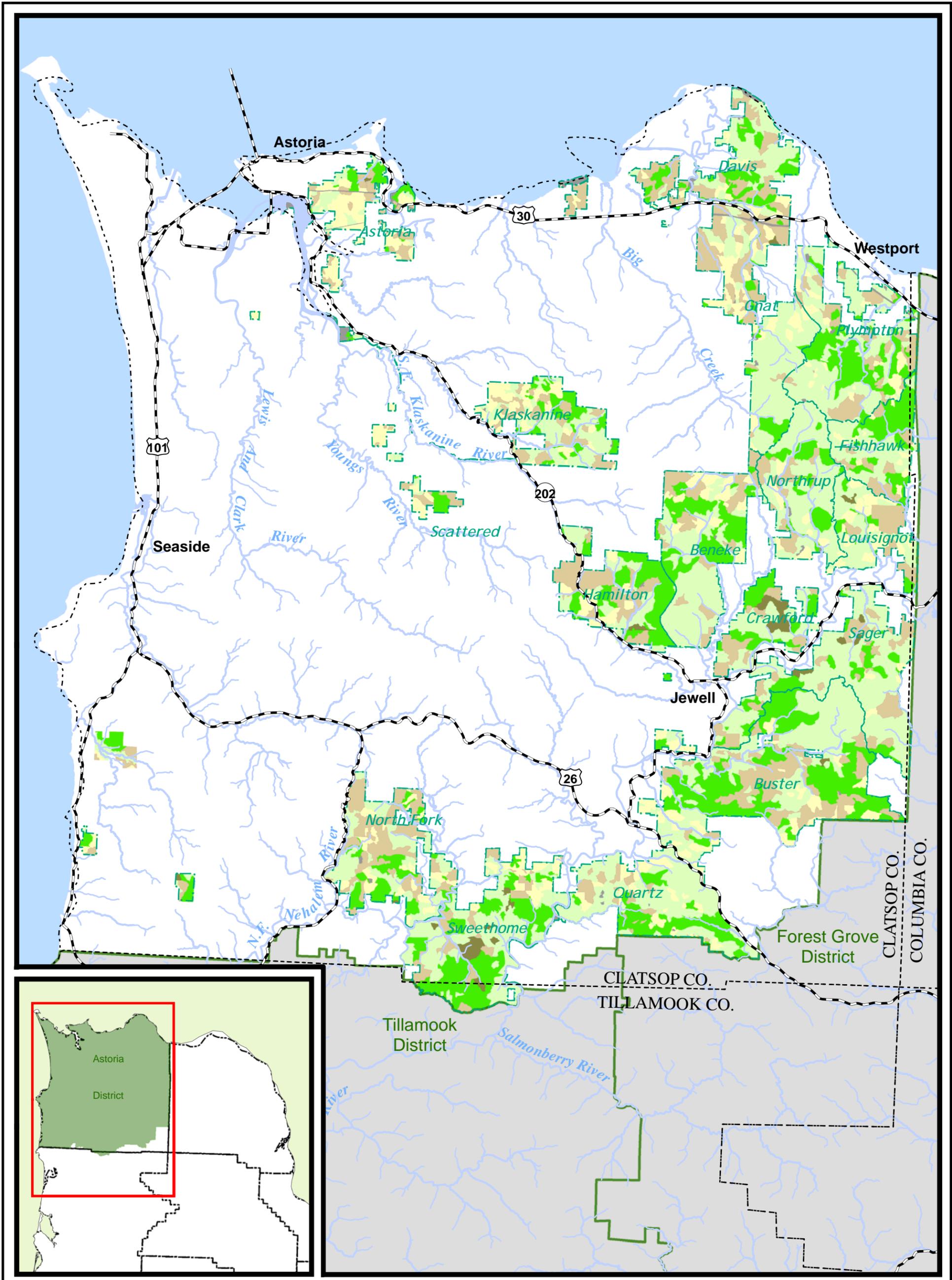
- Board of Forestry Lands
- Common School Lands

- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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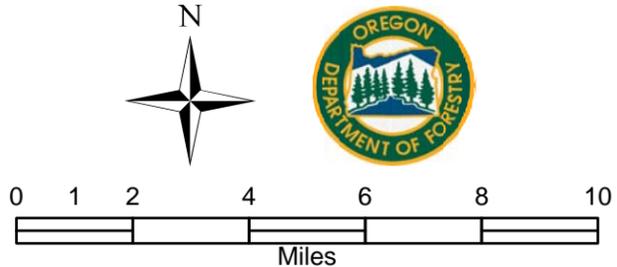
Astoria District Current Condition



Stand Structure Type (6/30/2010)

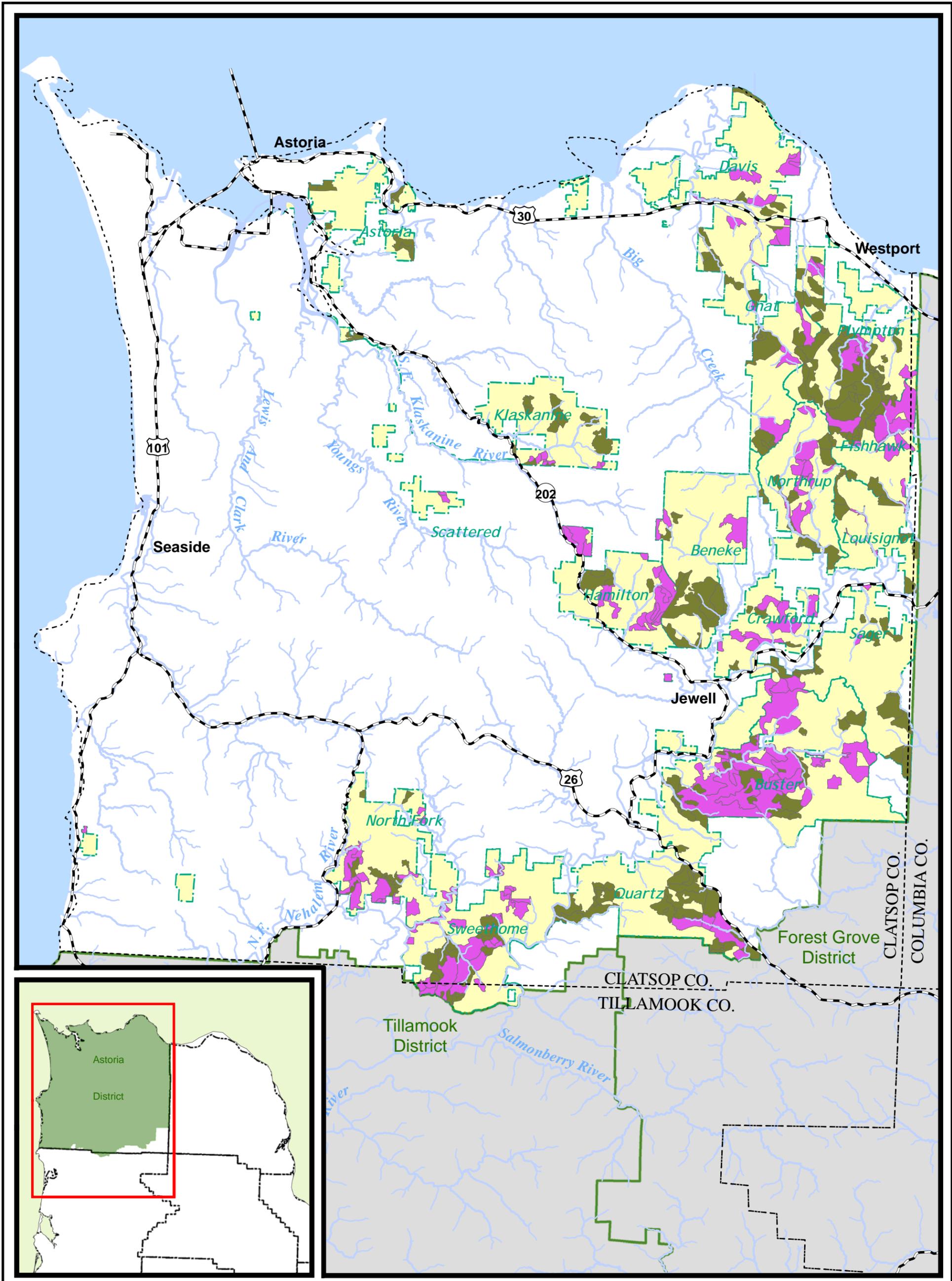
- Non-Silviculturally Capable
- Regeneration
- Closed Single Canopy
- Understory
- Layered
- Older Forest Structure

- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



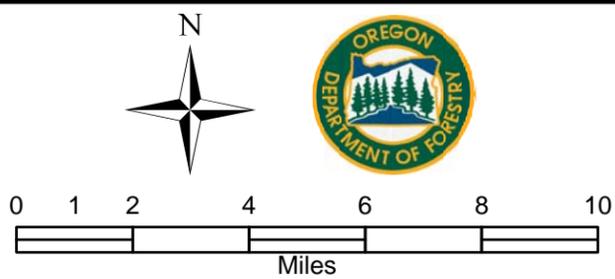
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Astoria District Desired Future Condition



