



# Oregon

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## Department of Forestry

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To: Dave Lorenz, Acting State Forests Division Chief

From: Paul Bell, Acting State Forester *PCB*

Date: July 1, 2012

Subject: Approval of North Cascade and West Oregon Implementation Plans



"STEWARDSHIP IN FORESTRY"

This memo conveys direction related to implementation plans for approximately 85,000 acres of state-owned forest lands in the North Cascade and West Oregon districts. In January 2010 the Oregon Board of Forestry established clear direction to the Department to increase timber harvest revenue from these lands over the next ten years. In addition, the Board approved 2010 Northwest 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 rule, provides an opportunity to reflect this new direction in the context of these 10-year implementation plans.

The revision process for these implementation plans and Forest Land Management Classification maps included significant opportunities for public involvement, including meetings with the Forest Trust Land Advisory Committee, the State Forest Advisory Committee, three meetings open to the general public, and a 45-day written comment period. The districts reviewed and incorporated, where appropriate, the comments received on these plans and maps.

My review of these implementation plans has found them to be consistent with the Northwest Oregon State Forests Management Plan (2010) and the management activities conducted under these plans will be consistent with State Forests Division Operational Policies and strategies. Therefore, I am approving the revised Implementation Plans for North Cascade and West Oregon Districts and the revised Forest Land Management Classification maps for those districts.





# **North Cascade District**

## **Implementation Plan**

*June 2012*

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# Introduction

The *North Cascade District Implementation Plan* (IP) guides forest management for all forest resources on the North Cascade District beginning July 1, 2012. This implementation plan is a major revision of the plan approved by the State Forester in March 2003. It describes 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).

This IP has been developed in accordance with State Forests Policy Bulletin SFB 12-06, including a new landscape design that designates 35 percent of the district for the development of complex structure<sup>1</sup> over time. This change in the proportion of complex structure development is coupled with additional policy direction from the Board of Forestry regarding Species of Concern.

In addition, the policy bulletin directs an increase in the Annual Harvest Objective from 14 Million Board Feet (MMBF) per year to between 18 and 20 MMBF per year. There is currently a total of 1,043 million board feet (MMBF) of standing wood volume on the district. At the end of this IP period, there will be a total of 1,169 MMBF. This illustrates that while the district is increasing the annual harvest volume with this IP, the volume being harvested is still less than the total amount of volume per year being grown on the district. Additional discussion of the harvest level can be found in the Proposed Management Activities section under Harvesting, while an overview of the analysis that informed this policy direction is found in Appendix A of this IP.

Approximately 26 percent of the district is currently in a complex structure. Some understory stands that have been partial cut in the past will be moving into the layered stand structure during this IP period. Minor amounts of existing layered stands, located outside of the landscape design for complex structure, may be harvested. Overall, the amount of layered stands on the district will increase during this IP period.

In summary, this landscape design has a twofold aim:

1. Provide better economic performance.
2. Retain benefits to fish and wildlife through more precisely targeted development of complex structure and the application of Species of Concern Strategies.

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

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<sup>1</sup> Complex structure refers to Layered and Older Forest Structure. See chapter 4 of the Northwest Oregon State Forest Management Plan for a description of these structure types and the landscape management strategies.

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 Strategies<sup>2</sup>;
2. Northern spotted owls;
3. Forest Roads Manual.

The specific operations and management activities necessary to carry out this IP will be described in annual plans, beginning with the *FY 2013 North Cascade District Annual Operations Plan (AOP)*.

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<sup>2</sup> The SOC policy will be updated to reflect strategies proposed in this IP upon implementation.

# District Overview

## Land Ownership

The Santiam State Forest contains 47,625 acres, and is located in the foothills of the Cascade Mountains in Oregon. The Santiam State Forest is managed by the North Cascade District. The acreage in the Santiam State Forest is distributed between three counties, as displayed in the table below. The ownership is primarily Board of Forestry Lands (98 percent), with a small amount of Common School Forest Lands (2 percent). Other forest lands in the counties are held by a mix of landowners: United States Forest Service, Bureau of Land Management, private timber companies, and small private landowners.

**Table 1. North Cascade District Acres, by County and Ownership**

<b>County</b>	<b>Board of Forestry</b>	<b>Common School</b>	<b>Total Acres</b>
Clackamas	7,156	110	7,266
Marion	18,300	739	19,039
Linn	21,234	86	21,320
<b>Total Acres</b>	<b>46,690</b>	<b>935</b>	<b>47,625</b>

## Forest Land Management Classification

### *Background*

The Forest Land Management Classification System (FLMCS) is based on OAR 629-350-005, an administrative rule on state forest management adopted by the Board of Forestry in 1998. This rule states that the state forests in the planning area (district) be classified for the purposes of implementing the plan's forest resource management strategies. The FLMCS is a method of describing the management emphasis of an area of state forest land. The management emphasis identifies the extent to which an area 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 FLMCS 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.

- General Stewardship – all forest resources are actively managed using integrated management strategies and sound conservation practices to meet forest management plan goals.
- Focused Stewardship – natural resources, social values, or administrative areas are present so that it is necessary to carry out supplemental planning or modified management practices in order to conserve those resources.
- Special Stewardship – one or more natural resources, social values, or administrative areas are present which require a level of protection that precludes the integrated management of all forest resources; lands are committed to a specific use and management activities are limited to those that are compatible with the specific use.

The stewardship class identifies the extent of management and subclass identifies the resource that the classification is intended to address: Focused Stewardship has thirteen subclasses, while Special Stewardship has 16 subclasses. Some of the subclasses identify areas for the conservation of natural resources, such as ‘Aquatic and Riparian’ for streams and ‘Plants’ for threatened and endangered plants or unique plant communities. Other subclasses identify areas for the conservation of social values, including ‘Recreation’ for campgrounds and day use areas. Finally, there are subclasses that identify administrative areas on the forests, such as ‘Energy and Minerals’ for the rock quarries that supply the surfacing of the forest roads, or ‘Transmission’ that identify the right-of-ways of the large power lines that cross state forests.

### ***Major Change to FLMCS***

The district’s initial draft of the land classification was completed in 2003 and subject to public review. This revision of the North Cascade District IP includes a Major Change to the FLMCS (as described in the OAR) for the district that increases Special Stewardship by 146 acres and Focused Stewardship by 13,642 acres. Most of the subclasses changed by between 1 and 10 acres since 2003, while the majority of the acres changed in two of classifications:

- Aquatic and Riparian Habitat – The Aquatic Anchors added 11,004 acres to the Focused Stewardship. The Aquatic Anchors are described on page 18 as a Species of Concern Strategy. Fish presence surveys and improved mapping have reduced the Aquatic and Riparian Special Stewardship by 90 acres and Focused Stewardship by 1,044 acres.
- Wildlife Habitat – The Focused Stewardship acres have been reduced by a total of 401 acres. The composition of these acres has changed due to the movement of northern spotted owl activity centers and the addition of a Terrestrial Anchor as a Species of Concern Strategy (see page 19).

Summarizing the acres in FLMCS can be confusing because there can be overlap between Special and Focused Stewardship Classification; overlap between subclasses; and overlap within a subclass. However, there is no overlap of the General Stewardship classification.

Due to the presence of multiple resources, a single acre may have multiple stewardship classifications. As an example, consider a cultural resource site classified as ‘Special Stewardship – Cultural’ that occurs within a riparian area with a ‘Focused Stewardship – Aquatic and Riparian’ that is in a scenic area that is classified as ‘Special Stewardship – Visual’ and is near a northern spotted owl activity center, so it has a ‘Focused Stewardship – Wildlife’. The single acre in this example has four resources present, so it has four classifications, and would be counted as four acres in a summary.

Table 2 summarizes the FLMCS on North Cascade District by Stewardship Class and Fund. The overlap within the Special and Focused Stewardship classifications have been eliminated in this table, so the table shows the total area covered or the “foot print” of each of these classifications. This table still includes overlap between Focused and Special Classification.

***Table 2. North Cascade District Acres, by Stewardship Class and Fund***

<b>Classification</b>	<b>Board of Forestry</b>	<b>Common School</b>	<b>Total Acres</b>
Special	6,714	104	6,818
Focused	41,573	435	42,008
General	17,987	512	18,499

Table 3 lists the total acres in the Focused and Special Stewardship classes by subclasses. In this table none of the overlap between and within the classes and subclasses has been removed, so the total acres in the table exceed the total acres in the district. The subclasses in Table 3 have been grouped to show those that are for the conservation of natural resources, those that are for the conservation of social values, and those that are for the administration or management of the forest.

In the context of management over the life of this implementation plan, the most intensive management and nearly all harvesting will be occurring on those lands classified as General Stewardship. Some harvesting will occur on lands classified as Focused Stewardship, mostly through partial cuts. Finally, very little harvesting is anticipated from lands classified as Special Stewardship; however, the range of conditions present on these lands will cover either end of the spectrum. Lands classified as Special Stewardship in the Aquatic and Riparian or Wildlife subclass will be or have the goal of becoming complex forest structures, while Special Stewardship lands with an Energy and Minerals subclass are likely to be rock pits and will be maintained in a non-forest condition.

**Table 3. North Cascade District Acres, Focused and Special Stewardship Subclasses**

	<b>Acres Focused</b>	<b>Acres Special</b>
<b>Conservation of Natural Resource Values</b>		
Aquatic and Riparian Habitat		
Riparian Management Areas	5,386	3,528
Aquatic Anchors	11,004	0
Domestic Water Use	45	0
Operationally Limited	0	1,927
Plants	84	0
Wildlife Habitat	11,921	524
<b>Conservation of Social Values</b>		
Cultural Resources	1	0
Recreation	1,339	584
Visual	8,697	24
<b>Administrative Areas for Forest Management and “Non-Forest” Uses</b>		
Administrative Sites	0	12
Deeds	0	0
Easements	0	0
Energy and Minerals	0	28
Research/Monitoring	4	29
Transmission	0	161

Four maps of the FLMCS can be found in the map section of this document. In addition, GIS data is available upon request. Neither the maps nor the GIS data made available to the public will show the locations of cultural resources or the specific location of threatened and endangered species due to the highly sensitive nature of these resources.

## **Current Condition**

### ***History***

Most of the forest in the Santiam Canyon and the Butte Creek area was harvested between 1880 and 1930, with railroads often used to transport the timber. In the late 1930s, many of

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

## **Physical Elements**

### ***Geology and Soils***

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

The dominant soil associations within the North Cascade District include Akerson, Fawn, Goodlow, Henline, Pechuck, Hembre and Nasty. Many of the soils on gentle to moderate slopes are easily compacted when wet. Therefore, restrictions are necessary on heavy equipment to prevent serious losses in soil productivity. Several shallow, rocky soils in the Santiam State Forest are not capable of producing timber in reasonable rotations. These soils make up a very small percentage of the forest.

The rugged topography and wet climate combined with the forces of old and recent volcanic activity, glaciation and stream down-cutting make the Cascade Range and associated foothills prone to landslides. The Cascade Range experiences many types of landslides, but in general two types are worth noting:

#### 1. Shallow landslides

- are 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 but often originate in headwalls or in or alongside steep gullies which don't normally flow water
- Periods of intense rainfall or rain-on-snow events will trigger shallow landslides

## 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 though loading by stockpiling aggregate or wasting excess fill from road-building or slide cleanup can often initiate new movement.
- 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, topographic or LIDAR-generated maps and movements often are a reactivation of a pre-existing landslide feature, however movement
- may still be hard to predict at a site-specific level.

The risk associated with active management in a landslide prone landscape is mitigated using the processes described in the Aquatic and Riparian Strategy 6 in the FMP and the Landslides and Public Safety sections of the FPA. The ODF geotechnical specialist can be consulted when district personnel need additional perspective on layout of timber sale boundaries or road-building. Generally, these issues would include:

- quarrying, stockpiling aggregate and wasting material
- laying out harvest on or near headwalls or on steep open slopes
- laying out harvests on steep slopes near or above RMA's where a landslide could deliver debris to an RMA or Type-F stream
- in situations where ground cracking or slumping is observed
- where road-building will create fills or cuts on steep ground
- when forest roads have been impacted by landslides, and
- when public roads, structures, or homes are located down slope from proposed harvest units on steep slopes.

## ***Topography***

The terrain in the Santiam State Forest is characterized by long, smooth, steep slopes and broad ridge crests, but rock bluffs and deeply incised stream channels are also common. Approximately 29 percent lies between 1000 and 2000 feet, 46 percent lies between 2000 and 3000 feet, about 22 percent is between 3000 and 4000 feet, and 2 percent lies above 4000 feet. Elevations range from 1,000 to a little more than 5,000 feet. Higher elevations are typically rocky, especially on very steep slopes and ridge crests. Approximately 46 percent of the district has slopes less than 30 percent, 37 percent has slopes between 30 and 60 percent and 17 percent has slopes over 60 percent.

## ***Water***

Major streams that drain these forest lands are: Rock Creek, Mad Creek, Snake Creek, Sardine Creek, and Stout Creek, which all flow into the North Santiam River. Major streams in the north include Butte Creek, Abiqua Creek, Cedar Creek, and Silver Creek, which flow into the Pudding River. Gawley Creek flows into the Molalla River. These major watershed basins define the basin planning areas in the section entitled **Management Basins**. The Santiam State Forest contains a few scattered wetlands smaller than 10 acres.

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

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

## ***Climate***

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

## ***Natural Disturbance***

Forest fires, windstorms, landslides, floods, and insect and disease outbreaks are natural occurrences that have influenced the stands within the Santiam State Forest. In recent years fire prevention and suppression activities have kept fires that have occurred on the Santiam State Forest small. The Sardine Creek Fire of 1951 burned approximately 20,000 acres. This was the last large fire on the Santiam State Forest. This area was replanted and makes up a large portion of Green Basin. Windstorms occur more frequently than large fires and in isolated patches across the district. Windstorms can interact with root disease to create patchy stands. If windstorms cause large quantities of trees to blow over, insect outbreaks of

bark beetles can occur such as in 1993. The flood of 1996 inflicted major damage on the forest road system. Many of the road systems have been upgraded since then. Natural disturbances will continue to be a part of the adaptive management for the district.

## Biological Elements

### *Vegetation*

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

Invasive weeds such as Himalayan blackberry, Scotch broom, tansy ragwort, false brome and others compete with native vegetation. Management and control of invasive species is described under **Proposed Management Activities**.

Cold water corydalis (*Corydalis aquae-gelidae*) is a candidate for threatened and endangered status, but is not currently proposed under the state of Oregon's Endangered Species Act. This plant is found in swampy margins of cold mountain streams and lakes. Cold water corydalis has been identified in one location within the Butte Creek Basin. Table 4 lists endangered, threatened, or candidate plants that may exist on the district.

**Table 4. Endangered, Threatened or Candidate Plant Species**

Genus	Species	Subspecies	Common name <sup>1</sup>	Status	Record exists <sup>2</sup>	Potential to be present
<b>Threatened and Endangered Plants</b>						
<i>Aster</i>	<i>curtus</i>		White-topped aster	ST		✓
<i>Aster</i>	<i>vialis</i>		Wayside aster	ST	✓	
<i>Castilleja</i>	<i>levisecta</i>		Golden Indian-paintbrush	SE, FT	✓	
<i>Howellia</i>	<i>Aquatalis</i>		Howellia	ST, FT		✓
<i>Lomatium</i>	<i>bradshawii</i>		Bradshaw's lomatium	SE, FE	✓	
<i>Lupinus</i>	<i>sulphureus</i>	<i>kincaidii</i>	<b>Kincaids lupine</b>	ST, FT		✓
<i>Sidalcea</i>	<i>nelsoniana</i>		<b>Nelson's checkermallow</b>	ST		✓
<b>Plants of Special Concern</b>						

Genus	Species	Subspecies	Common name <sup>1</sup>	Status	Record exists <sup>2</sup>	Potential to be present
<i>Aster</i>	<i>gormanii</i>		<b>Gorman's aster</b>	SP	✓	
<b>Candidate Plants</b>						
<i>Cimicifuga</i>	<i>elata</i>		Tall bugbane	SC		✓
<i>Corydalis</i>	<i>aquae-gelidae</i>		<b>Cold water corydalis</b>	SC	✓	
<i>Erigeron</i>	<i>oreganus</i>		<b>Oregon daisy</b>	SC		✓
<i>Montia</i>	<i>howellii</i>		Howell's montia	SC		✓
<i>Sisyrinchium</i>	<i>sarmentosum</i>		<b>Pale blue-eyed grass</b>	SC		✓
<i>Sullivantia</i>	<i>oregana</i>		<b>Oregon sullivantia</b>	SC		✓

<sup>1</sup>Plant names in bold are on the NW FMP list of plants.