Desired Future Condition
■ Layered
■ Older Forest Structure

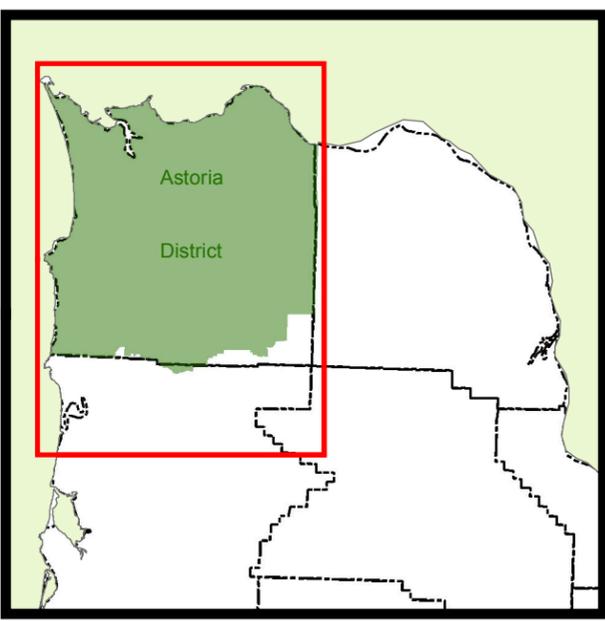
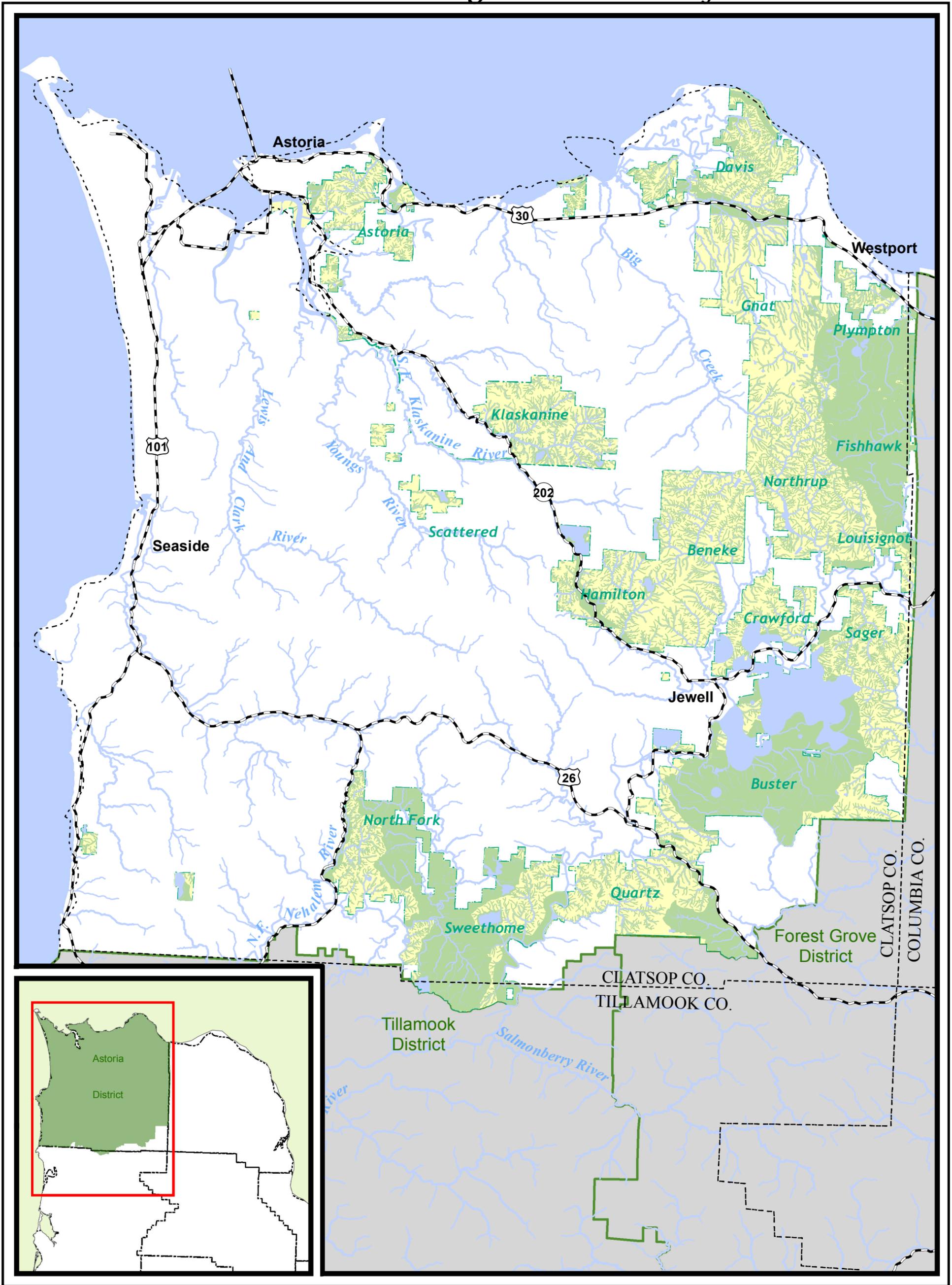
- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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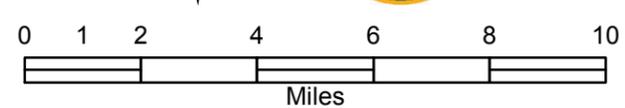
Astoria District

Forest Land Management Classification



Legend

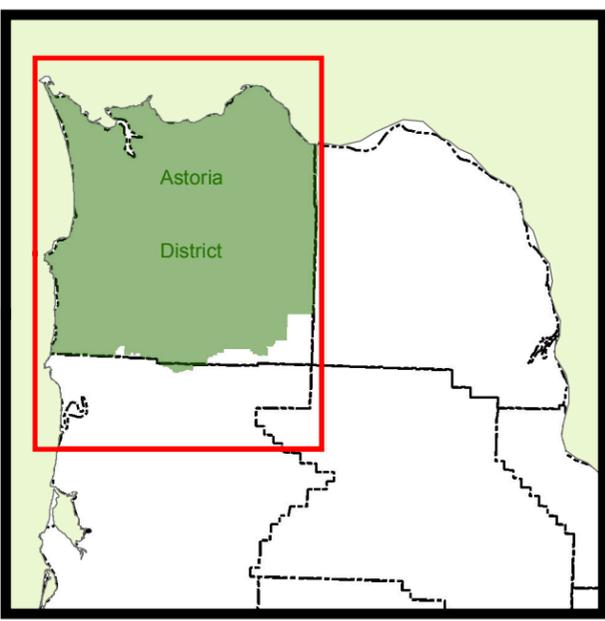
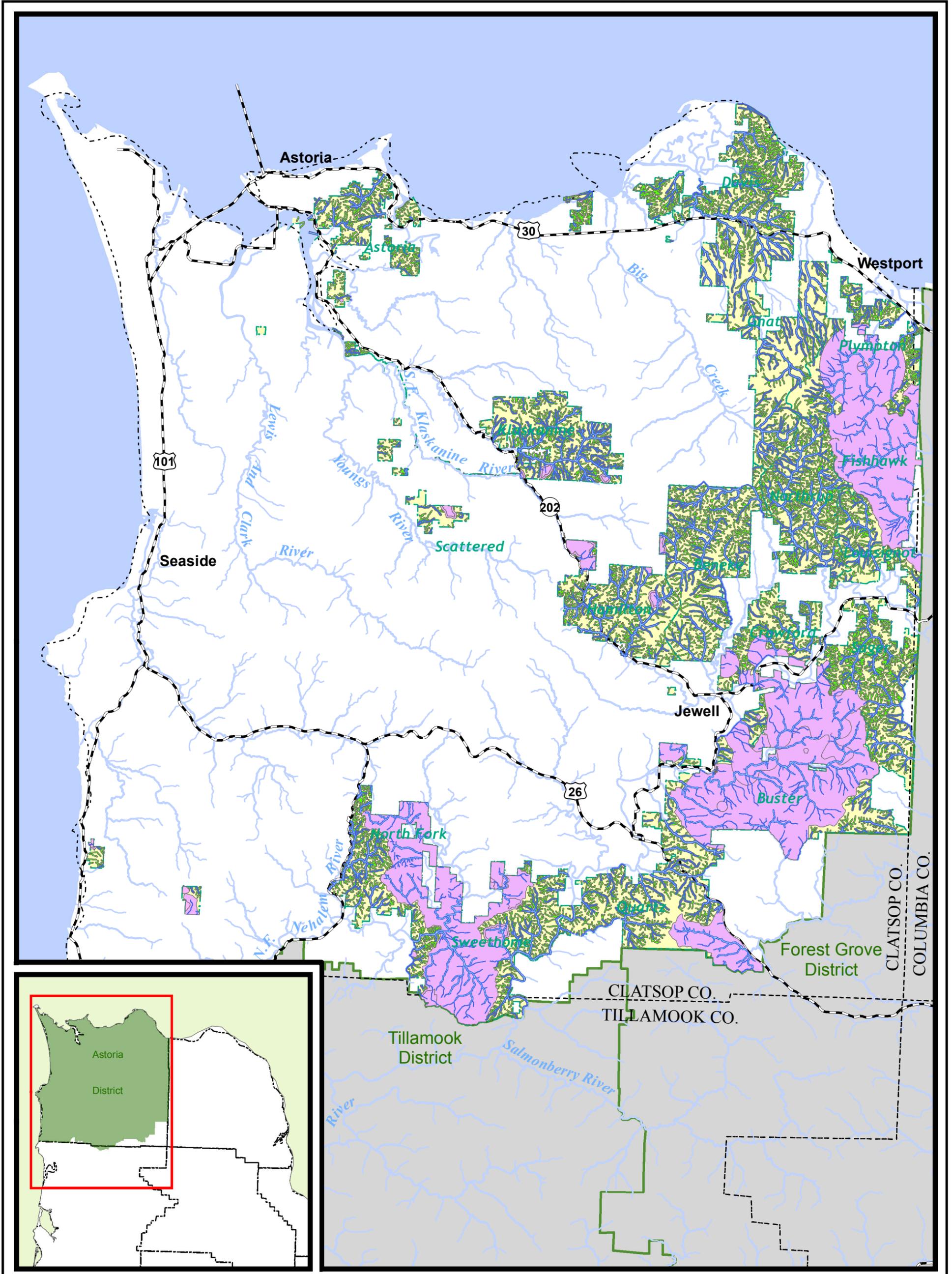
- Special
- Focused
- General
- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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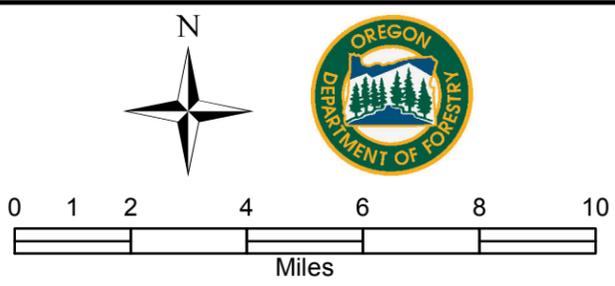
Astoria District