<sup>2</sup>Plants have been observed on or in close proximity to state forestlands.

**Status:**

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

***Forest Health***

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

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

***Fish and Wildlife***

The North Cascades District is comprised of a variety of habitat types that support many native species found in forests in the Oregon Cascade Range (Johnson and O'Neil 2001). Appendix E [of the FMP] contains lists of native fish and wildlife species, with scientific names, that are currently known, or are likely, to exist within the area covered by the NW FMP. In addition, many game and furbearer species occur on the district. Some of the most

common game species are black-tailed deer, Roosevelt elk, and black bear. Also common are beavers, mountain beavers, cougars, bobcats, and coyotes.

Of the many wildlife species potentially found on the North Cascade District, the northern spotted owl is listed as threatened under both the federal and state Endangered Species Acts. The northern spotted owl was listed as threatened by the USFWS in 1990. The North Cascade District has conducted a northern spotted owl survey program since 1990. Currently, there are four known spotted owl sites on the district. Three are classified as “pair status” and the fourth is classified as “resident single”. There are 14 additional known spotted owl sites near state forest lands that may affect management practices on the district. The protection measures for the northern spotted owl are described in the *State Forest Division Operational Policies for: Northern Spotted Owls (2011)*.

The streams, rivers, lakes, and other water bodies on the North Cascade District provide habitat for a variety of fish species. There are approximately 66 miles of known fish bearing streams on ODF ownership within the district. Fish presence surveys continue on an as needed basis. Native salmonid species that have been confirmed on the North Cascades District include chinook salmon, coho, steelhead trout, and coastal cutthroat trout. The influence of Big Cliff and Detroit Dams on Chinook and Winter Steelhead is an important backdrop for the North Santiam Watershed. The dams adversely affect Chinook and steelhead by blocking access to a large amount of their historical habitat upstream of the dams and by contributing to degradation of their remaining downstream habitat. Specific threats from flood control and hydropower management include: 1) blocked or impaired fish passage for adults and juveniles, 2) loss of some riverine habitat (and associated functional connectivity) due to reservoirs, 3) reduction instream flow volume due to water withdrawals, 4) lack of sediment transport and role in habitat function, 5) altered physical habitat structure, and 5) altered water temperature and flow regimes (ODFW and NOAA 2011). Protection measures for fish habitat are described in the aquatic and riparian strategies in the *NW State Forests Management Plan (2010)* and *State Forests Species of Concern Operational Policy (2012)*. 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 maintenance and restoration of habitat.

### **Species of Concern**

Species of Concern Strategies, adopted in 2012, specifically identify fish and wildlife species of concern on the North Cascade District. Species of concern include those on federal or state ESA lists, state sensitive species, and strategy species for the West Cascade Range ecoregion (Oregon Conservation Strategy). Strategies in addition to the *NW State Forests Management Plan (2010)* to address these species are identified in policy. These strategies include:

- Identification of a Terrestrial Anchor (TA) Site. The TA in this district is intended to benefit primarily species associated with high elevation lakes, wetlands, and forests. Management within the TA will emphasize protection of existing high elevation lakes, wetland, and talus slopes. Management within the forested portions of the TA will promote development of mature forest conditions. Harvest will be limited to

thinning projects that benefit high elevation forest plant communities. ODF biologists will assist in developing management prescriptions within TAs.

- Identification of Aquatic Anchor (AA) sites which are watersheds where salmonid and aquatic amphibian conservation is of concern. 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. The species and types of sites that will be addressed on a site-specific basis include: bald eagle nesting and roosting sites, peregrine falcon nest sites, band-tailed pigeon mineral springs, great-blue heron nesting rookeries, osprey nest sites, black swift nest sites, and Townsend’s big eared bat roosting sites (particularly caves and mines). Where known sites exist, plans will be developed to address protection of habitat and/or prevention of disturbance.
- Additional strategies exist for stream restoration projects and creation of snags in some regeneration harvest areas.
- Wildlife strategy species identified by ODFW in the Oregon Conservation Strategy (ODFW 2006) that are known or likely to occur on the North Cascade district are shown in Table 5.

**Table 5. List of Fish and Wildlife Species of Concern for the North Cascade District.**

<b>Species</b>	<b>Reason Included</b>	<b>Regulatory Status</b>
<b>AMPHIBIANS</b>		
Clouded Salamander	Strategy Species	SSV
Coastal Tailed Frog	Strategy Species	Fsoc, SSV
Cascade Torrent Salamander	Strategy Species	SSV
Oregon Slender Salamander	Strategy Species	Fsoc, SSV
Foothill Yellow-legged Frog	ODFW Input	Fsoc, SSV (W Valley)
Western Toad	Strategy Species	SSV
Cascades Frog	Strategy Species	Fsoc, SSV
<b>REPTILES</b>		
Northwestern Pond Turtle	Strategy Species	Fsoc, SSC
<b>BIRDS</b>		
American Peregrine Falcon	Strategy Species	SSV
Bald Eagle	Strategy Species	ST
Band-tailed Pigeon	Strategy Species	Fsoc
Great-blue Heron	Protected by FPA	FPA
Northern Goshawk	Strategy Species	Fsoc
Northern Spotted Owl	Strategy Species	FT, ST
Olive-sided Flycatcher	Strategy Species	Fsoc, SSV

<b>Species</b>	<b>Reason Included</b>	<b>Regulatory Status</b>
Osprey	Protected by FPA	FPA
Little Willow Flycatcher	ODFW Sensitive/ODFW Input	SSV
Purple Martin	ODFW Sensitive	Fsoc, SSC
Western Bluebird	ODFW Sensitive	SSV
Black Swift	Strategy Species	none
<b>MAMMALS</b>		
American Marten	Strategy Species	SSV <sup>2</sup>
California Myotis	Strategy Species	SSV
Fringed Myotis	Strategy Species	Fsoc, SSV
Hoary Bat	Strategy Species	SSV
Long-legged Myotis	Strategy Species	Fsoc, SSV
Silver-haired Bat	Strategy Species	Fsoc, SSV
Yuma Myotis	ODFW Input	Fsoc
Townsend's Big-eared Bat	Strategy Species	Fsoc, SSC
Red Tree Vole	Strategy Species	Fsoc, SSV
Pika	ODFW Input	None?
<b>FISH</b>		
Bull Trout, MF Willamette	Strategy Species	FT, SSC
Chinook, Lower Columbia, Fall	Strategy Species	FT, SSC
Chinook, Lower Columbia, Spring	Strategy Species	FT, SSC
Chinook, Upper Willamette, Spring	Strategy Species	FT, SSC
Chum, Lower Columbia	Strategy Species	FT, SSC
Coastal Cutthroat, Lower Columbia River (Southwest Washington Columbia River)	Strategy Species	Fsoc, SSV
Coastal Cutthroat, Willamette (Upper Willamette)	Strategy Species	none
Coho, Lower Columbia	Strategy Species	FT, SE
Lamprey, Western Brook	Strategy Species	Fsoc, SSV
Lamprey, Pacific	Strategy Species	Fsoc, SSV
Lamprey, River	Federal SOC	Fsoc
Steelhead, Lower Columbia, Winter	Strategy Species	FT, SSC
Steelhead, Willamette (Upper Willamette), Winter	Strategy Species	FT, SSV
Oregon Chub	Strategy Species	FT, SSC

### **Aquatic Anchors**

Rock Creek and Sardine Creek Watersheds are designated as Aquatic Anchors (AAs) and were selected through a collaborative effort with ODFW District Fish Biologists, State

Forests Aquatic Specialist, District Forester, and district staff. The Rock and Sardine Creek watersheds meet the landscape design principles described under the “Landscape Design” section of this document. Fish are well distributed throughout the Rock Creek Watershed and Sardine Creek presents a unique opportunity for an aquatic anchor with amphibian emphasis. A relatively high percentage of ODF ownership in each watershed means that management actions have a higher likelihood of influencing watershed processes. Additional Species of Concern Strategies applied within AA’s are intended to lower short term risk to salmonids and amphibians while landscape strategies foster the development of properly functioning aquatic systems and suitable habitat forest-wide.

**Rock Creek**

ODF owns 77 percent of the Rock Creek Watershed (Table 6). Of all the watersheds in the North Cascades District this one has a high percentage of ODF ownership and provides high quality habitat for Chinook and steelhead. ODF-contracted surveys were conducted for aquatic amphibians in this watershed in 2004. During those surveys, coastal tailed frogs and Cascade torrent salamanders appeared to be relatively common and widespread in the watershed. The landscape design designates 74 percent of the watershed to be managed for complex structure. Having a large percent of the watershed in complex forest structure is beneficial for watershed processes that influence stream flow, stream temperature, large wood recruitment and sediment routing. Wider no-harvest areas around Fish and Non-fish streams when clearcut harvesting will further reduce the potential for short term risks to aquatic habitat. For all Fish streams there will be 100-ft no-harvest buffers and for most small Non-fish stream there will be a 50-ft no harvest buffer.

**Sardine Creek**

Sardine Creek is located between Big Cliff Dam and Detroit Dam, neither of which pass anadromous fish. The Upper Willamette Restoration Plan proposes an ODFW program to truck adult Chinook around the dams, but the program is not well developed yet. Eventually ODFW’s program will focus on wild Chinook isolating the watersheds above the dam for wild fish only. Currently Sardine Creek watershed is likely to provide high quality habitat for Amphibian Species of Concern and cutthroat trout and all three species are likely to occur in this anchor. No surveys for SOC have been conducted in this AA to date. However, Oregon Slender Salamanders have been reported on adjacent USFS lands (as reported in the Oregon Biological Diversity Institute database). ODF manages 43 percent of the watershed (Table 6) and therefore may have a relatively strong influence on watershed-level processes. Wider no-harvest areas when clearcut harvesting around Fish and Non-fish streams will further reduce the potential for short term risks to aquatic habitat.

**Table 6. Characteristics for aquatic anchors.**

<b>Watershed Characteristics</b>	<b>Sardine Creek</b>	<b>Rock Creek</b>
Aquatic Anchor Acres	3,514 acres	12,263 acres
Percent ODF Ownership	43%	77%
Percent of ODF Ownership Designated for Complex Structure	0%	74%

Anadromous Fish Distribution		
Coho	0 miles	0 miles
Steelhead	0 miles	3.5 miles
Chinook	0 miles	2.8 miles
Miles of Medium and High Intrinsic Potential	TBD	TBD

## Terrestrial Anchor

The Rhody Lake Terrestrial Anchor (TA) is located in the Butte Creek Management Basin and is 1,332 acres in size. Elevations range from approximately 2800 to 4200 feet. The TA includes Rhody Lake, the Butte Lake complex, the headwaters to Butte Creek, wetlands and wetland-associated shrub habitat, talus slopes, and conifer forests. The TA contains recreational trails connecting Rhody Lake to Butte Lakes. The primary Species of Concern expected to benefit from designation of this TA are species associated with ponds, lakes, and wetlands (especially the Cascades Frog and little willow flycatcher), talus slopes (pika), and conifer forests (e.g., bats, Oregon slender salamander). Although no data currently exists for species occurrence in this TA, data from the Oregon Biodiversity Program indicate that the Oregon Slender Salamander and Coastal Tailed Frog are known to be present on nearby BLM land. It is likely that these two species, as well as many additional SOC, are likely to be present within the TA.

## Human Uses

### *Forest Management*

Table 7 shows the current annual objectives of silvicultural management activities as well as the ten-year average of acres accomplished.

**Table 7. Silvicultural Management Activities**

Activity	Current Level <sup>2</sup> (Acres Per Year)	Ten-Year Average (Acres Per Year)
Regeneration Harvest <sup>1</sup>	183	249
Partial Cut	503	730
Reforestation	417	309
Precommercial Thinning	0 <sup>3</sup>	168
Fertilization	0	0
Pruning	0 <sup>3</sup>	30

1. Under Oregon Department of Forestry management, this refers to a regeneration harvest (clearcut, 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. Current levels are taken from the district's most recent approved Annual Operations Plan, which is the Fiscal Year 2012 Annual Operations Plan.

3. Customary annual objectives of 250-300 acres of Pre-commercial Thinning and 0-100 acres of Pruning were deferred due to budget constraints for FY 2010-2012. However, 760 acres of PCT were accomplished through an ARRA funded grant.

## ***Roads***

The North Cascade District’s primary road network is an established system that has been in place for 50 to 60 years. It provides access for forest management activities, fire suppression, and recreation. (Note: these roads are designed and maintained for forest management activities, so the public should use care when traveling these roads). Visions, guiding principles, and goals for managing the district’s road network are discussed in the *Northwest Oregon State Forests Management Plan* and the *Forest Roads Manual* (July 2000). The *Forest Roads Manual* also provides standards and guidance for all road management activities and definitions, road classifications and other terms. The following table shows the approximate number of miles by road use standard:

***Table 8. North Cascade District Road System***

<b>Road Classification</b>	<b>Miles</b>
Mainline	14
Collector	99
Spur	204
Administrative	0
<b>Total Miles</b>	<b>322</b>

Approximately 55 percent of the road miles are located on mid-slopes. This is a result of the long slopes common in the Cascades and the fact that many of the district’s roads are located on old railroad grades that were often on mid-slopes. Thirty-five percent of the roads are located on ridge tops and 10 percent are in valley bottoms.

Over 89 percent of the road miles are surfaced with rock. Natural rock (pit run) quarries are common in the district and are frequently used for road surfacing. Clean crushed rock has been applied on approximately 65 percent of the road miles in the district.

Approximately 21 culverts are installed in known fish-bearing streams. Of these, approximately 18 culverts will allow all fish to move upstream and downstream. The remaining culverts are either full or partial barriers to fish passage (blocking upstream passage of all fish or blocking upstream passage of juveniles and/or adults at some stream stages). See the Aquatic Habitat Restoration section under Management Strategies later in the document for more detail on strategies to address this issue.

The type and level of road activity that will occur during the planning period is discussed in the **Proposed Management Activities** and **Management Basins** sections of this document.

# Recreation

## District Overview

### *Recreation*

The Santiam State Forest is within two hours of Portland and 45 minutes of Salem, via Highway 213 or Highway 22. Traditional recreation uses on the forest have been dispersed hunting, fishing, camping, and off-highway vehicle use primarily by Clackamas, Marion and Linn County citizens. Users from outside the district often use the forest for these same purposes

The level of use for recreation activities has increased over time. In 2000, a Santiam Recreation Plan was developed to help guide recreation management on the forest. In the 12 years since the adoption of the recreation plan, much has been accomplished; therefore a recreation plan with new goals and objectives needs to be created. This IP will establish the new recreation goals and objectives for the district and will replace the 2000 Santiam Recreation Plan.

The recognized system for classifying settings and the experience they provide is the Recreation Opportunity Spectrum (ROS). The ROS is a continuum of recreational settings ranging from primitive (wilderness) at one end and urban (cities) at the other. It is a common method of defining a provider's role and is used extensively by federal, state, and local agencies. Recreation on the Santiam State Forest has been managed to provide settings that lie at the mid-range of the spectrum within the categories of Roded-Natural and Roded-Modified.

**Roded-Natural:** Forest setting that generally appears natural or slightly altered. Access is by highway, road and trail. Users can expect to meet moderate numbers of other people. Facilities such as developed campgrounds, trailheads and trails are present but widely distributed. Occasional use of off-highway vehicles occurs. There are ample opportunities to seek solitude and participate in activities where there are no facilities and few people.

**Roded-Modified:** Forest settings that have obviously been altered by timber harvesting. Access is by highway, road and trail. Users can expect to meet a high level of other people in concentrated locations along rivers, peaks and developed sites. Facilities such as developed campgrounds, trailheads and day use areas are numerous. Frequent and concentrated use of off-highway vehicles occurs. There are limited opportunities to seek solitude and participate in activities where there are no facilities or other people.

Since 2000, the landscape has been managed to accomplish the general description of recreational settings as described above. The forest provides rustic, natural, high quality facilities in locations where resources are compatible with recreation and the need for

development has been identified. In general, the following general approaches have been used:

### **1. Campgrounds**

- a. Fees are charged for overnight use.
- b. All have barrier-free vault toilets, designated campsites and ADA compliant trails where feasible.
- c. Drinking water is available from a centralized well with hand pump where ground water and geology allow.
- d. Campsites are equipped with fire grates, picnic tables, tent pads and site markers.

### **2. Day-use Areas**

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

- a. Generally include space for parking, information boards and picnic tables.
- b. Vault toilets may be available at heavily used areas.