Stewardship Classifications - Biological Subclasses



- Legend**
- Special Stewardship**
- Aquatic & Riparian
 - Plants
- Focus Stewardship**
- Aquatic & Riparian
 - Wildlife Habitat

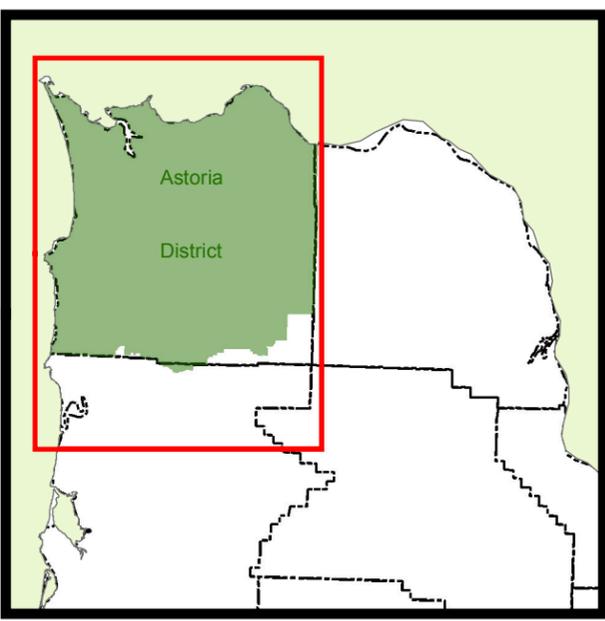
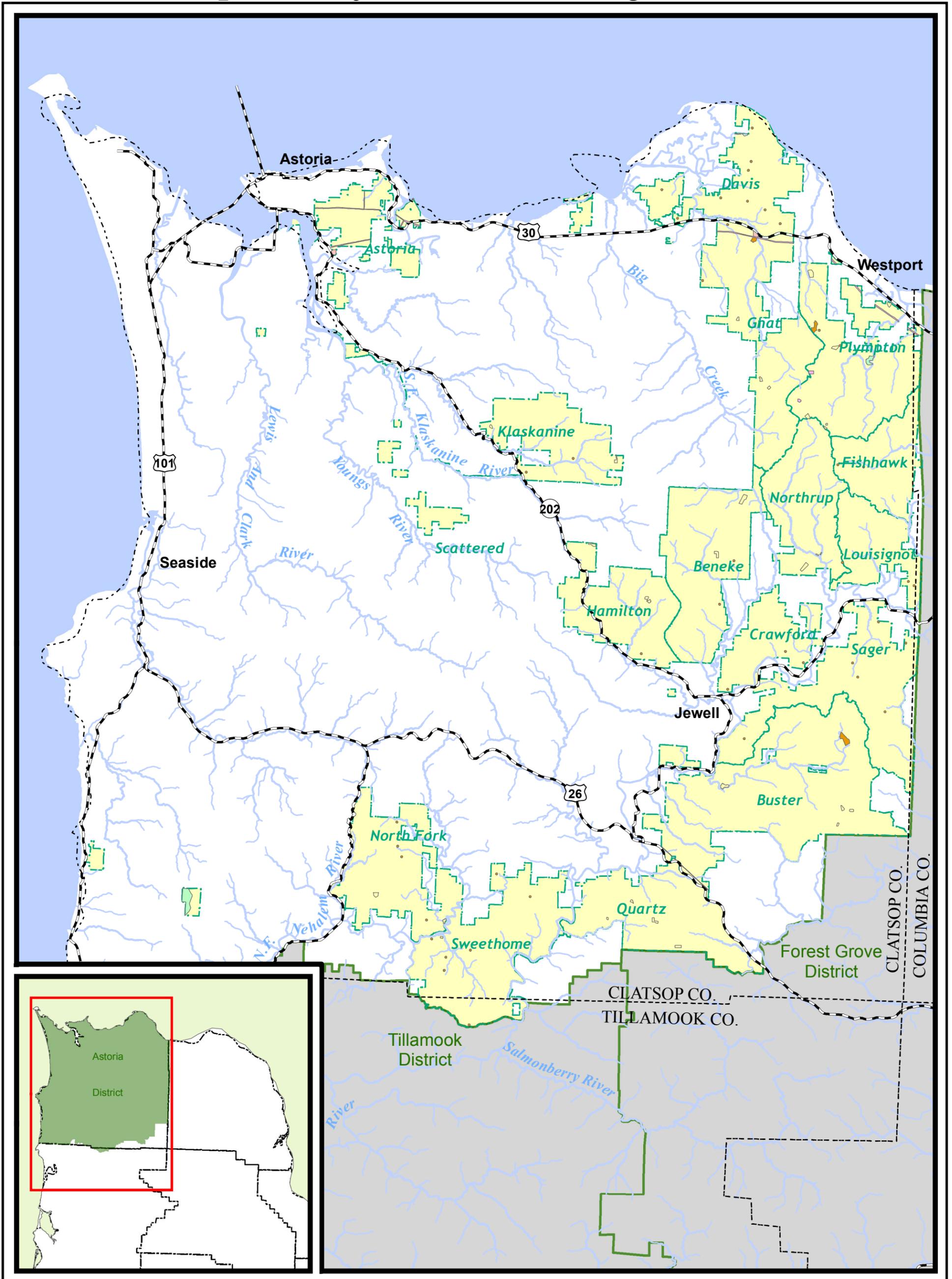
- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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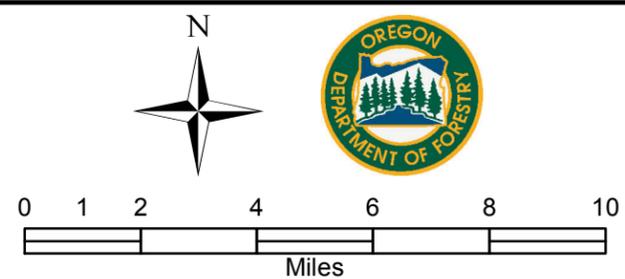
Astoria District