### **3. 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:

- a. Parking area large enough for turnaround space for OHV trailers
- b. Vault toilet facilities at heavily used sites
- c. Trash receptacles at heavily used sites

### **4. Equestrian Staging Area:**

- a. Parking area large enough for turnaround space for stock trailers
- b. Vault toilet facilities at heavily used sites
- c. Provide day-use access to equestrian trail
- d. Trash receptacles at heavily used sites
- e. Campground area is designed for equestrian use – pull through sites, corrals and manure bins.

### **5. Trailheads:**

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

## ***Recreation Resources***

Following these guidelines, the Santiam State Forest has five designated campgrounds: Butte Creek Campground, Rhody Lake Campground, Rock Creek Campground, Santiam Horse Camp and the Shellburg Falls Campground. Day use areas include Butte Creek Falls

trail, Crooked Finger ATV trails, High Lakes trail, Monument Peak trails, Natural Arch trail, Rocky Top trail, Shellburg Falls trails and Shellburg Falls Free Ride Mountain Bike trails.

#### Butte Creek Basin

Butte Creek Campground offers 3 car camping sites as well as fishing and swimming opportunities along Butte Creek. There is access to .6 miles of hiking trails along the Butte Creek Falls trail system.

Rhody Lake Campground offers 3 car campsites as well as swimming, fishing and non-motorized boating opportunities on Rhody Lake. There is access to 1.3 miles of hiking trails on the High Lakes trail system nearby.

#### Cedar Creek Basin

The Crooked Finger ATV trail system offers a staging area and 6.6 miles of trails.

#### Green Basin

The Natural Arch trail offers .4 miles to hike.

The Rocky Top trail also offers .7 miles to hike. Trail ends at a historical lookout site used in the 1950's era.

#### Rock Creek Basin

Rock Creek Campground offers 4 car campsites as well as fishing and swimming opportunities along Rock Creek.

#### Mad Creek Basin

Santiam Horse Camp offers 9 car campsites with corals for horses and 2 walk-in camp sites. There are access to 9.2 miles of equestrian, mountain bike and hiking trails within the Monument Peak trail system.

#### Scattered Basin

Shellburg Falls Campground offers 4 car campsites, 3 walk-in campsites and a large shelter for group gatherings. There are 1.3 miles of hiking only trails, 6.1 miles of multipurpose trails and 4.6 miles of extreme mountain bike trails.

Most of the Santiam Forest is used for dispersed recreation, including dispersed camping, hunting, fishing, mountain biking, ATV riding and horseback riding on forest roads are all popular recreational activities.

### ***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 goals for activity zone designations are to minimize resource impacts, reduce conflicts between different users and forest management activities, 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 minimization of these affects across the forest. In addition, it will focus certain activities in areas that are more suitable for a particular activity. See Map Section, *Recreation Activity Zones*, for information on zone boundaries.

The current designation of the zone boundaries involve many components. First, the staff reviewed all of the ideas generated, compiled and prioritized from Stage 3 and proposed an initial map to the Citizen Advisory Committee (CAC). The CAC provided feedback on the draft preliminary zones. The following criteria were used to arrive at the proposed activity zoning map for Santiam State Forest:

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

For example, 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. Note too, that areas of the forest known to contain sensitive, threatened, or endangered wildlife species will be managed in a manner to protect those species.

The activity zone boundaries include three categories: (1) non-motorized, (2) motorized, and (3) not designated. Trails developed and designed 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 designed in a motorized zone will focus on motorcycles and all-terrain vehicles (ATV). Motorized use in the “motorized zone” of the Forest is to be confined to gravel roads and officially designated, signed trails.

### ***Volunteer Program***

The recruitment and use of volunteers is critical to the overall success of the recreation program. The district currently manages a volunteer program that includes the following: Camp Host, Adopt-a-Trail, Adopt-a-Camp, Boy Scout Eagle Scout service projects and various trail maintenance and cleanup projects. These programs are expected to grow. The volunteer program takes a substantial amount of dedicated staff time for effective planning and use of volunteers.

## ***Event Management***

The Santiam State Forest permits organized club-sponsored trail use events. On the average the forest permits 8 to 10 events a year. The events range from trail runs, mountain bike events, repelling, summer camp for special needs kids and club equestrian rides.

## ***Scenic***

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

## ***Cultural Resources***

Cultural resources are scattered throughout the forest, mostly from the early logging and homesteading that took place on the Santiam 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 *Santiam State Forest Recreation and Cultural Resource Inventory and Assessment Report* (ODF-2002) provides the first inventory of cultural resources on the Santiam State Forest. This inventory is not complete ; however, it provides a foundation of information the district can use in management planning.

## **Forest Stand Types—Current Condition**

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

In order to determine the current condition of the stand structure array on the district, an algorithm in the Stand Level Inventory (SLI) was used. The algorithm uses a variety of stand characteristics such as diameter, heights, trees per acre, density, snags, down wood and understory vegetation to determine stand structures.

Currently 57 percent of the stands on the North Cascade have been inventoried. Information for unmeasured stands is generated by imputation. Imputation uses specific information from a single measured stand to represent similar unmeasured stands.

In order to correct any errors from imputed data, all silvicultural prescriptions will be based on actual field reconnaissance during pre-operational analysis and planning, rather than just SLI data.

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

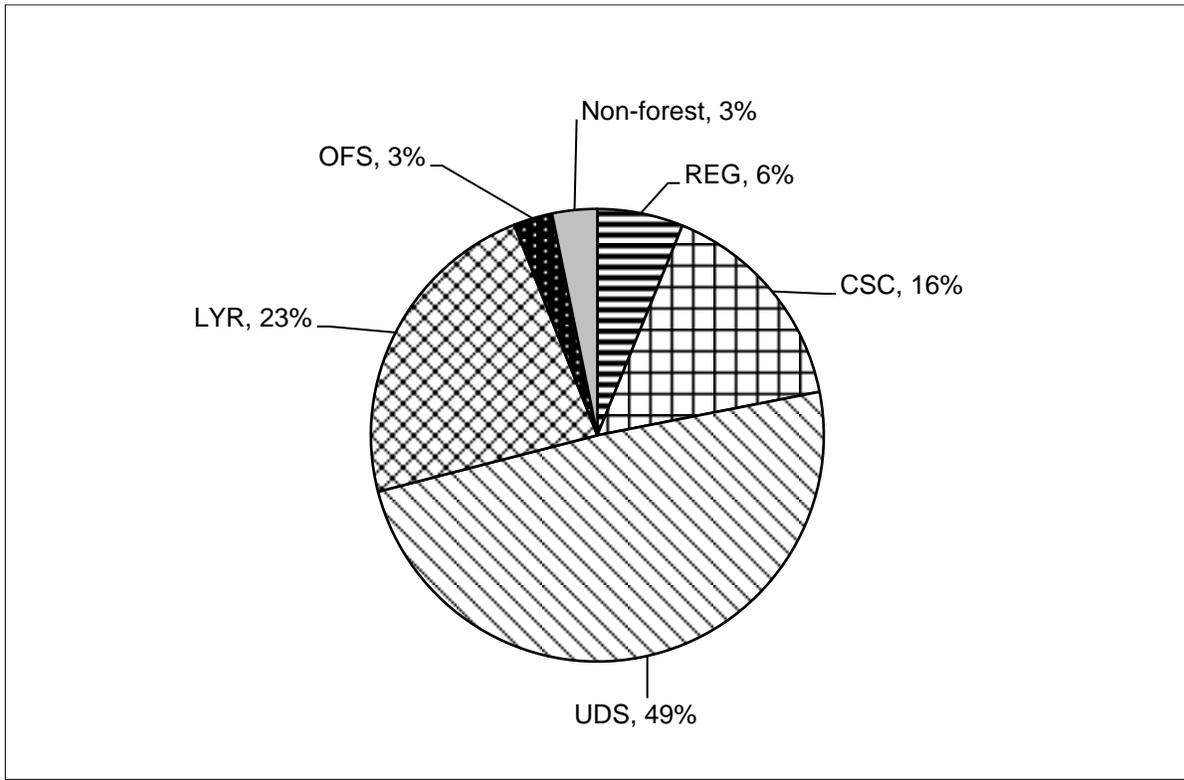
#### **Abbreviations for Forest Stand Structure Types**

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

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*Figure 1. Current Stand Structure, by Percent<sup>1</sup>*

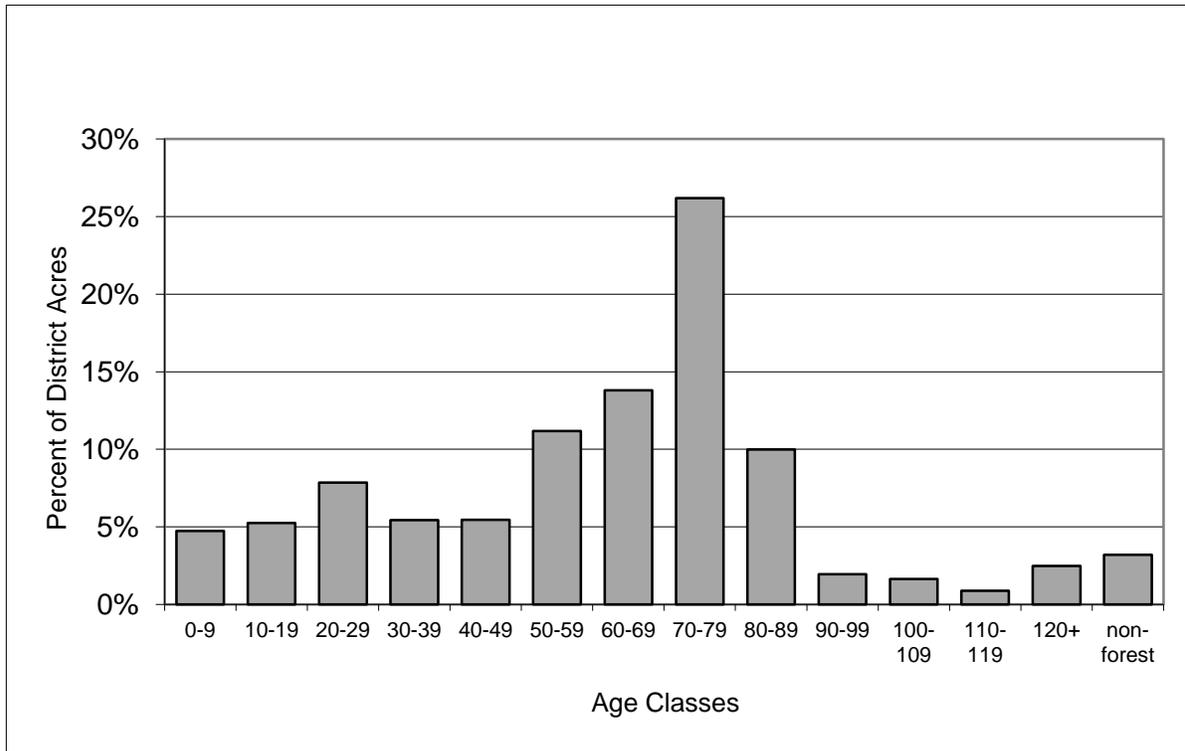


1. Based on 2009 SLI data

Note: Non-forest (NF) lands are those areas, greater than 5 acres that are maintained in a permanently non forest condition. Examples include district offices and large power line right-of-ways.

The district's largest stand structure class is UDS. The most limited stand structure class on the district is OFS. Partial cutting will be the main tool used to move stands into a more complex structure class on the district. Snags and down wood may need to be added to layered stands to help them cross over to the older forest structure classification. More details can be found in the **Management Activities in Each Stand Class** section of this plan.

**Figure 2. Stand Age Distribution, by Percentage of acres**



The age class distribution of the North Cascade District is the result of past harvest activities. Thinning as a stand management tool within the district started in the 1980's with a very minor amount of acreage accomplished each year. By 1992, the amount of acreage targeted for thinning increased. The younger age classes are the result of regeneration harvests.

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# Management Activities

## Current Condition Analysis

### *Stand Structures Interaction*

The Current Condition Analysis and the Landscape Design sections of this Implementation Plan describe the amount of each of the identified forest stand types. As described in the *Northwest Oregon State Forests Management Plan* (April 2010), the stand types represent only five points along a continuum of forest development. Five “stand” types were developed as a means to plan for and assess the development of the forest toward a range of “forest” types over time. Because the five types are only points along a continuum they do not express five specific habitat types nor are they perceived as discrete habitats by wildlife species. This is discussed in detail in Appendix C of the *Northwest Oregon State Forests Management Plan* (April 2010).

### *Regeneration*

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

### *Closed Single Canopy*

Stands clearcut more than 15 years ago are now considered to be in the closed single canopy stand structure. CSC stands currently make up 16 percent of the Santiam Forest. Generally, these are Douglas-fir plantations with remnants from the prior stand. These areas have a single, dense, even-aged layer of conifer trees. Other closed single canopy stands are older, dense, naturally regenerated stands that have not been previously partial cut. These are typically mixed conifer stands that include Douglas-fir, hemlock, western redcedar, and noble fir. They are generally dense stands that have an overstory of conifer and an understory of very suppressed brush species and an insignificant amount of hemlock seedlings and/or saplings.

### *Understory*

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

have allowed an understory to develop. These stands often have mixed species in the overstory as well. At the beginning of the 2003 IP, CSC was the largest category, by percent of acres. At 46 percent, UDS now is the most extensive structure category. This demonstrates the effect of applying Structure Based Management over the last 10 years.

### ***Layered***

The Santiam State Forest has an increasing number of stands that are in the layered stand structure. These are the results of a fairly aggressive partial cutting program during the 1970s and 1980s. Approximately 8,500 acres were partial cut. Some partial cuts were heavy enough to allow the layered stand structure conditions to develop. These stands generally have a large overstory of Douglas-fir with an understory of hemlock, alder, and bigleaf maple. Layered stands currently comprise 23 percent of the forest.

### ***Older Forest Structure***

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

### ***Hardwoods***

Although hardwood stands are not a stand structure type as defined in *the Northwest Oregon State Forests Management Plan* (April 2010), they do play a role in the mix of stand structures across the landscape. There are approximately 600 acres of hardwood stands within the Santiam State Forest. Other patches of hardwoods exist along streams and in small patches within conifer stands. Hardwood management is an evolving process and nontraditional silvicultural practices may be considered to manage and perpetuate hardwood stands. A component of hardwoods in mixed stands will be maintained during stand management activities.

### ***Non-Silviculturally Capable and Non-Forest Types***

Less than three percent of the district is classified as Non-Silviculturally Capable (NSC) and Non-Forest (NF) types. The NSC areas are located on two sites: a meadow with very shallow soils and a forested area on a very poor site. The NF areas include such areas as power line corridors and cell towers/communication sites.

NSC forest lands are defined in administrative rule OAR 629-35-0040 as not capable of annual wood production of 20 cubic feet per acre at culmination of mean annual increment. However, these lands do provide unique and significant habitat contributions to the district landscape. NSC lands are characterized by geologic and hydrologic conditions unsuitable

for the commercial growth and harvest of forest tree species. Geologic conditions include rock cliffs, talus slopes, rock slopes and outcroppings, and other substrate conditions incapable of supporting forest tree species. Hydrologic conditions include floodplains, marshes, beaver ponds, and other aquatic conditions that prevent the growth of forest tree species. These lands provide for plant and animal communities not associated with the other forest structures.

NF lands are silviculturally capable areas, greater than 5 acres that are either maintained in a permanently non-forest condition.

NSC and NF areas are not considered part of the commercial forest land base and will not be managed for the growth and harvest of forest tree species.

## **Management Activities in Each Stand Type**

This section describes the various management activities and the effects of management for each structure type.

### ***Regeneration Stands***

Management practices will be applied to these young stands in order to quickly re-establish tree cover and maintain tree growth, while providing big game forage and wildlife habitat. These stands have the potential to move through all of the stand structures toward OFS, depending on current and future landscape designs. All current and future regeneration harvests are designed to retain some live green trees, snags, and down wood. These structural components in the young plantation will contribute to the proper habitat function of REG stands throughout their growth and development.

### **Reforestation**

Reforestation promptly follows all regeneration harvests and patch-cut harvests where at least one-quarter acre has been removed. Site-specific conditions determine species composition, stock type, and stocking levels. A variety of conifer species are planted during reforestation, including Douglas-fir, western hemlock, and western red cedar. Red alder is sometimes planted in areas that contain root rot disease that is harmful to conifer species. Tree planting, site preparation, vegetation management, and tree protection activities are important for successful stand establishment and maintenance. Site-specific prescriptions may include slash piling, prescribed burning, herbicide treatments, manual release, and tubing (of seedlings to protect them from animal damage).

### **Pre-commercial Thinning**

Pre-commercial thinning (PCT) is an important density management practice in young, dense stands. PCT generally occurs in stands between 13 and 17 years old and removes small or defective trees, in order to provide more water, light, and nutrients to increase the growth of the healthy residual trees. In addition, PCT delays the canopy from closing, thus preserving the growth of herbaceous vegetation required by big game; and provides an opportunity to maintain species diversity in the plantation through tree selection.

### **Pruning**

Pruning removes the limbs on the lower 9 to 24 feet of the tree bole. It is conducted to improve wood quality or to prevent certain diseases. Currently, only white pines are pruned to prevent infection from white pine blister rust. In the past, Douglas-fir has been pruned to increase wood quality, with the added benefit of reducing bear damage; however, it has not been found to be a cost effective investment for State Forests. An additional benefit of pruning is that it helps post-pone the CSC condition, thus retaining big game forage for a longer period of time.

## ***Closed Single Canopy Stands***

### **Fertilization**

No stand fertilization is planned during this Implementation Plan period, because it would not be a cost effective investment considering the silvicultural prescriptions that are anticipated under this IP.

### **Partial Cut**

Past management experience has found that most CSC stands respond well to partial cutting. Not only do the residual trees grow faster, but also complex structures and diverse habitats develop more rapidly, with the creation of snags and down wood, and the introduction of a shade-tolerant shrub and conifer understory (such as western hemlock, western red cedar, vine maple). Partial cutting improves forest health by increasing stand vigor and lowering susceptibility to damage from insects and disease. Partial cutting also produces timber, revenue, and enhancements to other resources, including scenic and wildlife resources. Therefore, the majority of current CSC stands will be partial cut, to help these stands develop into the UDS structure.

In planted stands, the first partial cut occurs sometime between age 25 and 35 years. A second thinning usually is conducted around 15 years later. Partial cuts in CSC natural stands will contain a variety of ages, sizes, and stand densities.

Partial cuts in areas with a DFC of general will have a silvicultural thinning prescription that reduces stocking enough to increase or maintain individual tree growth. Trees are left evenly spaced over the stand. The goal is to produce high quality; high volume stands at final harvest.

### **Underplanting/Patch Cutting**

In areas with a DFC of complex, stands may receive a similar prescription to the one mentioned above, or the stand may be thinned heavier to allow understory re-initiation (i.e. establishment of a second layer of trees), either natural or planted. In addition, small patch cuts (from 1-5 acres in size) may be introduced and replanted. Both under planting and patch cut planting is done with shade tolerant conifer or hardwood. The goal here is to increase diversity and put the stands on a pathway towards a complex structure. Under planting and patch cutting will occur only on sites well suited for these activities and only if funding is available.

### **Clearcut Harvests**

Snags and down wood will be created when clear cutting CSC stands; however, the amounts created will depend on site-specific conditions, including tree size, number of existing snags, and the amount and condition of the down wood.

In hardwood stands, particularly those with very few or small conifer trees, it will be necessary to meet the residual live tree, snag, and down wood goals using hardwood trees and logs. Although hardwood snags and down wood do provide short-term wildlife habitat and some other ecosystem needs, they do not persist long enough to provide the legacy necessary to achieve older forest structure. On these sites with very low conifer stocking, the

district will develop site-specific prescriptions, which may include lower targets of residual trees, snags, and down wood, in order to meet the overall long term goals of the *Northwest Oregon State Forests Management Plan*.

## ***Understory Stands***

### **Partial Cut Harvests**

Partial cut harvests in UDS stands are intended to reduce the canopy density, while maintaining and encouraging the development of an understory component or complexity in stands designated as DFC complex. Some of these stands occurred naturally, while others are the result of previous partial cut operations. Snags and down woody material may be created during these stand entries dependant on site specific conditions.

Partial cuts in areas with a DFC of general will have a silvicultural thinning prescription that reduces stocking enough to increase or maintain individual tree growth. Trees are left evenly spaced over the stand. The goal is to produce high quality; high volume stands at final harvest.

### **Under planting/Patch cutting**

In areas with a DFC of complex, stands may receive a similar prescription to the one mentioned above, or the stand may be thinned heavier to allow the existing understory to continue to grow. If the understory contains mainly brush, an understory of conifer may be planted. In addition, small patch cuts (from 1-5 acres in size) may be introduced and replanted. Both under planting and patch cut planting is done with shade tolerant conifer or hardwood. The goal here is to increase diversity and put the stands on a pathway towards a complex structure. Under planting and patch cutting will occur only on sites well suited for these activities.

The ability to reforest under plant areas and patch cuts often depends on funding.

### **Clearcut Harvest**

Most clearcut harvests conducted under this IP will be in understory stands predominately in areas of DFC general. In DFC complex areas, some clear cutting may occur in understory stands that will not easily develop the complexity needed for LYR stands or in cases of disease or severe environmental damage.

UDS stands that are poor candidates to develop into LYR or OFS typically consist of overstory Douglas-fir, with an understory of dense shrub cover such as vine maple, hazel, or salal. Due to the height of the existing tree canopy and the difficulty in establishing seedlings in the thick understory vegetation, it is extremely difficult to develop these stands into LYR and OFS.

Occasionally UDS stands are clearcut because *Phellinus weirii* infection is so severe.

Snags and down wood may be created during these stand entries.

## ***Layered Stands***

### **Partial Cut Harvests**

Partial cut harvests in LYR stands are intended to reduce the canopy density, while maintaining and encouraging further development of LYR and OFS components such as large overstory trees and understory vegetation layering. Some of these stands occurred naturally, while others are the result of previous partial cut operations. Snags and down wood will be created during these stand entries if needed. Where a LYR stand has the potential of achieving OFS structure, by the addition of a few snags and some down wood, and a commercial harvest operation is not necessary or viable the district will consider creating these structure components through another means, depending on funding availability.

### **Clearcut Harvests**

Some stands classified as LYR may be considered for clearcut harvest if they are not in an area designated to become complex structure. Clearcutting will result in a REG stand of vigorously growing trees, with some live green trees, snags, and down wood remaining from the previous stand.

## ***Older Forest Structure Stands***

### **Partial Cut Harvests**

OFS stands will likely be left unmanaged during this planning period. However, it is possible that a dense stand of OFS could be partial cut to promote increased overstory tree diameter growth and understory tree response. This would also be an opportunity to create additional hard snags and large down wood within the stand.

### **Clearcut Harvests**

Because there are so few stands that are currently in OFS, no clearcuts are planned in OFS stands during this implementation plan period.

## **Proposed Management Activities**

This section describes the management activities that will be accomplished starting in Fiscal Year 2013.

All management activities will be designed consistent with FMP strategies (Chapter 4 in the FMP) for the conservation of resources including those related to slope stability, cultural, scenic resources, and plants.

## ***Harvesting***

The Annual Harvest Objects (AHO) in Table 9 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 is determined through the District Opportunity Analysis described in Appendix A. The Opportunity Analysis establishes 19 MMBF as the sustainable volume that can be produced to meet the goals of the Northwest Oregon State Forest Management Plan as applied through this Implementation Plan. The acre ranges for regeneration harvest and partial cut harvest describe the types of harvest activities that will occur over time to achieve the volume objective and desired future condition of stand structures.

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

The acres of regeneration harvesting and partial cutting proposed in each Annual Operations Plan will normally be within the ranges identified in Table 9, 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 indentified 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 significant shift in the AHO is necessary; this Implementation Plan will be revised.

***Table 9. Annual Partial Cut and Regeneration Harvest Objectives, by Volume and Acres***

Volume (MMBF)	Regeneration Harvest Acres	Partial Cut Harvest Acres
19	110-450 <sup>2,3</sup>	290-1170 <sup>1,3</sup>

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. The large range of partial cut and regeneration harvest acres is due to several factors. The number of acres harvested to meet the volume target for the district depends on the volume per acre of the stands. If high volume stands are being harvested, fewer acres will need to be cut to meet the volume target. If lower volume stands are being harvested, then more acres will need to be cut to meet the volume target. The large acreage range also gives the district flexibility to respond to natural disturbances, stand conditions and market conditions. For instance, if a significant wind event occurred, the district would have the flexibility to have higher regeneration harvest acres to respond to those situations if needed. In good market conditions, partial cutting acres may be higher. In low market conditions, regeneration harvest acres may be higher.

See **Appendix A** for additional information on the rationale and method applied to determine the proposed silvicultural activities in Table 9 above.

### ***Structure Outputs***

The harvest levels proposed in this implementation plan will contribute toward the desired future structure targets as outlined in Table 14, **Information Summary for all Management Basins**. Table 10 shows an estimate of desired future structure targets at the end of this implementation planning period.

Partial cutting will be the primary silvicultural stand management activity to advance stands toward the next level of structural complexity. More complex structures will not be achieved immediately following a partial cut. Partial cutting in both younger and older stands will progress CSC and UDS stand structures toward the more complex LYR stand structure. Some younger stands will receive multiple partial cut entries to develop the components of a LYR stand. Some LYR stands may require an additional partial cut entry to hasten the development of OFS characteristics (larger diameter trees, higher snag densities, and greater down wood levels, etc.). For the 10-year planning period, stands currently in OFS will be retained to function as complex structure on the landscape.

### **Partial Cut Harvest and Structural Components**

During the planning process, partial cuts will be evaluated at the stand and basin level for the need/opportunity to add structural components. Some snags may need to be created in older partial cuts that are lacking in hard snags. Structural components in younger partial cuts will be addressed at the next silvicultural decision point. This delay in snag creation in younger partial cuts will provide for the creation of larger diameter snags in the future. While there is no specific down wood target for partial cuts, it is expected that the recruitment of down wood will be continuous through natural processes and management activities for those stands progressing towards complex stand structures. An estimated 200 cubic feet per acre of down wood will be added during older partial cut operations as a result of residual slash from harvesting operations. In addition, these stands will be monitored over time to ensure that recruitment of down wood is taking place through natural processes.

### **Regeneration Harvest and Structural Components**

For regeneration harvest units, snag creation will be considered based on existing snag presence. Down wood will be added at the time of harvesting by leaving cull logs and slash,

and if necessary, by creating down wood. The down wood target for regeneration harvests is 600 to 900 cubic feet per acre in decay class 1 and 2. In conifer stands where down wood is severely lacking, 1 to 2 trees per acre may be left in addition to the 5 green trees per acre target. These additional trees may be felled immediately after harvest or left standing for the purpose of recruitment by natural means over time (e.g., wind throw).

**Table 10. Anticipated Stand Structure Development by 2022**

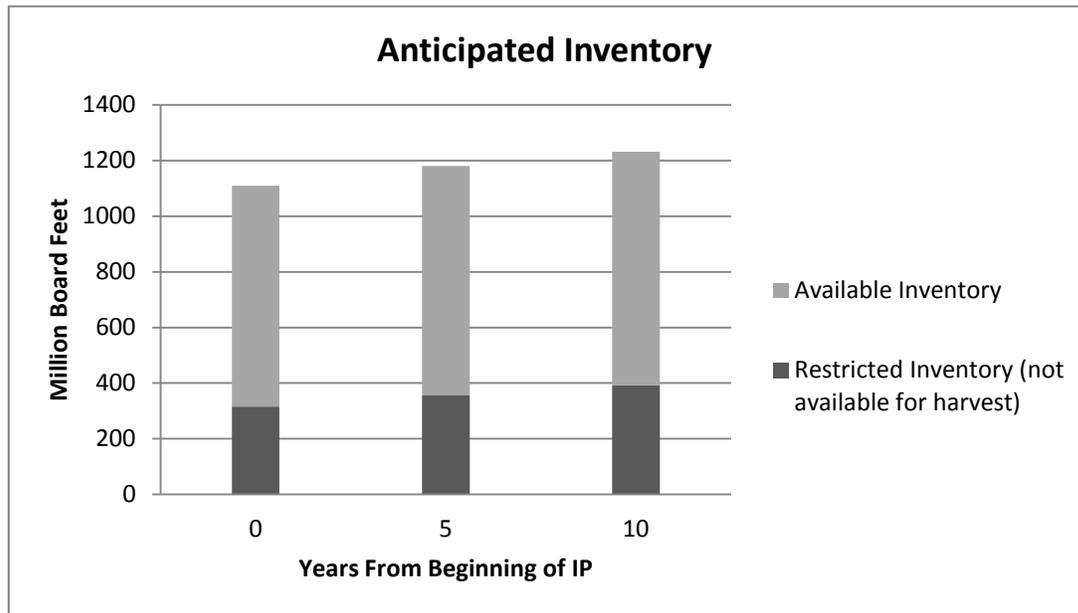
	REG	CSC <sup>2,3</sup>	UDS <sup>3,4</sup>	LYR <sup>4</sup>	OFS
Current Condition <sup>5</sup>	6	16	49	23	3
After Implementation Plan Period <sup>1</sup>	11	14	43	26	4
Desired Future Condition	←	62	→	20	15

1. These are estimates that may differ from the actual conditions significantly.
2. After partial cutting CSC stands, it takes about 5 to 7 years for an understory to develop.
3. After partial cutting and/or under planting, it may take 20 to 30 years for layering to develop.
4. The time it takes to develop UDS or 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 does not equal 100% because 3% of the district is designated as Non-Silviculturally Capable or Non-Forest.

Figure 4 shows the anticipated inventory on the district at three points during this IP (current inventory [year 0], inventory half-way through the IP [year 5], and inventory at the end of the IP [year 10]). The total inventory is increasing over 10 years of this IP, even with the increase in annual harvest from 14 MMBF per year to 19 MMBF. The increase in volume can be attributed to the trees in the no-harvest areas continuing to accumulate volume over time.

This figure shows that the harvest levels are sustainable over the short term. These harvest levels are also sustainable over the long term; a full discussion of the long term sustainability of these harvest levels can be found in Appendix A.

**Figure 4. Anticipated Inventory**



1. The volume in this chart is 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.
2. Restricted Inventory are those areas that not available for harvest and includes Inner Riparian Zone, designated NSO areas (40 percent of the provincial circle), Administrative Sites, high landslide hazard locations that are a risk to public safety, and some other non-harvestable sites.

### Reforestation and Young Stand Management

Table 11 below lists silvicultural activities for the North Cascade District for fiscal 2013 to 2022.

**Table 11. Annual Silvicultural Activities Starting in Fiscal Year 2013**

Activity	Estimated Annual Acreages
Site Preparation	200 - 800 acres <sup>1</sup>
Reforestation	200 - 500 acres <sup>2</sup>
Animal Damage Control	100 - 200 acres <sup>3,5</sup>
Release	0 – 200 acres <sup>4,5</sup>
Precommercial Thinning	0 – 250 acres <sup>5</sup>
Pruning	0 – 50 acres <sup>5</sup>

1. Site preparation may include one or more of the following occurring on the same acreage: machine slash piling, pile burning, broadcast burning, or vegetation control with herbicides.
2. Reforestation acres may be different than regeneration harvest acres because they do not relate directly to the regeneration harvest acres for that fiscal year. There may be additional acres due to units being held

- over for site preparation or units being harvested in the first year of their contract period. Partial cut areas with under planting or patchcut planting will contribute to reforestation acres.
3. Animal damage control work may include one or more of the following conducted on the same acreage: mountain beaver or other rodent trapping, tree tubing, or repellent application.
  4. Release work may include vegetation control using herbicides or hand or power tools.
  5. The acres shown represent a range dependent on annual workloads and budget levels. In years of low fiscal budget levels, these estimates could fall to zero.

## ***Roads***

The desired future condition of the road system is one that safely meets the transportation needs of the district for fire protection and management activities. This road system must also minimize the impact on water quality and other forest resources. Guidance for achieving this desired future condition will come from the Oregon Department of Forestry's *Forest Roads Manual* (ODF, July 2000).

### **Potential Road Activities**

To accomplish the district's silvicultural objectives, it is estimated that between 40 and 50 miles of new road construction and between 50 and 80 miles of road improvement will be necessary 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. Additional details can be found in the **Management Basins** section of this document. Roads will be maintained as necessary to protect water quality and the road system asset value. Stream crossing structures associated with roads are addressed in the Aquatic Resources: Habitat Restoration section.

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* and the *Forest Practices rules*. Road maintenance is accomplished under timber sale contracts for roads used for hauling forest products, and using the district road crew for all other roads. Maintenance is focused on ensuring proper drainage to prevent sediment entering streams. After this, roads are graded to allow efficient forest management and where needed, recreation. Collector roads and roads in active sale areas need and get the most maintenance. District personnel respond to heavy storms and thaw periods by road inspections, additional maintenance, and where necessary stopping heavy truck use during periods when roads cannot handle traffic without damage to water quality or the road asset.