Stewardship Classifications - Management Subclasses



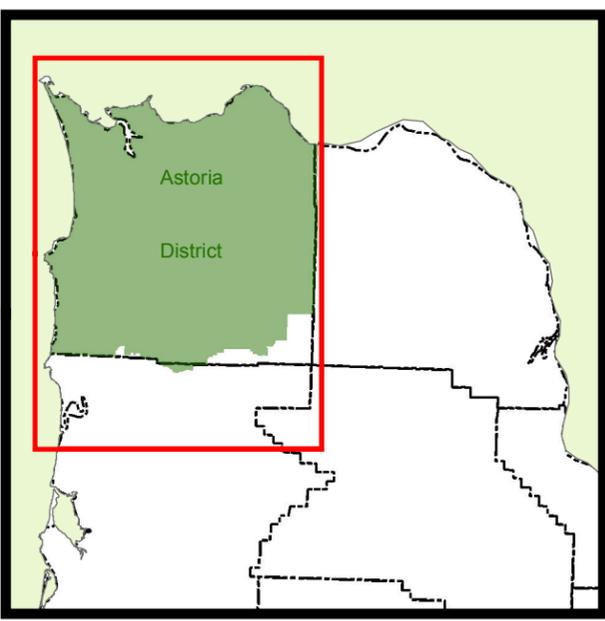
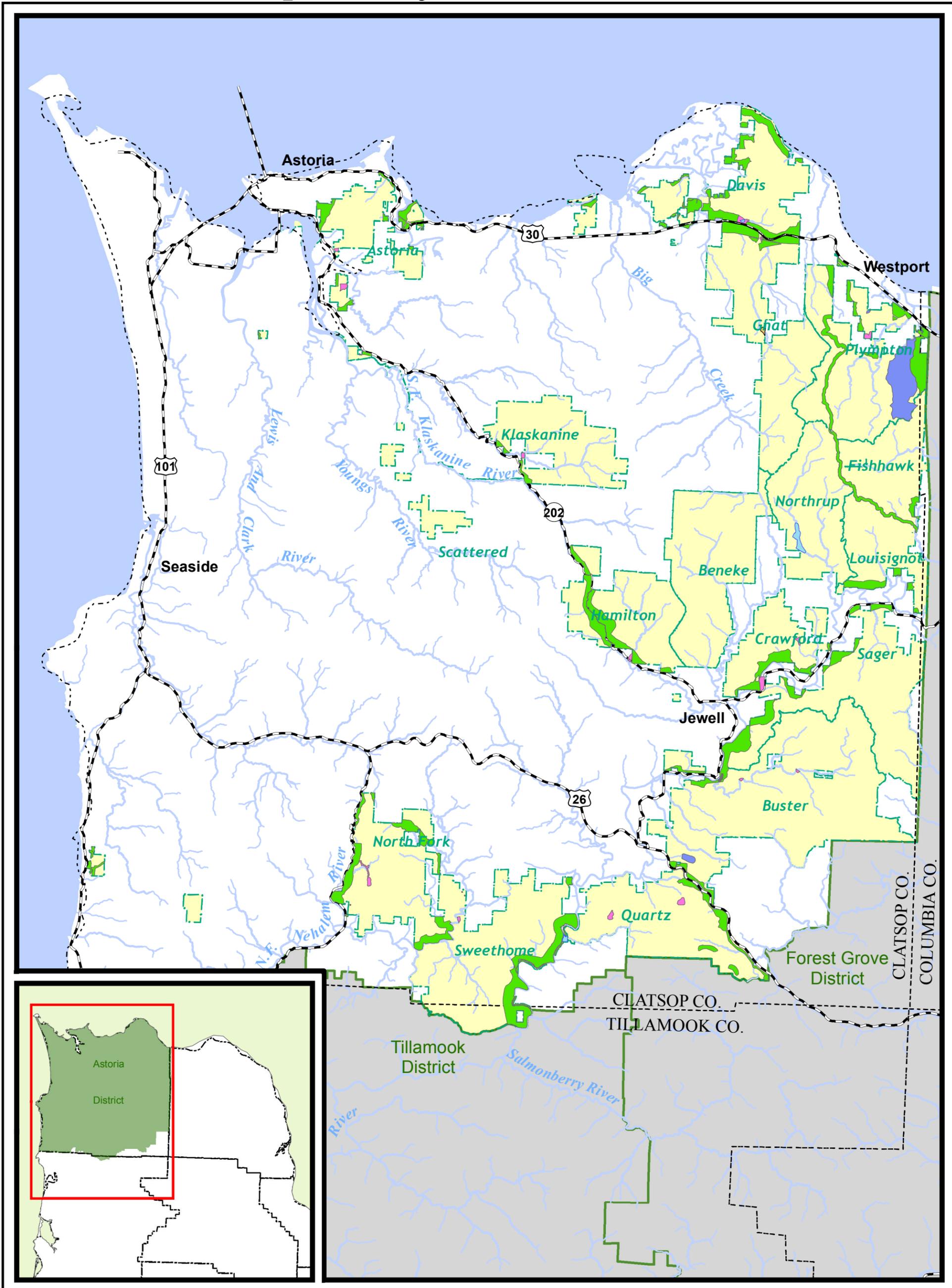
- Legend**
- Special Stewardship**
- Administrative Sites
 - Agriculture, Grazing or Wildlife Forage
 - Energy and Minerals
 - Operationally Limited
 - Transmission
- Focus Stewardship**
- Research/Monitoring

- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



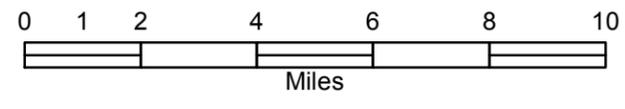
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Astoria District Stewardship Classifications - Social Subclasses



- Legend**
- Special Stewardship**
- Recreation
 - Visual
- Focus Stewardship**
- Domestic Water Use
 - Recreation
 - Visual

- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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Oregon

John A. Kitzhaber, MD, Governor

Department of Forestry

Astoria District
92219 Highway 202
Astoria, OR 97103
(503) 325-5451
Fax (503) 325-2756

June 29, 2012



"STEWARDSHIP IN FORESTRY"

To: Doug Decker, State Forester

From: Tom Savage, Astoria District Forester

CC: Andy White, NWOA Director
Mike Bordelon, State Forests Division Chief
Liz Dent, State Forests Deputy Division Chief
Rob Nall, State Forests Operations Coordinator

Re: OAR 629-035-0060 - **Changes to Forest Land Management Classifications**

The Astoria District has completed the required 30 day comment period per OAR 629-035-0060 which completes a major change to the districts Forest Land Management Classification (FLMC). A major change is defined as one that cumulatively exceeds 500 acres within one year.

The driving force for this modification was the expiration of the *Strum Creek Agreement for the Conservation of Northern Spotted Owls*. The Strum Creek NSO site has been in "historic" status since 2005; although the Department continued to protect the home ranges per the "Agreement" until its expiration in September of 2011. The male and female home ranges combined totaled approximately 9,200 acres. The home ranges were classified as Special – Wildlife and have been removed from the FLMC. Additionally, two other changes/updates were made to the districts FLMC: One Marbled Murrelet Management Area has been added, and an acreage error was corrected in the Focused – Wildlife Habitat category. A summary of the acreage changes is below. The required 30 day public comment period was held in conjunction with the Districts 2013 AOP comment period. All comments received on these changes have been resolved. As defined in the above referenced OAR, major modifications require State Forester approval.

Changes to Table 2 located in the Astoria District Implementation Plan (July1, 2011)

Stewardship Class	BOF	BOF	CSL	CSL	Total Acres	Total Acres	Total Change in Acres
	2011 Acres	2012 Acres	2011 Acres	2012 Acres	2011 Acres	2012 Acres	
Focused	78,889	78,894	1,646	1,646	80,535	80,540	5
Special	19,404	13,013	231	231	19,635	13,244	-6,391
General	46,849	48,346	289	289	47,138	48,636	1,498

Changes to Table 3 located in the Astoria District Implementation Plan (July1, 2011)

Subclass	Focused	Focused	Focused	Special	Special	Special
	2011 Acres	2012 Acres	Total Change in Acres	2011 Acres	2012 Acres	Total Change in Acres
Visual	10,339	10,338	-1	60	58	-2
Wildlife Habitat	47,139 38,658	38,665	-7	8,394	1,391	-7,003

Approved:

 7/5/12
Date

Doug Decker
State Forester

Astoria District

Forest Land Management Classification



Legend

- Special
- Focused
- General

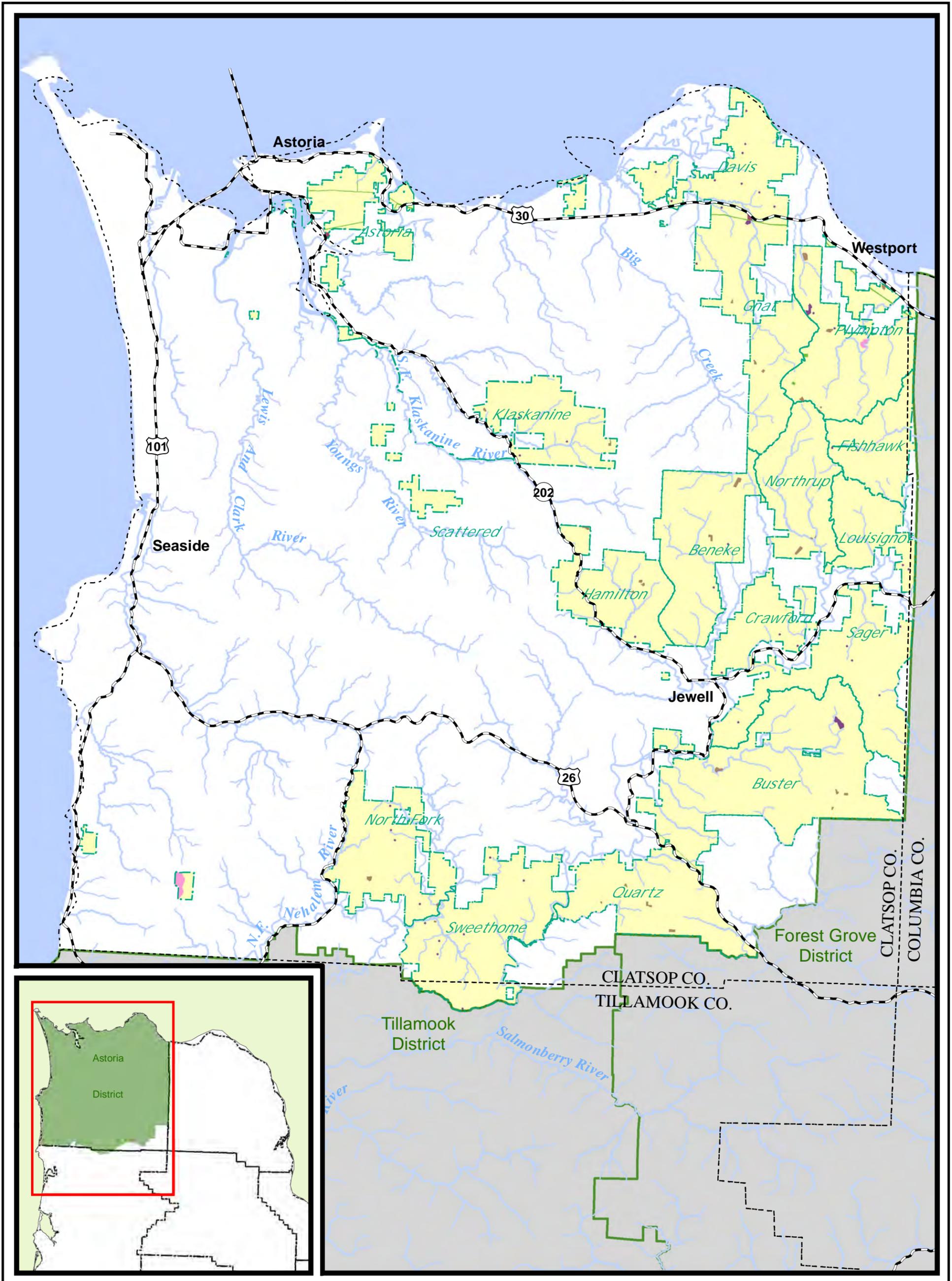
- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



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Astoria District

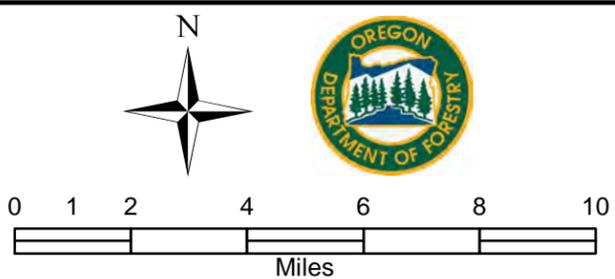
Stewardship Classifications - Management Subclasses



- Special Stewardship**
- Administrative Sites
 - Energy and Minerals
 - Transmission
 - Operationally Limited

- Focused Stewardship**
- Research/Monitoring

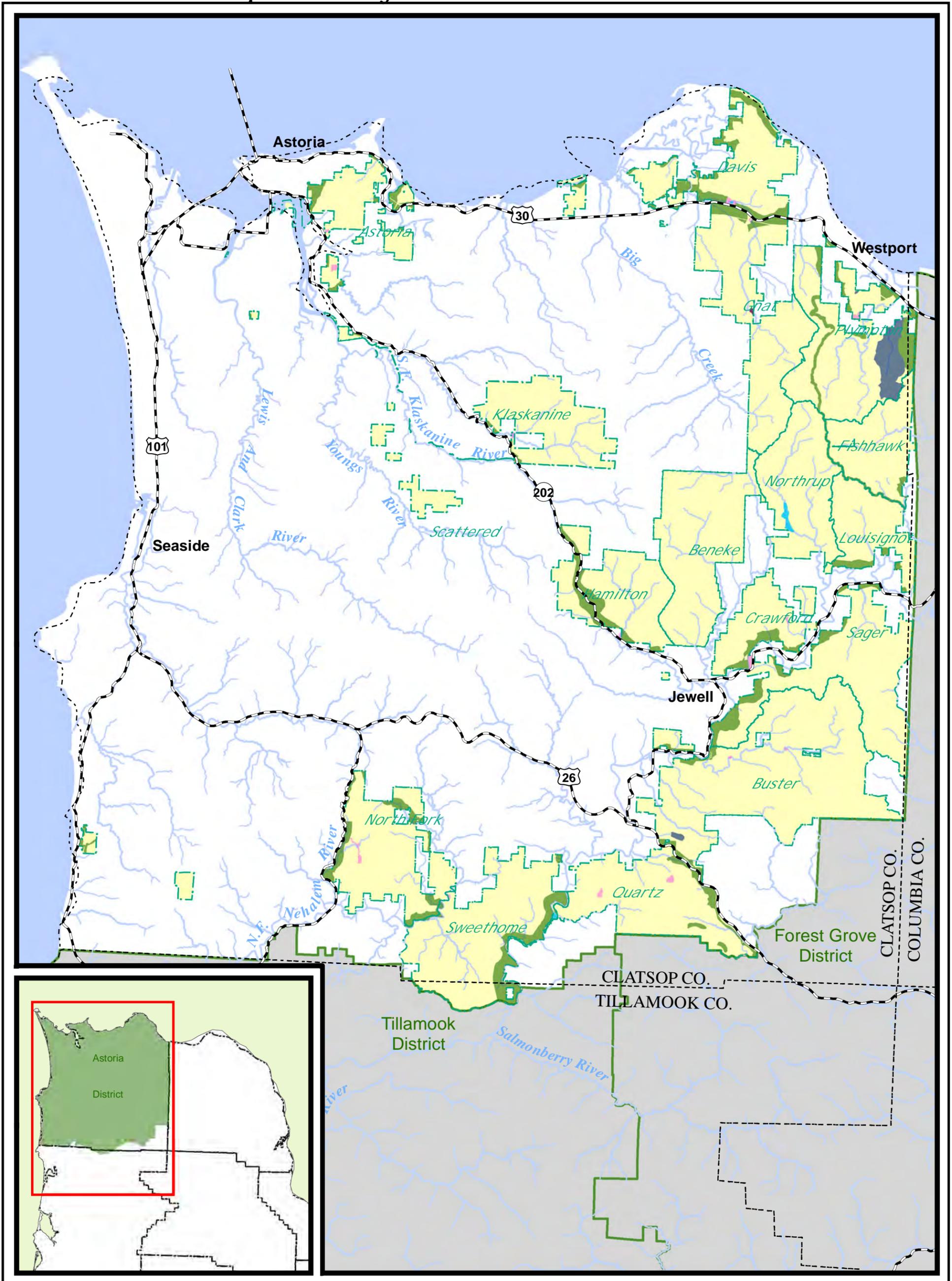
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- Roads
- Streams, Large
- Streams, Medium
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Astoria District

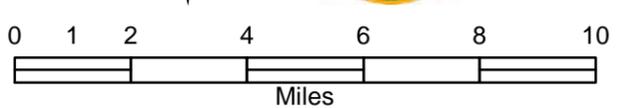
Stewardship Classifications - Social Subclasses



Legend

Special Stewardship	Focused Stewardship
■ Recreation	■ Domestic Water Use
■ Visual	■ Visual
	■ Recreation

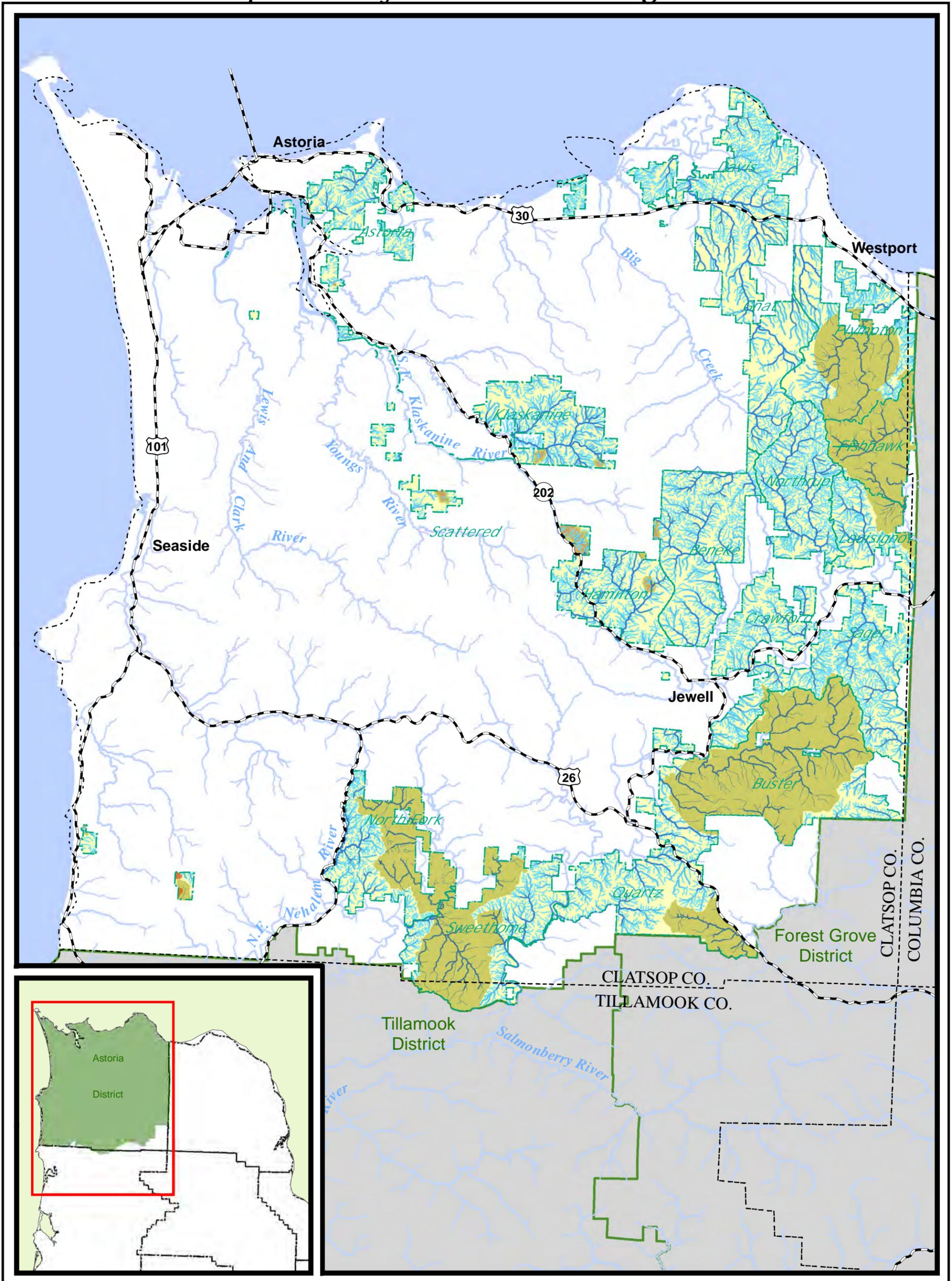
- Towns
- Roads
- Streams, Large
- Streams, Medium
- Adjacent Districts
- Management Basins