No new mainline roads will be required. Approximately 90 percent of the roads to be constructed will be single spur roads within timber sale areas. These spurs will be narrow and have lengths between 0.1 and 1.0 miles. Collectors that connect these sale areas to the mainline system make up the remaining 10 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.

Table 12 summarizes proposed road activities on the North Cascade District.

**Table 12. Average Yearly Road Activities for the North Cascade District for fiscal 2013 to 2022.**

<b>Activity</b>	<b>Estimated Annual Mileage</b>
New Construction	4-5 miles
Road Improvement	5-8 miles
Road Vacating	.5 mile

### **Recreation**

During the next 10 years, recreation is anticipated to continue to be roaded-natural and roaded-modified recreation opportunities. Existing recreation infrastructure and zoning is expected to be maintained; however development of new facilities may be limited in the first part of this IP due to funding and staff limitations.

Existing volunteer and partnership groups will be important partners and will help guide and shape the recreation program on the Santiam State Forest.

### **Recreation Program Objectives**

The recreation management objectives below provide broad level intent for all recreation activities on the forest.

- Objective #1 - Integrate recreation opportunities with other forest management activities. Key considerations include timber harvesting, transportation system management, fire protection, wildlife habitat, and adjacent landowners.
- Objective #2 - Inform and educate 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 Facilities Standards Manual.
- Objective #5 - Increase user group and volunteer participation.

### **Opportunities at Specific Recreation Sites:**

The recreation opportunities are described by recreation areas. Each area has a set of opportunities that may be pursued during this IP period. Priorities for implementation shall be conducted with input from the Recreation Advisory Committee, public comment and available funding.

### **Shellburg Falls Recreation Area**

- As funding allows develop a camp host site, add an additional 3 campsites and add one additional vault toilet.
- As funding allows improve all 7 campsites with tent pads, relocate fire pits, relocate picnic table sites and define campsite areas.
- Continue to implement a fee system for overnight use.
- Assess bridge location on the Shellburg Falls trail and replace or remove.
- Assess relocating Shellburg Falls trail if bridge is not replaced.
- Assess portions of stair structures on Shellburg Falls trail for maintenance and/or replacement.
- Assess retaining wall on Shellburg Falls trail located under the falls for maintenance and/or replacement.
- Develop a trail inventory and comprehensive trail plan.

### **Santiam Horse Camp**

- As funding allows improve all 11 campsites with tent pads, relocate fire pits, relocate picnic table sites and define campsite areas.
- Continue to implement a fee system for overnight use.
- As funding allows maintain the horse stalls.
- As funding allows add an additional 5 tent campsites.

### **Monument Peak Trail System**

- Assess location to construct 6 miles of trail to connect the Rock Creek campground area to the Santiam Horse Camp and the Monument Peak Trail system.
- Assess 4 number of bridges for maintenance and/or replacement.
- As funding allows add hitching post, manure bin, trash receptacle and watering trough at Monument Peak trailhead.
- Develop a trail inventory and comprehensive trail plan.

### **Rock Creek Campground**

- As funding allows relocate campsites 3 and 4 away from Rock Creek to meet 25 foot buffer from waters of the State.
- As funding allows improve all 4 campsites with tent pads, relocate fire pits, relocate picnic table sites and define campsite areas.

- As funding allows install gate on the base of Rock Creek road.
- As funding allows add an additional 2 tent campsites.
- Continue to implement a fee system for overnight use.

#### **Crooked Finger ATV Trail System**

- As funding allows add a vault toilet and trash receptacle to the staging area.
- Develop a trail inventory and comprehensive trail plan.

#### **Butte Creek Campground**

- As funding allows improve all 3 campsites with tent pads, relocate fire pits, relocate picnic table sites, add a water pump and define campsite areas.
- Continue to implement a fee system for overnight use.

#### **Butte Creek Falls Trail System**

- Assess location to construct .2 miles of trail to connect Butte Creek Falls trail to Butte Creek Campground.
- Develop a trail inventory and comprehensive trail plan.

#### **Rhody Lake Campground**

- As funding allows improve all 4 campsites with tent pads and define campsite areas.

#### **High Lakes Trail System**

- Develop a trail inventory and comprehensive trail plan.

#### **Natural Arch & Rocky Top Trail System**

- Develop a trail inventory and comprehensive trail plan.

#### **All Locations**

- Assess all signage at campgrounds and trails adding signs where needed and replacing signs if needed.
- Assess educational and interpretative opportunities at campgrounds and trail systems.

## **Recreation Advisory Committee**

The purpose of the Santiam Recreation Advisory Committee is to provide a forum for recreation users to have direct input into development, review and implementation of specific recreation policies, plans, and projects for the Santiam State Forest. Input from the committee will help ensure the recreation program benefits from a variety of creative ideas. It will also assist in establishing priorities which reflect both the needs of users and the broad range of forest resource goals and strategies.

## ***Aquatic Habitat Restoration***

The NW Forest Management Plan 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 (Species of Concern 2010) which lists habitat restoration projects as an aquatic anchor strategy. The FMP and Species of Concern Policy establish several principles that provide the context and approach that North Cascade District will use for habitat restoration activities. The purpose of this document is to describe North Cascade District's habitat restoration goals and how restoration activities will be prioritized and reported.

## **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 (3a) and identify, design, and implement projects to remedy identified problems (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 (3a above) have largely been identified in the ODFW conservation strategy, the Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead (ODFW and NOAA 2011), and Watershed Analyses. Therefore the task is to

identify, design, and implement projects to address the limiting factors (3b above). This document is intended to address these elements of the restoration strategy by describing goals and priorities over the next 10 years.

## **District Goals**

### Contribute to Ecological Benefits through Stream Habitat and Water Quality Improvement

North Cascade 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”).

There are several principles for evaluating ecological benefits. Examples that fit well with State Forest policies and information base include (but are not limited to):

- Work that is based on watershed assessments and limiting factor analysis conducted by local watershed conservation entities.
- 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 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 Chinook and Steelhead.
- Projects that contribute to Upper Willamette River Conservation and Recovery goals for Chinook and Steelhead.

### Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead

An important reference for North Cascade District is the Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead (ODFW and NOAA 2011). This comprehensive document addresses the decline in abundance and range of spring Chinook and Winter Steelhead now listed as threatened under the Endangered Species Act. The extinction risk for Winter Steelhead was ranked as low and the desired status is for “very low”. Spring Chinook have a “very high” extinction risk and the goal is to move that to a range of low to high depending on the watershed.

The influence of Big Cliff and Detroit Dams on the recovery of Chinook and Winter Steelhead is an important backdrop for the North Cascade District-specifically North

Santiam Watershed. The dams adversely affect Chinook and steelhead by blocking access to a large amount of their historical habitat upstream of the dams and by contributing to degradation of their remaining downstream habitat. Specific threats from flood control and hydropower management include: 1) blocked or impaired fish passage for adults and juveniles, 2) loss of some riverine habitat (and associated functional connectivity) due to reservoirs, 3) reduction instream flow volume due to water withdrawals, 4) lack of sediment transport and role in habitat function, 5) altered physical habitat structure, and 5) altered water temperature and flow regimes (ODFW and NOAA 2011).

The Upper Willamette River Conservation and Recovery Plan establishes several strategies for addressing habitat issues for Chinook and Steelhead including but not limited to: limitations associated with dams, land-use, harvest, other species, and research and monitoring. Issues with greatest applicability to State Forest management include: protect intact riparian areas and high quality off-channel habitat, improve habitat complexity and diversity by restoring riparian structure and function in riparian areas with diminished function, restore degraded stream reaches with a priority on actions that improve the amount, complexity, diversity, and connectivity of riparian, floodplain, confluence, and off channel habitat. The NW FMP combined with Aquatic Anchor strategies, and restoration goals address all of these topics.

#### Number of Habitat Restoration Projects

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

- Improve road conditions on 20 miles of road: Upgrade roads, improve fish passage and decrease hydrologic connectivity. Performance Measure 5 (forest road risks to waters quality and fish habitat) calls for a reduction in the miles of road hydrologically connected to streams and the number of crossings that limit fish passage.
- Implement 10 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.

#### **North Cascade District Priorities**

The principles for prioritizing habitat restoration projects on North Cascade 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 North Cascade District 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 quality habitat reaches for steelhead or Chinook.
2. Road Upgrades (durable surfacing, drainage, hydrologic disconnection) and Decommission: Road upgrades is the next highest priority. North Cascades district will place a high priority on improving road surface and drainage conditions to minimize sediment delivery to streams. Road upgrades are important for all roads (i.e. including roads with connectivity to Type N or Type F streams) to reduce impacts on water quality. Road Decommissioning will be focused on the following situations:
  - a. Stream side roads: roads parallel and within 100 feet of Type F streams
  - b. Roads with significant stream crossing blow-out potential.
  - c. Roads with many Type F stream crossings.

Road decommissioning around Type N streams may be a lower priority than instream habitat projects (below) once all roads are compliant with the Forest 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 woody debris) 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 woody material, and minimize potential conflicts with public safety in downstream reaches. A priority will be placed on streams with Chinook salmon or steelhead habitat.
4. Alternative Plans to Manage Riparian Areas: These projects will promote the desired future condition for riparian areas (Mature Forest Condition 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.
  - b. Beaver pose a risk to plantation.Under these exception conditions:
  - a. A written plan will be submitted to the District Forester prior to the 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 Upgrades and Decommissioning: 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 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 North Cascade district would benefit from the addition of large wood which would entrap substrate, scour deep pools, and provide cover for fish (ODFW 2006).
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. State Forests 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 influences on streams provide 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 will compile information from several sources including: Fish habitat distribution (ODFW 2010); stream size and fish distribution (ODF GIS Data); stream gradient and width; road crossings, road segments, and stream reaches identified as good opportunities for restoration in Watershed Analyses (if available from Watershed Councils) ODFW Aquatic Inventory Assessments (ODFW 2006); and information from the Upper Willamette River Conservation and Recovery Plan (ODFW and NOAA 2011). 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 Chinook 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, road upgrades, hydrologic disconnection, decommission, wood placement, etc.)
- Miles of stream or roads treated or habitat made accessible
  - By type
  - By 5<sup>th</sup> Field HUC
- Number of miles/watershed treated within Chinook salmon or steelhead habitat

### **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

### ***Energy and Mineral Resources***

The district will assess aggregate rock sources where adequate sources for future management are not currently identified. The district will also assess the amount and quality of rock present at identified sources. Finally, the district will create quarry development and reclamation plans based on the assessment data, estimated long-term needs, and resource protection issues. Locating, planning and inventorying current and future rock sources will be a priority in the next 10 years.

### ***Lands and Access***

In January of 2008, the State Forester approved the North Cascade 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**.

### ***Cultural Resources***

The District will consider cultural resources when planning management activities. The following points are used during the classification of a cultural site:

- Inventoried cultural resource sites will be evaluated to determine the appropriate protection class (Class I, II, or III).
- Potential operation areas will be checked against the cultural resource site inventory for the district to see if any sites are in or adjacent to the operation area.
- Sites that are within or adjacent to a proposed operation that has the potential to impact the site, and which have not been assessed for class designation, will be evaluated to determine the appropriate cultural resource class.
- Class I sites will be protected according to the legal standards in the applicable laws (At this time the district is not aware of any Class I sites).
- Protection of Class II or III sites will be based on field inspection of the site and consultation with the State Forests Operations Coordinator or other specialist.

The district will perform its management in areas with identified cultural resource sites in accordance with the Cultural Resource Strategies outlined in the FMP.

### ***Special Forest Products***

The district will continue its firewood cutting program and miscellaneous forest products program in a manner that is consistent with the FMPs resource management strategies.

#### **District Firewood Cutting Program**

The District issues personal use firewood permits for areas where timber sale contracts have been completed. Other non-timber sale areas are available as conditions allow. These permits serve two purposes:

- Provide a low cost source of firewood for the public

- Remove excess logging debris from the landings in the harvest unit.
- Remove small timber and debris resulting from windstorms or other damage.

The process for obtaining a personal use firewood permit is described in the District AOP.

### Miscellaneous Forest Products

North Cascade District is not currently issuing Miscellaneous Forest Products permits, due to lack of compliance with permits and impacts to adjacent landowners. This policy may be re-evaluated during the 10-year lifespan of this IP. If permits are resumed, the process will be outlined in the District AOP.

## Invasive 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 a 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 land

*Table 13 North Cascade District Common Invasive Species and Management Objectives*

Species	Current status	Objective	Comments
Garlic Mustard	None known	Prevent	EDRR
<b>False Brome</b>	Green Basin, Rock Creek and	Control	Roadside spray projects

<b>Species</b>	<b>Current status</b>	<b>Objective</b>	<b>Comments</b>
	Mad Creek		
<b>English Ivy</b>	Rock Creek and Mad Creek	Control	Remove plants by hand or spray plants
<b>Gorse</b>	None known	Prevent	EDRR
<b>Himalayan Blackberry</b>	All Basins	Control	Roadside spray projects and plantation site prep/release.
<b>Yellow flag iris</b>	None known	Prevent	EDRR - pull plant/monitor site. Especially monitor yard debris dump sites
<b>Knotweed - variable species</b>	Rock Creek and Mad Creek	Prevent/control	The district will monitor and eradicate these patches as well as any others that we find
<b>Scotch Broom</b>	Prevalent throughout	Control	Roadside - treat during roadside spray projects. Plantations- treat when overtopping. Isolated patches-treat.
Yellow Archancel	Rock Creek	Eradicate	Small Plants found

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# Landscape Design Overview

The forest management plan establishes that a total of 30-50 percent of the landscape will be composed of complex stand structures over the long term. A desired future condition map can be found in the attached **Map Section**. The landscape design process was a collaborative effort between the district, resource specialists and ODFW biologists. The district intends to achieve the desired future condition of 35 percent complex stands on the district by designating areas for older forest structure (OFS) and layered (LYR) stand structures across the landscape, ensuring a variety of forest patch sizes and shapes that provide connectivity between watersheds, and dispersal habitat for wildlife. The overall design will include habitats for species on the District's Species of Concern list, and also include habitats necessary for those species needing more open conditions. The development of the DFCCs and the desired future condition stand structures is a long-term process.

The following criteria were considered when developing the placement of DFCCs on the landscape:

- Apply landscape design principles that benefit native fish and wildlife and species of concern (large patch sizes, connectivity, distribution, headwater habitat).
- Stands with high probability of potential suitable habitat within NSO circles.
- Known locations of species of concern (may be provided through the complex structure design or creation of anchor habitats).
- Consider the landscape context, particularly adjacency with large blocks of federal ownership.

For the next 30 to 40 years, areas not designated to be OFS or LYR will provide the pool from which regeneration (REG) and understory (UDS) stand structures will be created. These stand structures will be arranged across the rest of the landscape, based on habitat, resources, and logistical and operational needs and constraints. The closed single canopy (CSC) stand structure will not be purposely designed in the landscape design. It will be identified and mapped as stands move into that stand structure.

## **Complex Structure in the Short Term (30% in 10 years)**

***In addition*** to FMP landscape design principles stands which are most likely to reach complex in a shorter time frame and which meet the following:

- Retain all stands with a current condition of Layered (LYR) or Older Forest Structure (OFS).
- Only include stands with the potential to achieve complex forest structure within 10 years.

### Known locations of SOC-

Locate around known SOC when information is available (owl locations, responses, designated TA or AA; priority given to terrestrial species)

### Stand Characteristics include but are not limited to:

- Large trees, range of species, good understory development
- Areas that do not have to be clearcut harvested to reach complex
- Utilize stands currently in complex or managed to achieve complex (previous investments in thinned units)
- Recently clearcut stands are not good candidates as by their nature they will take an extended period of time to reach complex structure.
- Currently occupied habitat and/or high habitat potential stands for terrestrial, aquatic and amphibian SOC.

### **Long-Term Complex Structure (35%) Design**

In addition to the stands established above for short term development: Use same biological principles and add

- All stands identified at the 30 percent level, plus:
- Adjacent stands to block up or provide connectivity.
- Older stands within terrestrial and aquatic anchors.

### **Anchor Design Principles**

#### ***Designating Terrestrial Anchors***

- If it is decided to have one or more terrestrial anchors on a district, locate them using SOC Policy guidelines including 1.3.4, 1.3.8 and 1.3.9. The guidelines include the following:
  - Locate anchors to address needs associated with identified SOC, particularly those with low mobility or large home ranges
  - Prioritize placing TAs in areas that contain high-quality habitat considering the landscape design principals described above (e.g., areas that already have complex structure and/or known use by SOC species or areas that are most likely be functioning habitat and/or providing complex forest structure soon).
- Include areas with known SOC occurrence.
- Maximize benefits to multiple species by overlapping TA and AA as much as possible (when applicable when a district will have both TA and AA).