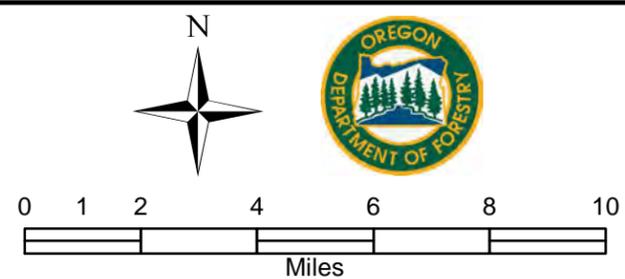
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Astoria District

Stewardship Classifications - Biological Subclasses



- Legend**
- | | | |
|---|----------------------------------|----------------------|
| Special Stewardship | Focused Stewardship | ● Towns |
| Blue: Aquatic and Riparian | Light Blue: Aquatic and Riparian | — Roads |
| Orange: Plants | Green: Wildlife Habitat | — Streams, Large |
| Dark Green: Agriculture, Grazing or Wildlife Forage | | — Streams, Medium |
| Brown: Wildlife Habitat | | ▭ Adjacent Districts |
| | | ▭ Management Basins |



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Oregon

John A. Kitzhaber, MD, Governor

Department of Forestry

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Salem, OR 97310-1336
503-945-7200
FAX 503-945-7212
www.oregon.gov/ODF

To: Liz Dent, State Forest Division Chief
From: Doug Decker, State Forester
Date: June 25, 2014



"STEWARDSHIP IN FORESTRY"

Subject: Implementation of the Revised Forest Land Management Classification Rule on State Forests

This memo addresses approval of the implementation of the revised Forest Land Management Classification System (FLMCS) rule, including the new High Value Conservation Areas and Special Use classifications, on State Forest lands managed by the following districts: Astoria, Coos, Forest Grove, North Cascade, Southwest Oregon, Tillamook, West Oregon, and Western Lane.

On June 5, 2013, the Oregon Board of Forestry adopted a revision to the FLMCS rule (OAR 629-035-0055) that added the classifications of High Value Conservation Area and Special Use while removing the Special Stewardship Classification. The purpose of this rule revision was to increase the visibility of the important conservation strategies that were already occurring on State Forests.

It was clear that implementation of this rule revision would result in a major change to the FLMCS maps/data and would be required to be available for public comment for 30-days (OAR 629-035-0060). Upon approval of the rule revision, the districts were directed to begin the task of updating the FLMCS data with the goal of having draft maps available for a public comment process that would occur concurrently with the normal 45-day public comment period for the Annual Operations Plans.

The public comment period occurred between March 17 and May 2, 2014 and included three open houses that focused on the implementation of the revised FLMCS rules, especially the location and purpose of High Value Conservation Areas. The open house were held early in the public comment period at the Forest Grove, Astoria, and Tillamook district offices. In response to the public comment period, the Division received:

- Eight letters/emails
- Approximately 1,700 form letter type emails
- Fifteen comments generated through an on-line survey

Almost all of the comments were generally supportive of the implementation of the FLMCS. Many of the comments included a request that the Department improve the durability of the High Value Conservation Areas; this issue is currently being addressed through the Alternative Forest Management Plan Project.

Several individuals indicated that old growth should be classified as High Value Conservation Areas. After reviewing the management strategies for old growth in the Northwest Oregon, Southwest Oregon, and Elliott State Forest Management Plans, I have found that old growth stands (as defined in those plans) qualifies for classification as High Value Conservation Areas under the Unique, Threatened, or Endangered Plants subclass. I have directed the districts to include existing old growth stands as High Value Conservation Areas in their final FLMCS designations.

After reviewing the draft FLMC maps/data, the public input, the recommendations from the District Foresters and Area Directors, and consistent with OAR 629-035-0060 (2), I am approving the revised FLMCS for Astoria, Coos, Forest Grove, North Cascade, Southwest Oregon, Tillamook, West Oregon, and Western Lane Districts.



Doug Decker
State Forester

6.25.14

Date

Appendix A – Changes to Forest Land Management Classification

The Forest Land Management Classification (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 four land management classifications. The classifications are: 1 - General Stewardship, 2 – Focused Stewardship, 3 – Special Use, and 4 – High Value Conservation Area. Subclasses are assigned for the specific forest resources that require a Focused Stewardship, Special Use, or High Value Conservation Area Classification.

This Appendix describes changes to the Astoria District FLMC. These changes meet the definition of a major modification. A major modification is defined as one that cumulatively exceeds 500 acres within one year. Major modifications require a 30 day public comment period which will be held in conjunction with the Districts 2015 AOP comment period. At the close of the public comment period, the Department will consider the public comments and make final decisions on the proposed changes. The District Forester will forward the draft final changes along with any public comments to the Northwest Oregon Area Director and the State Forester for review and final approval.

The Astoria District FLMC was last updated in July of 2013. Since that time, the Board of Forestry approved changes to the FLMC Administrative Rule that renamed the Special Stewardship classification to Special Use Area as well as added a new classification called High Value Classification Area. This FLMC update incorporates these new classifications and provides updated acres for each classification and subclass listed in the tables below.

Tables 2 and 3, originating in the District Implementation Plan have been updated to reflect these changes. As defined in OAR 629-035-0060, major modifications require State Forester approval. Updated FLMC maps are also included in this Appendix.

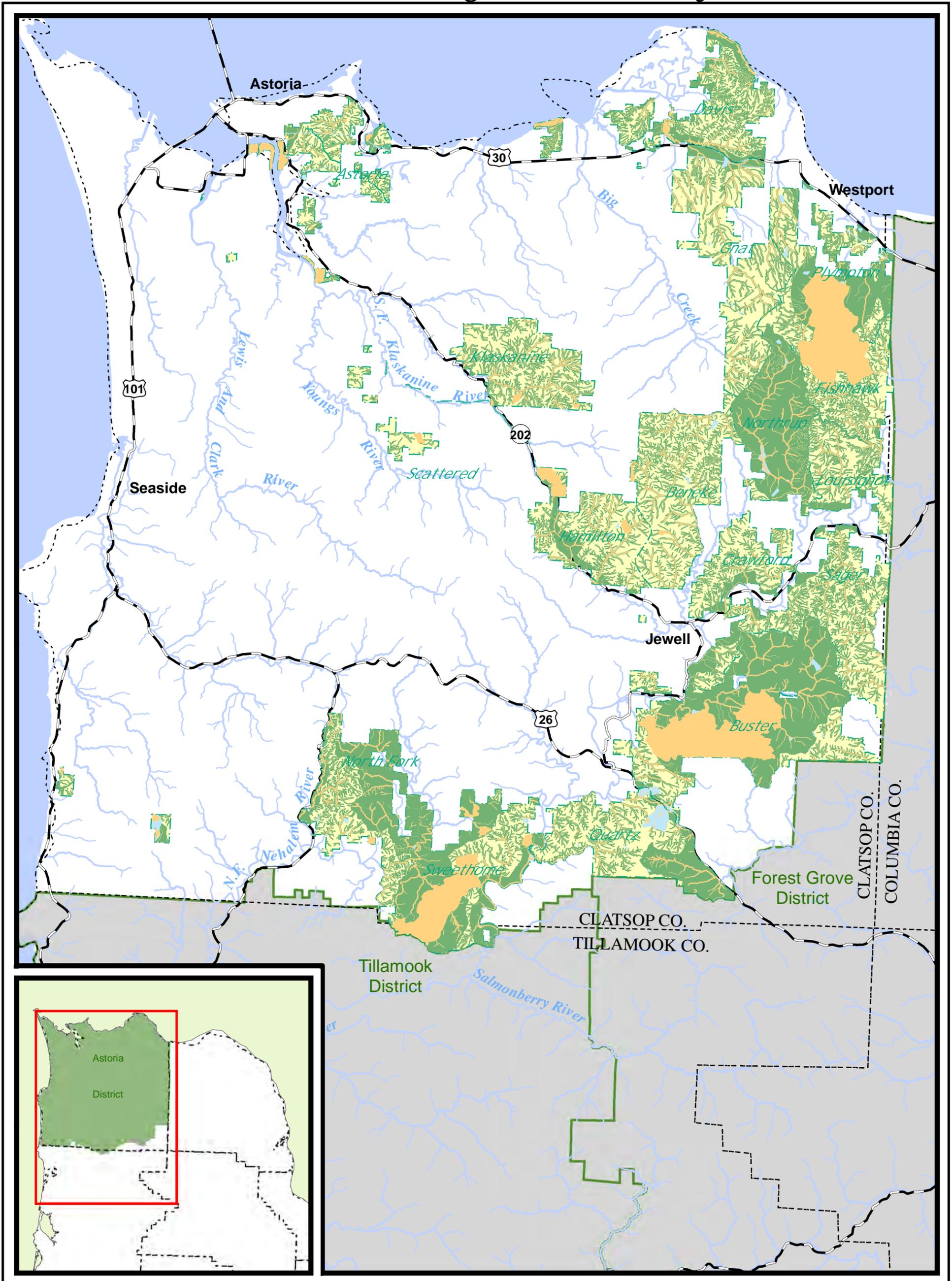
Table 2. Astoria District Acres, by Stewardship Class and Fund

Classification	BOF	CSL	Total Acres
High Value Conservation	23,672	256	23,928
Focused Stewardship	63,313	1,368	64,681
Special Use	1,274	64	1,338
General Stewardship	46,570	317	46,887

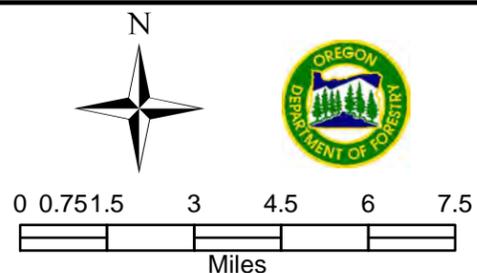
Table 3. (Includes overlapping Acres) Forest Land Management Classifications for Astoria District – Focused and Special Subclasses (Acres)

	Focused	Special	High Value Conservation
Administrative Sites	0	76	0
Agriculture, Grazing	0	11	0
Aquatic & Riparian	48,589	0	13,058
Cultural Resource	8	10	0
Domestic Water Use	81	0	0
Energy & Minerals	0	255	0
Operationally Limited	0	790	0
Plants	0	0	55
Recreation	1,098	140	0
Research/Monitoring	250	91	0
Transmission	0	214	0
Visual	9,237	33	0
Wildlife Habitat	37,088	0	12,027

Astoria District Forest Land Management Classification



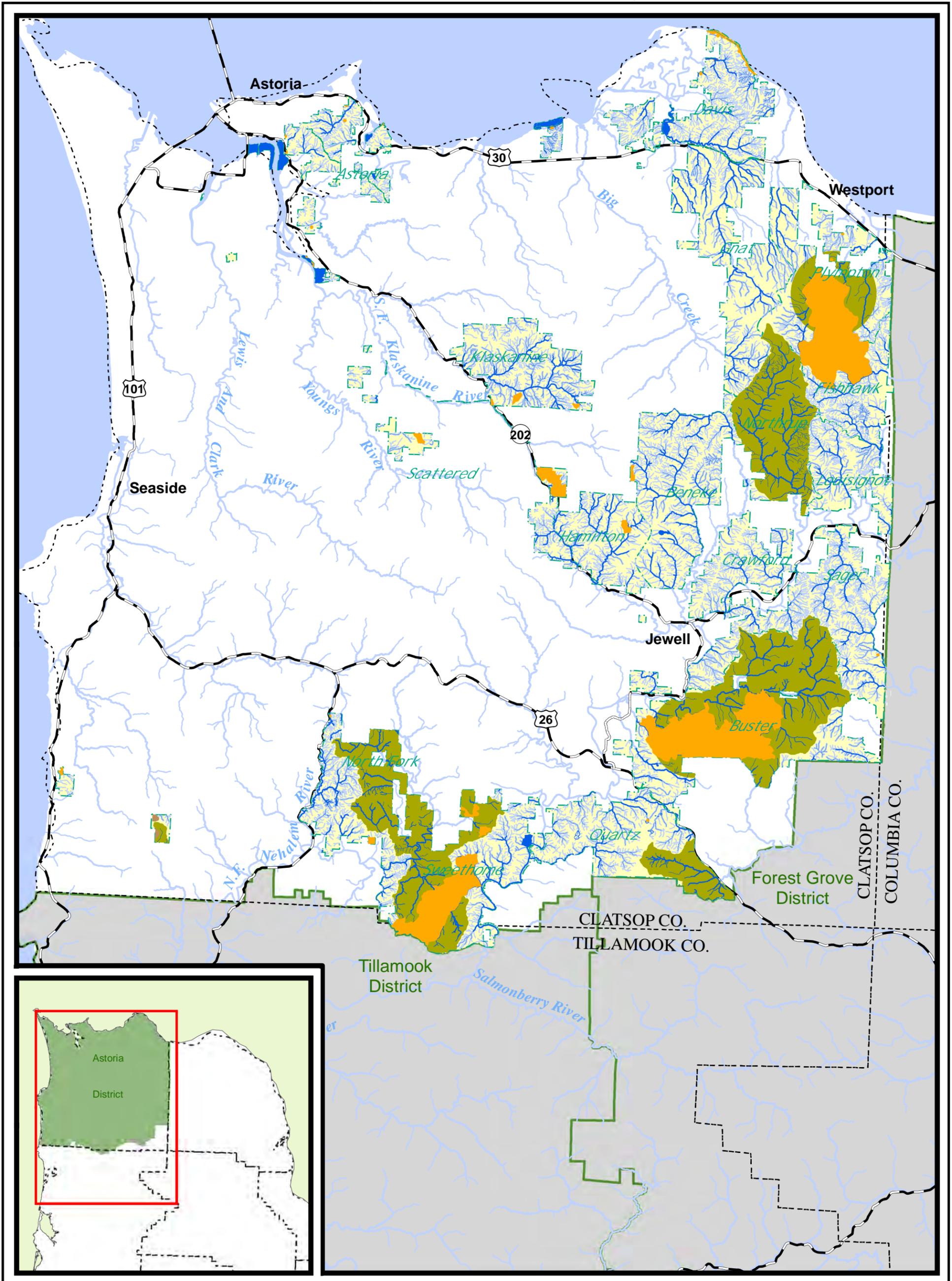
- Legend**
- | | |
|------------------------------|--------------------|
| STEWARDSHIP | Streams |
| High Value Conservation Area | Streams, Large |
| Special Use | Streams, Medium |
| Focused Stewardship | Adjacent Districts |
| Highways | |



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Astoria District

Stewardship Classifications - Biological Subclasses



Legend

- High Value Conservation Area**
- Aquatic and Riparian Habitat
 - Plants
 - Wildlife Habitat