### ***Designating Aquatic Anchors***

- Consider establishing Aquatic Anchors in watersheds with any of the following characteristics:
  - Watershed with high quality habitat or high potential for high quality habitat for SOC
  - High occurrence of fish or amphibian species of concern.
  - High percentage of ODF ownership (20%)
  - High percentage of ODF ownership in small headwater catchments (>15%) considered to be good habitat for amphibians.
- Consider designating complex habitat in Aquatic Anchors to provide additional benefit for fish SOC (large wood recruitment, older forests to reduce effects on hydrology). However, terrestrial needs take priority over aquatic needs.
- Consider applying site-specific strategies to maintain, improve, or restore habitat such as wider no-cut buffers around fish and non-fish streams, habitat restoration, or road improvement projects.

### ***Implementation of Landscape Design Maps***

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. Through the course of implementation, however, refinements to the landscape design map are likely to occur due to stand conditions, harvest efficiency and operability concerns, or new information.

Changes to the landscape design will be fully described in an Annual Operations Plan and will not exceed 240 acres in a year. The complex structure goal will remain consistent with the BOF direction that calls for the District to develop complex structure across 31% of its landscape. The landscape design map will be fully reviewed with any major revision of the district implementation plan.

# Management Basins

## Management Basins Overview

The district has been divided into 7 management basins (Table 14). These basins follow the boundaries of sub-basins delineated by major watersheds with minor exceptions. The Scattered Basin captures numerous tracts that occur in several different watersheds and do not fit logically with other named basins.

## Information Summary for All Management Basins

Table 14 shows the desired future condition for stand structures by individual management basins and for the Santiam State Forest as a whole.

**Table 14. Summary: Current Condition (CC) and Desired Future Condition\* (DFC), by Stand Structure and Percentage**

Management Basin	Acres	NSC/ Non- Forest <sup>3</sup>	REG	CSC	UDS	NON COMPLEX CONDITION	COMPLEX CONDITION			
							LYR	DFC	OFS	
		CC <sup>1</sup>	CC	CC	CC	DFC <sup>2</sup>	CC	DFC	CC	DFC
Butte Creek	9,990	5	7	22	47	59	17	27	3	14
Cedar Creek	4,202	0	4	23	61	92	6	4	6	4
Crabtree	1,842	0	31	0	10	100	59	0	0	0
Green Basin <sup>4</sup>	12,234	7	6	22	56	68	6	28	3	4
Mad Creek	6,743	0	11	23	35	75	30	11	1	14
Rock Creek	12,614	2	6	12	24	60	52	27	4	33
<b>District Total</b>	<b>47,625</b>	<b>3</b>	<b>6</b>	<b>16</b>	<b>49</b>	<b>65</b>	<b>23</b>	<b>20</b>	<b>3</b>	<b>15</b>

<sup>1</sup> The Current Condition was determined using the latest Stand Level Inventory imputed 2009.

<sup>2</sup> The Desired Future Condition will be achieved in an estimated 20 years.

<sup>3</sup> 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).

<sup>4</sup> Acreage for the Scattered Basin is included in Green Basin.

## Information Summary (continued)

In the *Northwest Oregon State Forests Management Plan* (pg 4-48), 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 14 on the previous page shows that for the North Cascade District desired future condition, the planned percentages of stand structure types fall within the management plan ranges. The desired future condition map in the **Map Section** shows planned future stand structure across the district. The time required to achieve this desired future condition depends on site quality and density management.

## Basin Descriptions

### *Butte Creek Basin*

The Butte Creek Basin contains 21 percent (9,990 acres) of Santiam State Forest's land, and is located in the northern half of the forest. Bureau of Land Management (BLM) land and privately owned lands border the management basin. The Willamette National Forest and the Mount Hood National Forest, and the BLM's Table Rock Wilderness are in close proximity to the basin. Most streams in this basin flow into the Pudding River. The rest of the streams flow into the Molalla River.

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

### **Key Resource Considerations for Butte Creek Basin**

- Recreation considerations include Butte Creek Falls, which supports hiking trails, , and camping areas; as well as Rhody Lake, Butte Lake, and Beaver Lake, which are popular for camping and fishing.
- There are a few cultural sites located in the basin.
- Scenic areas include Panther Rock on the eastern end of the basin.
- Butte Creek and Gawley Creek headwaters are on the eastern portion of the basin.

- There are approximately 15 miles of fish bearing streams within the basin. None of these streams contain anadromous fish.
- Cool Water corydalis has been identified by the Natural Heritage Program.
- The Rhody Lakes Terrestrial Anchor is located in this basin.
- One spotted owl site occurs on ODF ownership in this basin.
- Butte Creek Falls and Rhody Lakes recreation areas occur in this basin.

### **Desired Future Condition and Landscape Design**

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

### **Management Opportunities**

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

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

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

### ***Cedar Creek Basin***

The Cedar Creek Basin encompasses 9 percent (4,202 acres) of the Santiam State Forest's land, and is located in the northwestern part of the forest. The basin is composed of 10 separate parcels of land. Silver Falls State Park is adjacent to the basin's southwest boundary. Butte Creek Basin is northeast of the basin, but is not contiguous. BLM lands and privately owned land are intermixed with the state forest lands in this basin.

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

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

### **Key Resource Considerations**

- A pair of northern spotted owls resides on state lands within this basin.

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

### **Desired Future Condition and Landscape Design**

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

### **Management Opportunities**

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

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

### ***Crabtree Basin***

Located in the southernmost part of the Santiam State Forest, the Crabtree Basin contains only 3 percent (1,842 acres) of the forest's land. The basin is bordered by privately owned land. However, large portions of BLM lands surround this private land. The major streams in this basin include Green Mountain Creek, Bald Peter Creek, Bald Barney Creek, Cruiser Creek, and Camp Creek. All of these streams flow into Crabtree Creek, which ultimately flows into the South Santiam River.

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

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

## **Key Resource Considerations**

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

## **Desired Future Condition and Landscape Design**

Surveys have discovered significant amounts of the root disease *Phellinus weirii* within the basin. The district's main management goal in this basin is to reduce the amount of root disease and regenerate stands with resistant tree species. Also, this basin is a likely candidate for land exchange as it is surrounded completely by one private landowner. There is a federal late successional reserve area a little over a mile south of this basin.

## **Management Opportunities**

Any partial harvests in this basin will occur in CSC or UDS stands. Clearcut harvests in this basin will occur in CSC or UDS stands. Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* for the amounts, sizes, and distributions of these structural components.

## ***Green Basin***

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

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

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

## **Key Resource Considerations**

- There are eleven known northern spotted owl sites located on federal lands, whose home ranges overlap this basin.
- Rocky Top and the Natural Rock Arch recreation areas.
- Several areas of this basin are visible from Highway 22.

- The cities of Salem, Mill City and Gates get their water from the North Santiam River.
- According to the Oregon Department of Water Resources, 15 domestic water sources are located either adjacent to or on state lands within this basin.
- There are approximately 3 miles of fish bearing streams within this basin. Beneficial use (i.e. fish bearing or not) has yet to be determined on approximately 23 miles of stream.
- The Sardine Creek Aquatic Anchor is located within this basin.
- There are two cultural sites within the basin.
- Two High-tension powerlines are strung across this basin. The Cascade Crossing transmission project will be completed within the next 10 years. This will expand one powerline ROW by 275 feet wide, over 3.5 miles. This will take approximately 150 acres out of production in this basin.

### **Desired Future Condition and Landscape Design**

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

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

### **Management Opportunities**

The partial harvests will occur mostly in CSC and UDS stands.

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

The Cascade Crossing project will clearcut approximately 150 acres, which will be included in one of the AOPs in this IP period. Numerous roads may need to be constructed or reconstructed for tower construction and maintenance. There is an opportunity to upgrade many existing powerline roads to modern standards. This may improve access for harvesting and other management opportunities in the basin. The North Cascade District is actively engaged with Portland General Electric in the planning process for Cascade Crossing.

Snag creation and down woody material recruitment may take place at different levels within both partial harvests and clearcut harvests. The district will follow the guidelines within the *Northwest Oregon State Forests Management Plan* (April 2010) for the amounts, sizes, and distributions of these structural components.

## ***Mad Creek Basin***

The Mad Creek Basin contains 14 percent (6,743 acres) of Santiam State Forest's land and is located in the forest's southeastern portion, south of Highway 22 and the town of Gates. Privately owned land and some BLM land border the rest of the basin. Some of the basin is adjacent to Highway 22, or can be seen from the highway or Gates.

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

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

### **Key Resource Considerations**

- The home ranges of two resident single owls and a pair of northern spotted owls overlap ODF ownership in this basin..
- There are 11 miles of fish bearing streams within this basin. Mad Creek, Seven Mile Creek, and Turnidge Creek support steelhead populations.
- The cities of Salem, Mill City and Gates get their water from the North Santiam River.
- There are several cultural sites within the Mad Creek Basin.
- According to the Oregon Department of Water Resources, there are 2 domestic water sources located adjacent to or on state lands within this basin.
- Monument Peak Equestrian Camp is located in this basin.

### **Desired Future Condition and Landscape Design**

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

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

### **Management Opportunities**

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

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

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

### ***Rock Creek Basin***

The Rock Creek Basin is the largest of all the management basins, encompassing 27 percent (12,614 acres) of the Santiam State Forest. The basin is located south of Highway 22 and Mill City. It is bordered by Mad Creek Basin, BLM lands, and privately owned land. Some of this basin can be seen from Mill City and Highway 22. The major streams include Rock Creek and Snake Creek, which flow into the North Santiam River; and tributaries of Thomas Creek, which flows into the South Santiam River.

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

### **Key Resource Considerations**

- There is resident single northern spotted owl site on ODF ownership in this basin. In addition, the home ranges of two adjacent spotted owl sites overlap ODF ownership in this basin.
- There are 22 miles of fish bearing streams within this basin. Rock Creek has winter steelhead runs. The Rock Creek Aquatic Anchor is located within this basin.
- There are several cultural sites within the Rock Creek Basin.
- Areas of the basin are visible from Highway 22 and Mill City.
- The cities of Salem and Mill City get their water from the North Santiam River, via this basin.
- Rock Creek dispersed camps are located in this basin.

### **Desired Future Condition and Landscape Design**

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

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

### **Management Opportunities**

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

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

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

### ***Scattered Basin***

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

### **Key Resource Considerations**

- Shellburg Falls recreation area.
- Some areas are visible from Highway 22.
- There are five pairs and one resident single northern spotted owls adjacent to state lands that affect management activities within this basin.
- There are 14 miles of fish bearing streams within this basin.
- The city of Detroit's municipal water intake is located on state lands within this basin.
- There are a few cultural sites within the Scattered Basin.
- High-tension powerlines span through portions of these scattered tracts.
- According to the Oregon Department of Water Resources, 6 domestic water sources are located either adjacent to or on state lands within this basin.
- The city of Salem water supply comes from the North Santiam River.

### **Desired Future Condition and Landscape Design**

- A block of complex stands will be located within the Shellburg recreation and scenic areas.
- Patches of complex stands will be located within northern spotted owl areas and areas that can be seen from Highway 22 or the Little North Fork Road. A patch of complex stands will be located within the scattered parcel that contains the water intake for the city of Detroit's water supply.

The riparian areas in all fish-bearing streams, including Stout Creek and Ayers Creek, will be managed for mature forest conditions. The same management strategy will apply also to any medium-sized non-fish-bearing streams. These riparian areas will provide connectivity between complex stands.

### **Management Opportunities**

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

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

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

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# Appendix A

## District Opportunity Analysis

This section of the Implementation Plan describes the computer modeling conducted to inform the key decisions regarding the timber harvest and tree-stand structure goals to be achieved by this plan. It then explains how the model outputs are analyzed, adjusted, and converted to specific annual harvest volume targets and ranges for regeneration (clearcut) and partial-cut harvests for implementation on the ground; this process is referred to as a Model Solution Review (MSR).

### *Harvest Modeling*

The harvest scheduling model that generated the data for the Opportunity Analysis is based on the models developed 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 (FMP). These models incorporate rules that emulate the strategies and practices contained in plans, policies and strategies that apply to the North Cascade District. 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, Rob Nall, (503) 945-7514, rnall@odf.state.or.us.

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, including stand boundaries, locations of species of concern and the current landscape design; and
- Use revised yield tables developed from Stand Level Inventory data.

These models generate specific outputs (e.g., harvest volume per period, stand structure at point in time, etc.), but in reality there is uncertainty surrounding the accuracy of each of these numbers because the models' inputs are based on samples such as the forest inventory, projections like the growth and yield tables, and assumptions such as the number and location of northern spotted owl sites. If any of these inputs is incorrect, the outputs may be higher or lower. If the growth and yield projections are wrong, then the long-term harvest and structure estimates would change. Or if, for example, the assumptions about northern spotted owls are wrong and new owl sites are established, this would likely have an immediate impact on the harvest volume.

**Modeling uncertainty** - Unfortunately, it is very difficult if not impossible to demonstrate the uncertainty inherent in these types of models. The State Forests Division and other groups (e.g., C.L.A.M.S.<sup>3</sup>) with similar projects have been unable to calculate and display this uncertainty. In recognition of the uncertainty associated with these models, the district will monitor conditions on the district relative to the model assumptions and outputs (e.g., the number and location of owl sites, the actual harvest volume per acre, observed stand structure, etc.). If significant differences are found, the district will initiate a new modeling effort to address them. In addition, ODF will regularly update the models with new information and reevaluate the results to ensure that goals can continue to be met in a sustainable manner.

### ***Harvest and Structure Goals***

To inform the decisions on stand structure and harvest objectives, the division developed two sets of model runs to examine the range of outputs (stand structure and harvest volume) under different management scenarios:

1. The first set is referred to as the District Potential Scenarios. The purpose of these scenarios is to identify the broad potential of these lands and provide context for the implementation plan decisions. The District Potential computer modeling runs examine four different management scenarios ranging from the current implementation plan, which has a 50 percent landscape design (Base Case), to a scenario based on the State Forest Practices Act.
2. The second set of modeling runs is referred to as the Landscape Options Scenarios. These scenarios examine the potential stand structure and harvest volume outputs based on three different landscape designs developed for the district by district staff, resource specialists, and Oregon Dept. of Fish & Wildlife (ODFW) biologists.

The Division's decisions on harvest and structure goals are based on the broad strategies contained in the FMP. They also take into consideration the nine Performance Measures adopted by the Board of Forestry for State Forests ([www.oregon.gov/ODF/PUBS/docs/2011PerformanceMeasuresReport.pdf](http://www.oregon.gov/ODF/PUBS/docs/2011PerformanceMeasuresReport.pdf)). In these measures, the Board set specific targets for the Clatsop and Tillamook State Forests, but not for the North Cascade District. The harvest and structure decisions for the North Cascade District considered the principles contained within the Performance Measures, particularly:

- Performance Measure 3 – Increase annual revenues/volume above current levels
- Performance Measure 6 – Increase complex stand structures above current levels over the next two decades and develop complex structure in those areas where it is anticipated to result in the greatest benefits to both aquatic and terrestrial species of concern

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<sup>3</sup> Coastal Landscape Analysis and Modeling Study – a project sponsored by Oregon State University College of Forestry, the US Forest Service Pacific Northwest Research Station, and the Oregon Department of Forestry.

## District Potential Scenarios

The four management scenarios modeled to examine the district potential include the following:

1. FPA – This scenario simulates management practices under the State’s Forest Practices Act ([www.oregon.gov/ODF/privateforests/fpaKeys.shtml](http://www.oregon.gov/ODF/privateforests/fpaKeys.shtml)).
2. Take-Avoidance – All of the Division policies for complying with the state and federal Endangered Species Acts (through Take-Avoidance Strategies) are simulated under this scenario, as well as the riparian (streamside), green tree retention, snag, and down-wood strategies from the Northwest Oregon State Forest Management Plan. The only strategy missing from the FMP is the specific stand structure goals.
3. FMP with 30 percent Landscape Design – Simulates fully implementing the Northwest Oregon State Forest Management Plan, including Species of Concern Strategies and the Division’s Take-Avoidance Strategies. This model scenario includes a landscape design<sup>4</sup> that targets 30 percent of the district for complex stand structure (the lower end of the range identified in the FMP).
4. Base Case (FMP with 50 percent Landscape Design) – This scenario is the same as the one above, except that the landscape design targets 50 percent of the district for complex structure (the upper end of the range identified in the FMP). It uses the landscape design from the 2003 Implementation Plan.

The FPA and Take-Avoidance scenarios in the 2003 IP are not consistent with the FMP and thus were not considered as options for this implementation plan. However, these two scenarios help define the potential outcomes inherent to the district. Figure A-1 below displays the results of these four model scenarios as well as the 2003 IP harvest objective<sup>5</sup> of 21 million board feet (MMBF) per year (dashed red line), the current IP harvest objective of 14 MMBF per year (broad green line) and a broad yellow line depicting 70 percent of the FPA modeling run (this has been found to be a convenient reference). The X axis across the bottom of the graph is in periods with each period representing five years, so P20 on the graph represents a point 100 years in the future.

The Original IP (2003), the Current IP (2007) and the Base Case all have a goal of 50 percent complex structure, but result in different annual harvest objectives (21, 14, and 17 MMBF per year, respectively). These differences can largely be attributed to the forest inventory used to make these estimates.

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<sup>4</sup> The initial modeling for District Potential used a draft 30 percent landscape design for this scenario. The figures below use the results of the final model run for this IP based on the landscape design described in this IP and the Species of Concern strategies developed for this IP.

<sup>5</sup> The IP harvest objective was revised from 21 MMBF per year to 14 MMBF per year in 2007 based on the results of the Harvest and Habitat Model Project.

- The harvest estimates in the 2003 IP were based on an older inventory and relied on a manual calculation of the sustainable harvest.
- The Harvest and Habitat Model used to make the harvest volume adjustment in 2007 was a very sophisticated harvest model that used information from the Division's new Stand Level Forest Inventory. The reduced harvest estimate in 2007 was believed to be much more accurate than the 2007 estimate, although there was some concern at the time that the inventory under-represented the harvest potential on the district.
- The estimate for the Base Case scenario also uses an updated version of the Harvest and Habitat Model and a more complete Stand Level Inventory, but a much higher proportion of the acres had been inventoried (64 percent for the Base Case estimate versus 38 percent for the 2007 estimate).

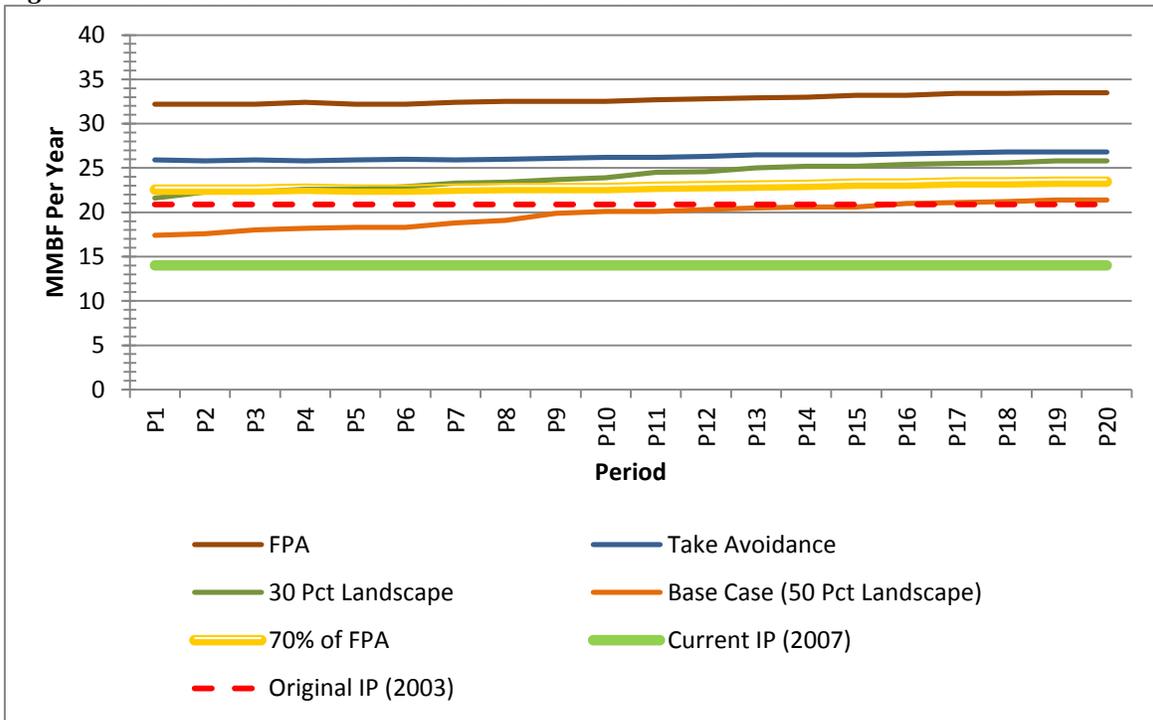
Table A-1 below displays the average annual harvest volume for the first decade (the average of P1 and P2 from the figure) and the first decade volume as a percent of the FPA scenario.

The complex structure (Layered and Older Forest) development associated with these management scenarios is shown in Figure A-2. The solid lines represent the total complex structure, and the dashed lines represent the Older Forest Structure<sup>6</sup>, while the Layered structure is the difference between the two lines for each scenario.

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<sup>6</sup> The estimate of Older Forest Structure in these models is based on tree size and includes estimates of snags and down wood, so the Older Forest Structure estimates may be high. ODF is currently developing methods to incorporate estimates of snags and down wood for future modeling.

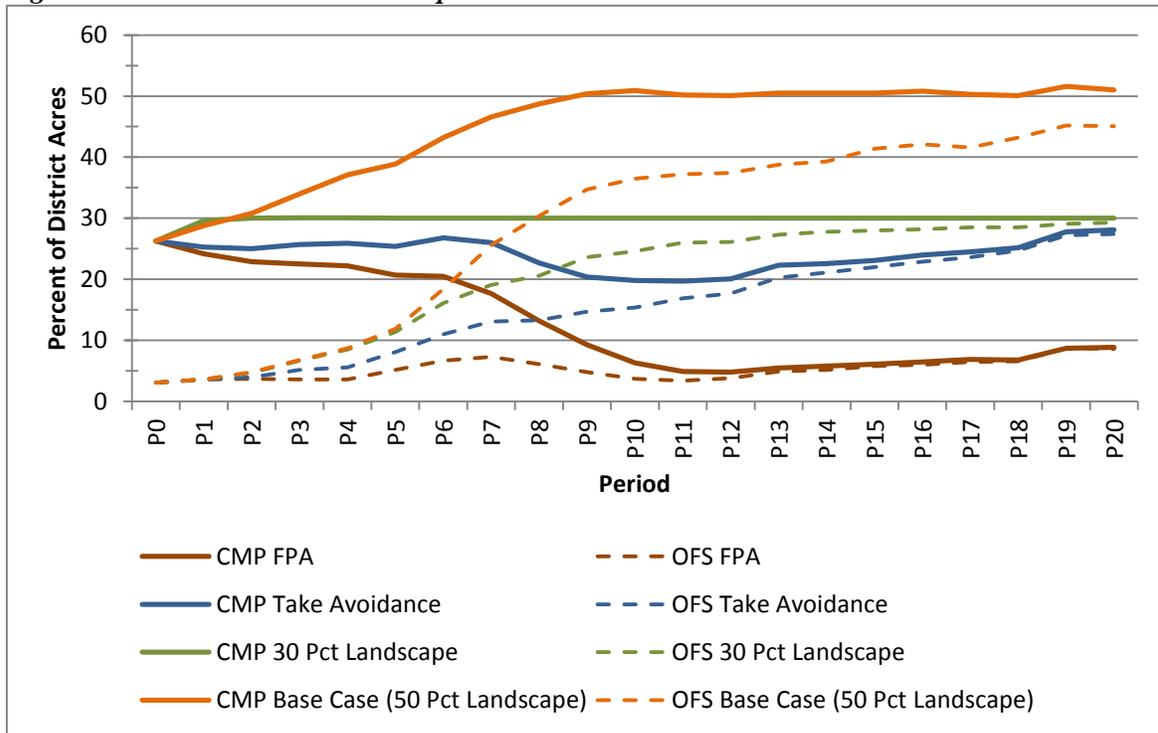
**Figure A-1. North Cascade District Potential – Harvest Volumes**



**A-1. Modeled Harvest Volumes**

Model Scenario	Ave. Volume 1 <sup>st</sup> 10 Years	Percent of FPA
FPA	32	100
Take-Avoidance	26	80
70% FPA	23	70
30 Pct Landscape	22	68
Original IP	21	65
Base Case	18	54
Current IP	14	43

**Figure A-2. District Potential - Complex Stand Structure**



The FPA and Take-Avoidance Scenarios do not attain the minimum structure requirements of the FMP. The structure they do develop is located in areas where clearcutting is prohibited, such as northern spotted owl sites, riparian management areas, and operationally limited areas<sup>7</sup>. As a result, nearly all of the complex structure in these areas is composed of Older Forest Structure. Under the Take-Avoidance scenario, approximately 26 percent of the district is covered by harvest restrictions to protect various resources.

The 30 Percent Landscape Design achieves the 30 percent complex structure goal in 10 years and the FMP requirement of 30 percent total complex structure (15 percent Older Forest Structure and 15 percent Layered) in 30 years (P6). The 30 percent total complex structure is maintained through the end of the modeling horizon (150 years).

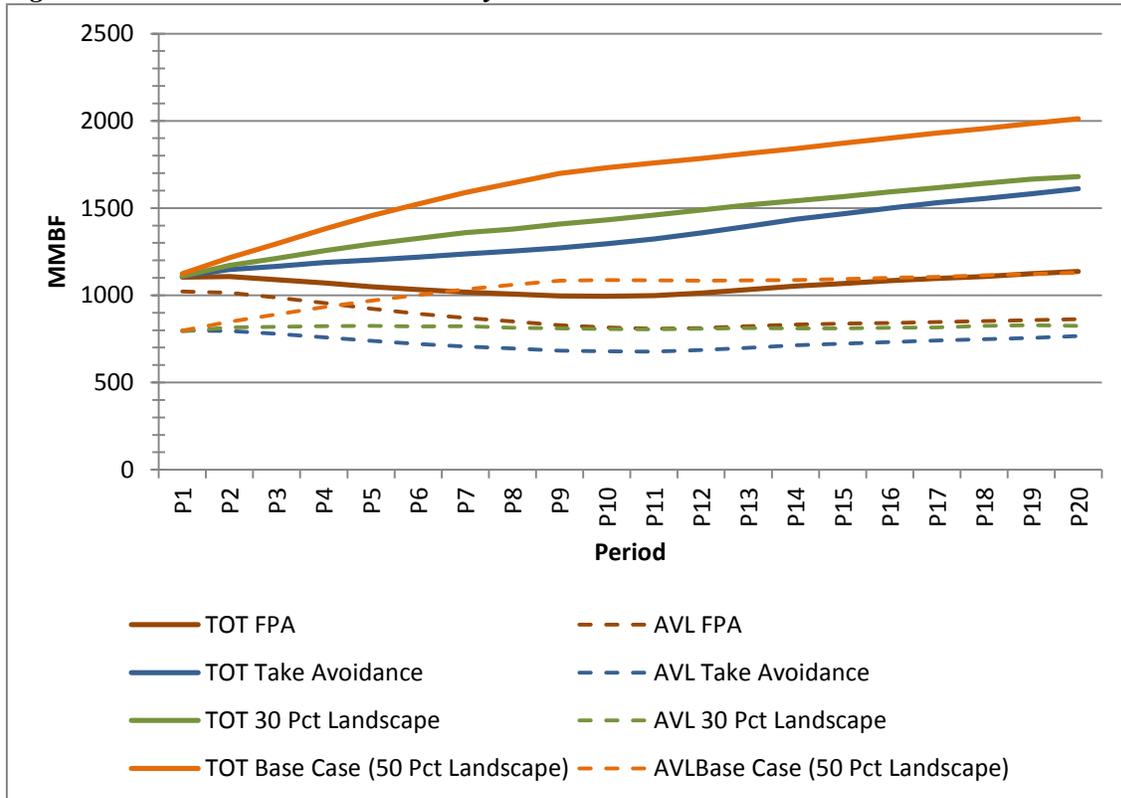
The Base Case (50 percent landscape design) achieves the 30 percent structure goal in 10 years and the FMP minimum requirements of 30 percent complex and 15 percent Older Forest Structure in 30 years. The 50 percent complex structure goal is achieved in 45 years (P9).

The standing inventory of timber volume is an important metric (measurement that helps determine whether a project is meeting its goals) to examine to ensure the management scenario is sustainable in terms of harvest volume and stand structure. Figure A-3 shows the total standing volume and the available volume for the four management scenarios. The total inventory (solid lines and shown as TOT in the legend) is standing timber volume of all

<sup>7</sup> A variety of conditions can cause an area to be considered Operationally Limited (i.e. it can't be logged). It may be an active landslide or potential landslide site that poses a risk to public safety. In many cases, there is no economic method to access and operate on the site without causing significant damage to natural resources.

ODF-managed lands on the district. The available inventory (dashed lines and shown as AVL in the legend) represents the standing inventory on all ODF-managed lands where harvesting is allowed (i.e., it excludes the volume on lands where clearcutting is not allowed, such as northern spotted owl sites and operationally limited areas).

**Figure A-3. District Potential - Inventory**



All management scenarios start with the same total inventory, since they all have the same land base. The FPA management scenario has a higher available inventory than the other scenarios, because it has fewer restrictions on harvest (smaller riparian management areas and lower protection standards for northern spotted owls). The other three scenarios have the same protection standards, but different structure goals (Take-Avoidance has no structure goal).

The total inventory on all scenarios, except FPA, increases over time, largely because trees in the no-harvest areas continue to grow and accumulate volume. The total volume under the FPA scenario declines very slightly initially, then returns to the original level.

The available inventory on the other scenarios declines by about 20 percent over the first 50 years, then levels off. The available inventory for the Take-Avoidance and 30 Percent Landscape scenarios declines initially, then slowly builds volume over time and eventually exceeds the initial volume.

The available inventory for the Base Case scenario increases by about 30 percent over time, then levels off. This scenario accumulates considerably more available inventory because it is developing additional complex structure, which typically has a higher volume per acre than the other stand structures. Thus, as the amount of complex structure increases, so does the available inventory. The available inventory for the 30 Percent Landscape scenario does not show an increase, because very little additional complex structure is required with this approach - an increase from 26 percent to 30 percent complex structure.

The sustainability of the volume and structure under these management scenarios is indicated by the non-declining trend of the available inventory lines for each of the scenarios after an initial period of adjustment. The available inventory lines for each of these scenarios remain flat (non-declining) from year 100 to year 150 (end of the modeling horizon). During the evaluation of these model scenarios, sustainability over the very long term beyond 150 years is confirmed by:

1. evaluation of long-term sustained yield calculations – this ensures that the growth from the standing inventory will support the harvest volume
2. review of the age class distribution - this ensures that enough acres will be available for clearcutting of stands that are an appropriate age.

### ***District Potential Conclusion***

After evaluating the results of the District Potential Scenarios and comparing the results to the principles contained in Performance Measures 3 and 6, Division leadership determined that the Base Case (50 percent landscape) scenario did meet the objective of increasing harvest revenue/volume, but it did not meet the expectations of the 2003 IP. The 30 Percent Scenario did achieve an increase in volume/revenue and provided an increase in complex structure. Division Leadership also determined that additional modeling was necessary to explore other landscape design options with goals of 35 and 40 percent complex structure and to gauge the effects of implementing additional Species of Concern Strategies.

## **Landscape Options**

The management scenarios below are based on the three landscape designs developed by the district in a collaborative process with resource specialists and ODFW biologists<sup>8</sup>. The three landscape designs are in turn based on complex structure goals of 30, 35, and 40 percent.