- Special Use**
- Agriculture, Grazing or Wildlife Forage

- Focused Stewardship**
- Aquatic and Riparian Habitat
 - Wildlife Habitat

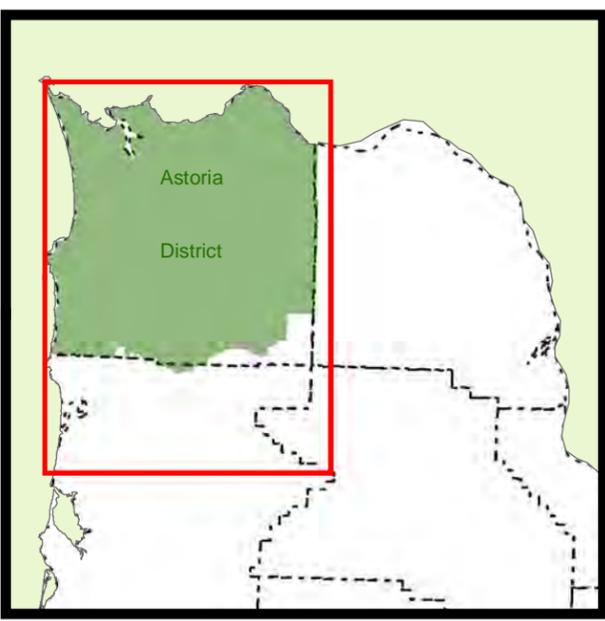
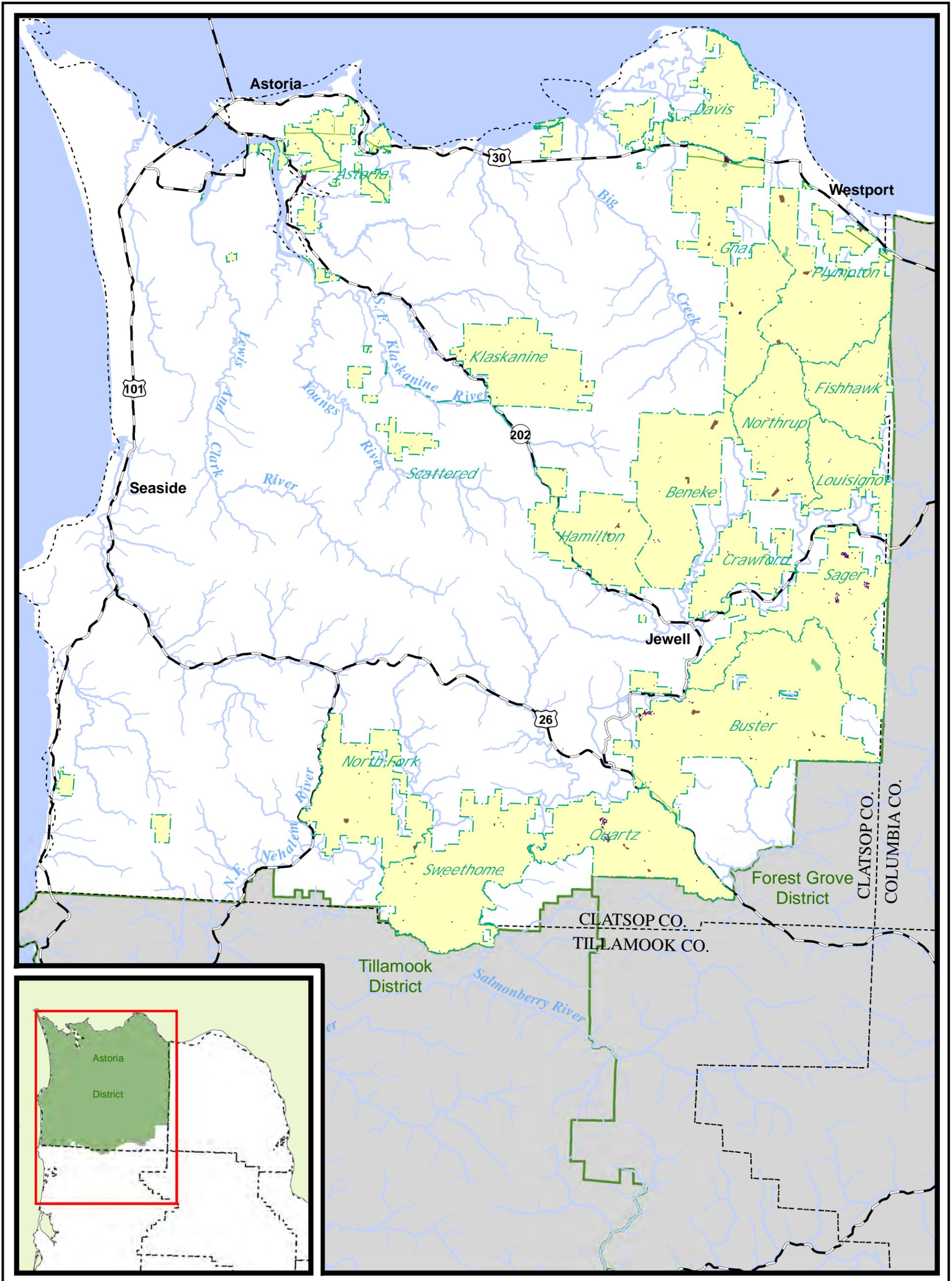
- Streams**
- Streams, Large
 - Streams, Medium
 - Adjacent Districts
 - Management Basins
 - Highways



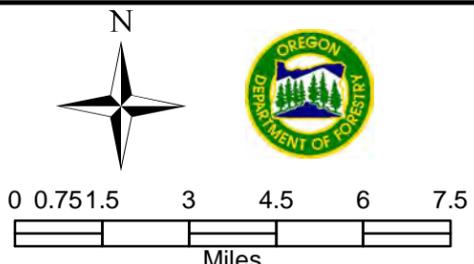
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Astoria District

Stewardship Classifications - Management Subclasses

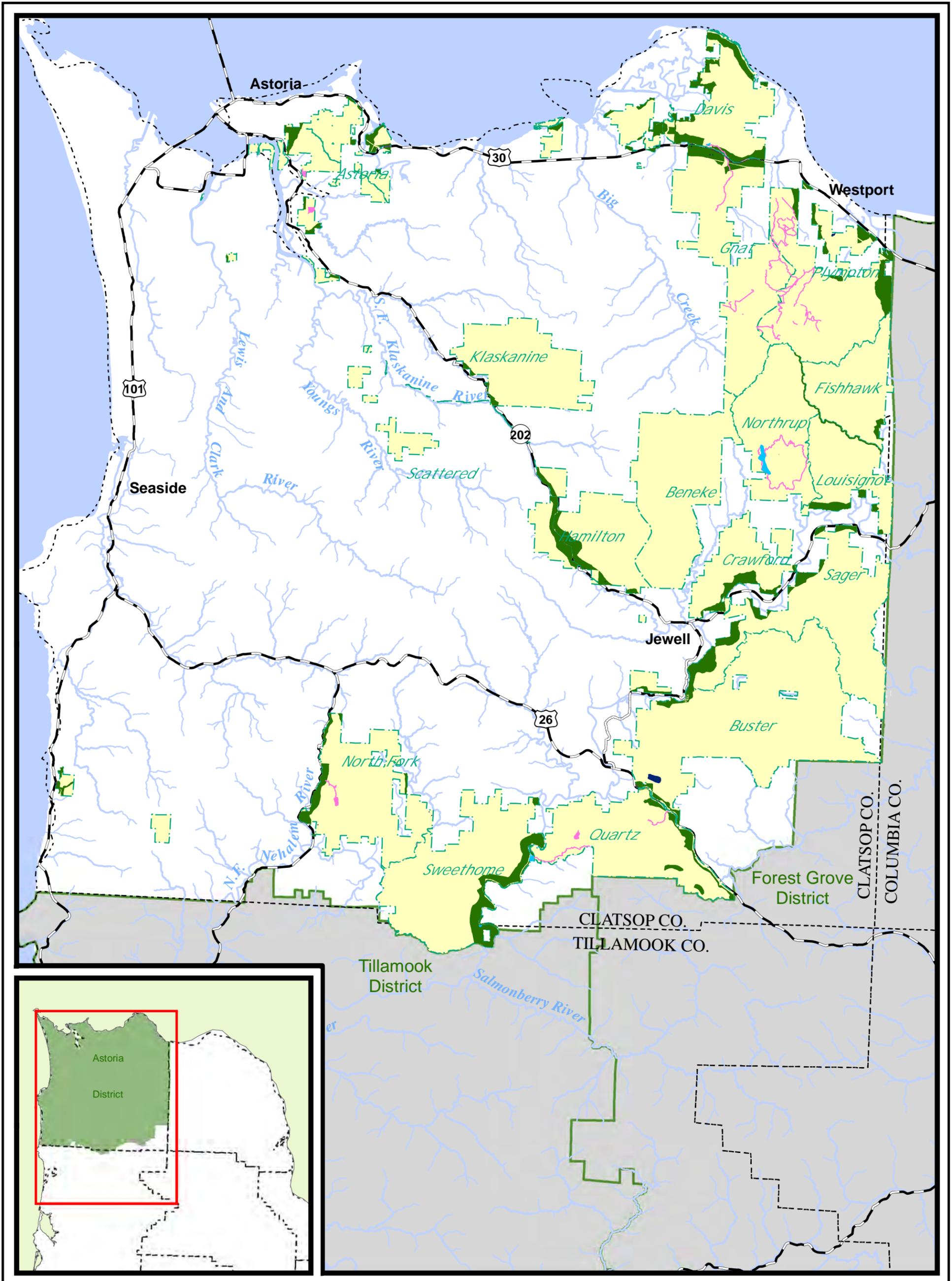


- Legend**
- | | | |
|-----------------------|-------------------------------|--------------------|
| Special Use | Focused Stewardship | Adjacent Districts |
| Administrative Sites | Focused - Research/Monitoring | Management Basins |
| Research/Monitoring | Streams, Large | Highways |
| Energy and Minerals | Streams, Medium | |
| Transmission | | |
| Operationally Limited | | |



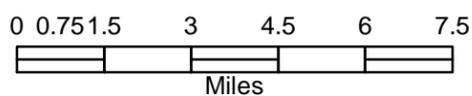
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Astoria District Stewardship Classifications - Social Subclasses



Legend

- | | | |
|----------------------------|----------------------------|--------------------|
| Special Stewardship | Focused Stewardship | Adjacent Districts |
| Recreation | Domestic Water Use | Management Basins |
| Visual | Visual | Highways |
| | Recreation | Streams, Large |
| | | Streams, Medium |



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