A modeling run of the 30 Percent Landscape management scenario was made with and without the additional Species of Concern Strategies. A comparison of these model runs showed that the addition of the Terrestrial and Aquatic Anchors reduced harvest volume by

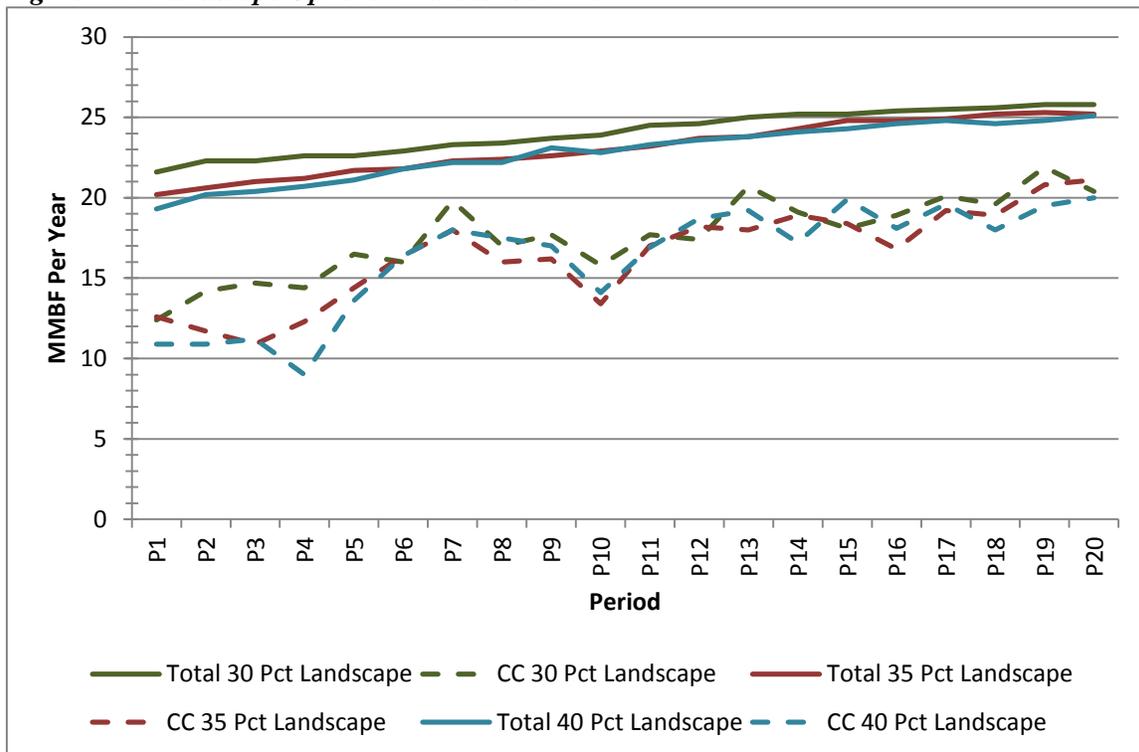
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<sup>8</sup> Landscape design planning meetings were held on January 26 and February 2, 2011. Participants included: Rod Krahrmer, Liz Ruther, Nancy Taylor, Susan Barnes and Steve Mamoyak from ODFW; Clint Smith, Liz Dent, Rob Nall and Jennifer Weikel – ODF resource specialists; and Shannon Loffelmacher, John Hawksworth, Mike Kroon, Steve Kendall, Russ Lane and Steve Wilson from the North Cascade District.

an average of two percent during the first 50 years of the model horizon. The reason the additional Species of Concern Strategies (see section” Biological Elements – Fish and Wildlife”) had so little effect on the harvest volumes is that the Terrestrial Anchors are largely within the 30 percent Landscape Design, which already has a restriction on clearcutting and certain types of thinning. The Aquatic Anchors increase the harvest restrictions within the existing riparian management area of fish-bearing streams and increase the width of the riparian management areas on perennial, non-fish bearing streams from 25 feet to 50 feet. So the Aquatic Anchors do not restrict harvest on a large number of acres. Given the low impact of the additional Species of Concern Strategies, they were incorporated into all subsequent model runs.

Figure A-4 displays the results of the three Landscape Options with the solid lines representing the total harvest volume and the dashed lines representing the harvest volume from clearcuts. Table A-2 shows the average annual harvest volume for the first decade and the average volume as a percentage of the FPA scenario. The results of the district Model Solution Review (MSR) on the 35 Percent Landscape Design scenario are also shown in parentheses on this table. The details of the MSR are discussed later in this appendix. They indicate that model volume outputs should be reduced by about 1.0 MMBF per year. While the first decade harvest volumes for the 35 Percent and 40 Percent Landscape scenarios appear to be identical, this is due to rounding. The 35 Percent Landscape is slightly above 20 MMBF and the 40 Percent Landscape is slightly below 20 MMBF.

**Figure A-4. Landscape Options - Harvest Volume**



**Table A-2. Landscape Options - First Decade Harvest Volume**

Model Scenario	Ave. Volume 1 <sup>st</sup> 10 Years	Percent of FPA
30% Landscape	22	68
35% Landscape	20 (19)	63
40% Landscape	20	61
*Harvest volume based on the MSR.		

During the first decade, the 30 Percent Landscape Design scenario has an average annual harvest about 10 percent higher than the 35 and 40 Percent Landscape Design scenarios. The average annual harvest volumes for the 35 and 40 percent scenarios are very similar, because the 2,500 acres added to the 35 percent landscape design to create the 40 percent landscape design are largely composed of lower stocked, lower site class, or operationally limited lands.

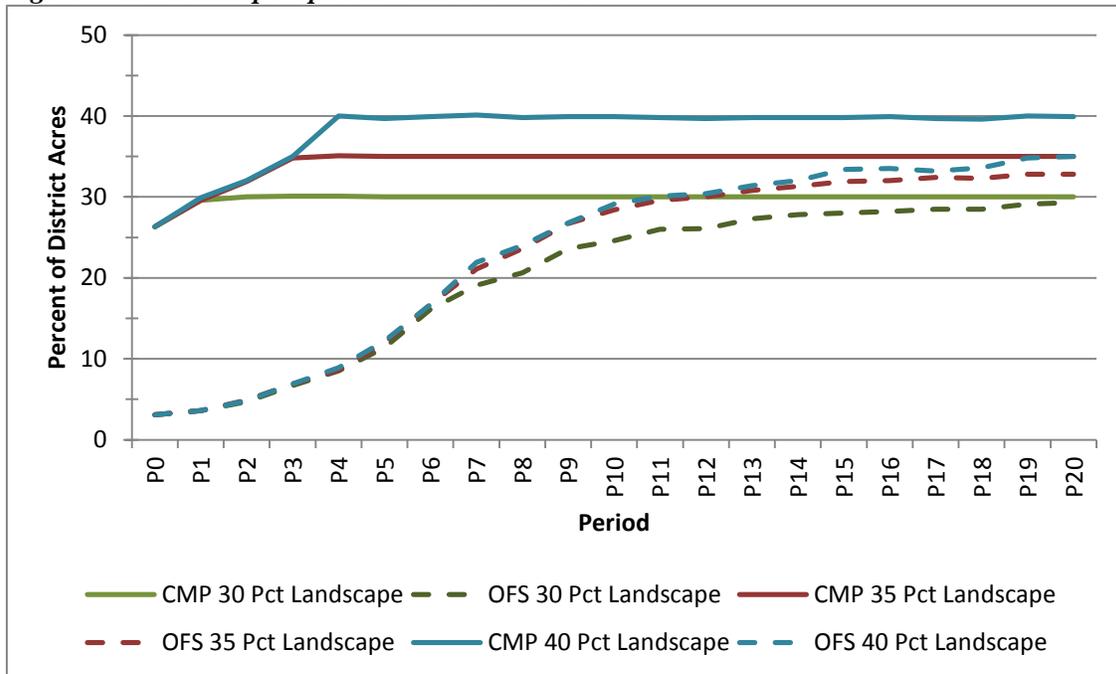
The first-decade harvest volumes from these management scenarios all show an increase in volume/revenue. However, the district MSR (described later in this appendix) indicates that these harvest volumes should be reduced by about 1.0 MMBF per year. Applying this reduction to all three management scenarios results in the 30 Percent Landscape Design scenario harvesting about 21 MMBF per year and the other two scenarios harvesting about 19 MMBF per year.

Figure A-5 shows the complex structure development associated with each of these three management scenarios. As in Figure A-2 in the District Potential section, the solid lines represent the total complex structure and the dashed lines represent the Older Forest Structure.

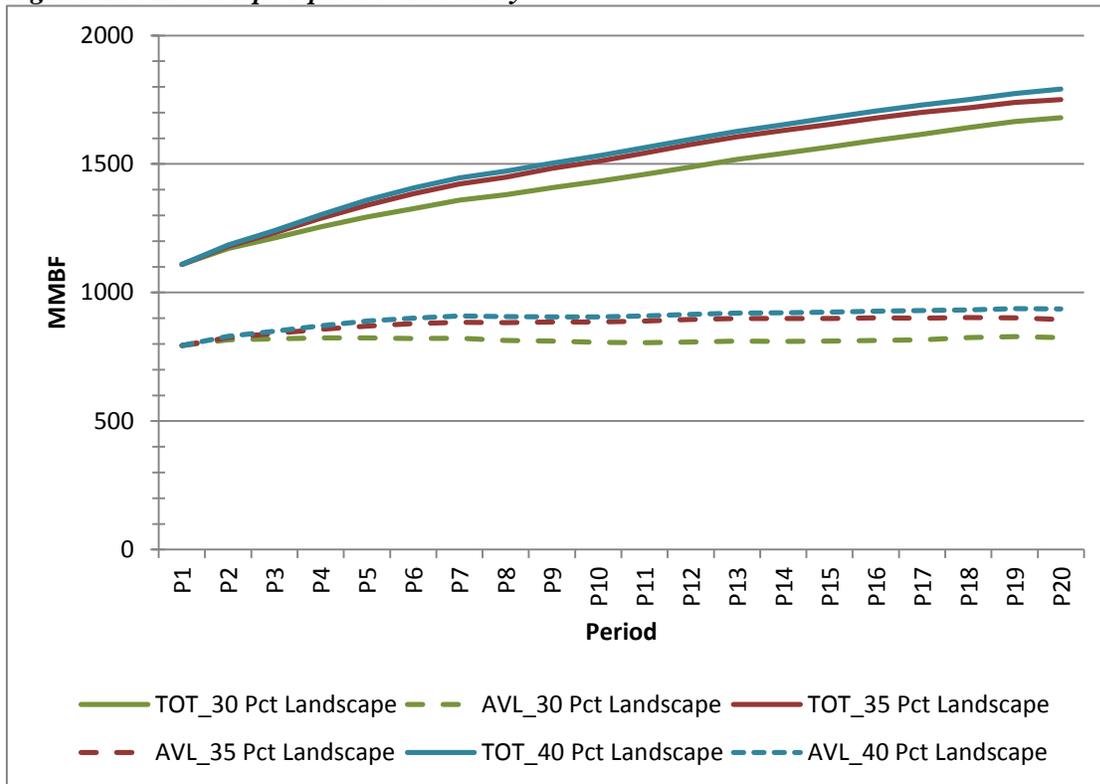
Each of these three scenarios achieves its respective complex structure goal and the FMP goal of 15 percent of Older Forest Structure at approximately the same time, in about 30 years (P6). The similarity in time to achieve complex structure and the trajectory taken to achieve it are understandable, since the difference between each complex structure goal is less than 2,500 acres on the North Cascade District: a complex structure goal of 35 percent targets about 2,350 acres more complex structure than does a complex structure goal of 30 percent.

Figure A-6 shows the total and available inventory for these three management scenarios. As in Figure A-3 in the District Potential section, the solid lines show the total standing volume and the dashed lines show the available volume. The available-inventory lines for the 30, 35, and 40 Percent Landscape Design scenarios flatten out, indicating that these scenarios are sustainable over the long term.

**Figure A-5. Landscape Options - Stand Structure**



**Figure A-6. Landscape Options - Inventory**



## ***Landscape Options Conclusions***

After evaluating the results of the District Potential Scenarios and comparing the results to the principles contained in Performance Measures 3 and 6, then considering the harvest reduction identified through the district MSR, Division Leadership determined that the most appropriate balance of outputs is achieved somewhere between a 30 – 35 Percent Landscape Design scenario. This approach could achieve both the increased volume/revenue and the increased stand structure principles contained in Performance Measures 3 and 6.

## ***Model Solution Review (MSR)***

The district, in collaboration with Salem staff conducted a model solution review on the 35 percent landscape design, with aquatic and terrestrial anchors. The modeling indicated a harvest potential of 20 MMBF in the first decade, prior to validation of the harvest units being selected by the model. In most instances, the model selections agreed with current and planned harvests the district has considered. A few discrepancies were noted in the MSR process:

- The model selected several helicopter settings, which are not likely to be economically viable in the near term.
- Some units of marginal silvicultural capability were noted. These had high cost-to-value ratios and are unlikely to be harvested in the near term.
- Some units were selected for thinning, which do not have access suitable for thinning operations.

Based on these factors, the district made a volume reduction of 1 MMBF per year. This results in a final Annual Harvest Objective (AHO) of 19 MMBF per year, which better reflects what could be executed on the ground, while still accomplishing the other landscape and desired-future-condition objectives.

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# Appendix B

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# Map Section

North Cascade District Ownership

North Cascade District: Current Condition Stand Structure

North Cascade District: Desired Future Condition Stand Structure

North Cascade District: Terrestrial and Aquatic Anchors

North Cascade District: Recreation Activity Zones

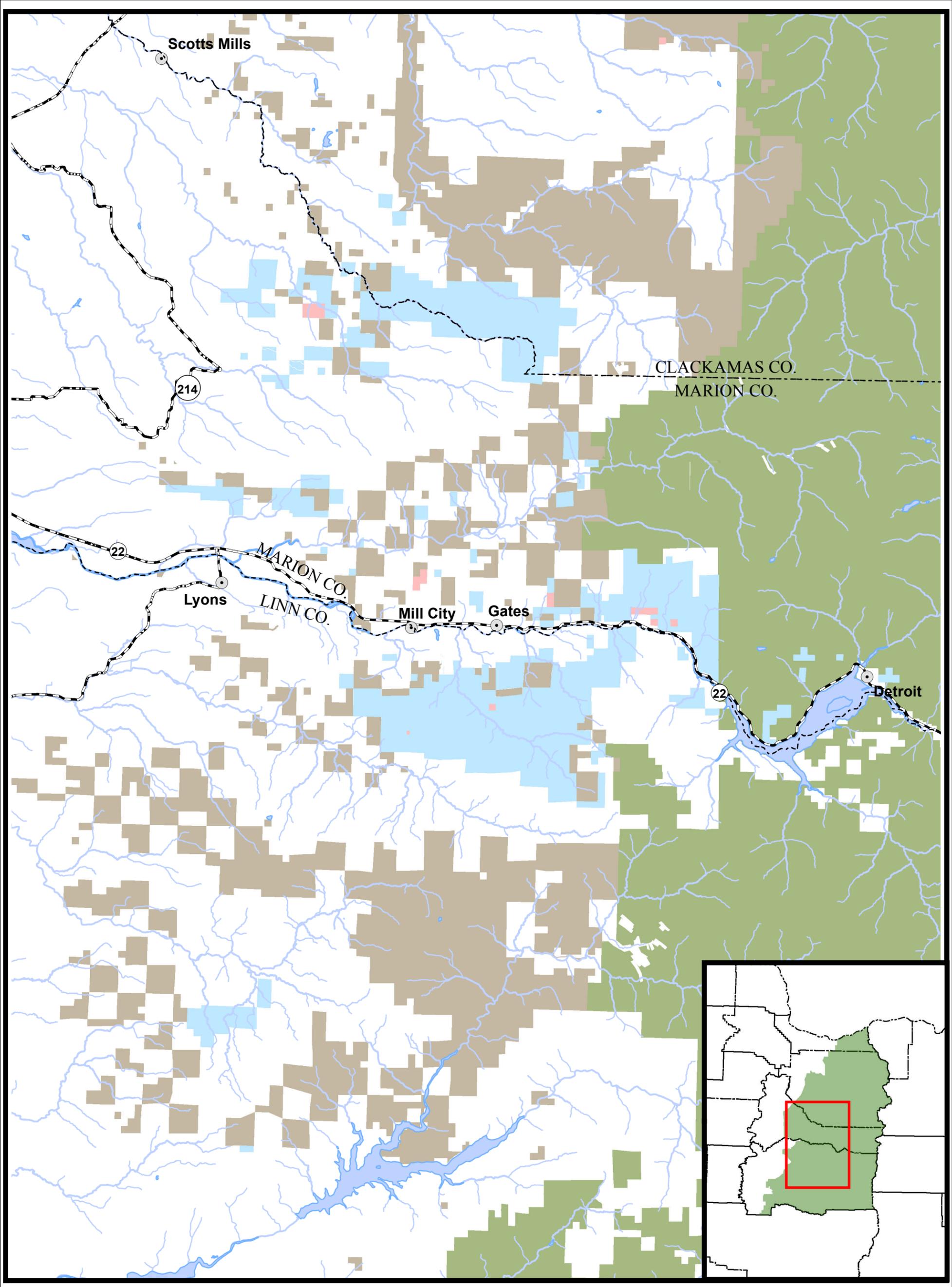
North Cascade District: Forest Land Management Classification – Stewardship Classes

North Cascade District: Forest Land Management Classification – Biological Subclasses

North Cascade District: Forest Land Management Classification – Management Subclasses

North Cascade District: Forest Land Management Classification – Social Subclasses

# North Cascade District Ownership



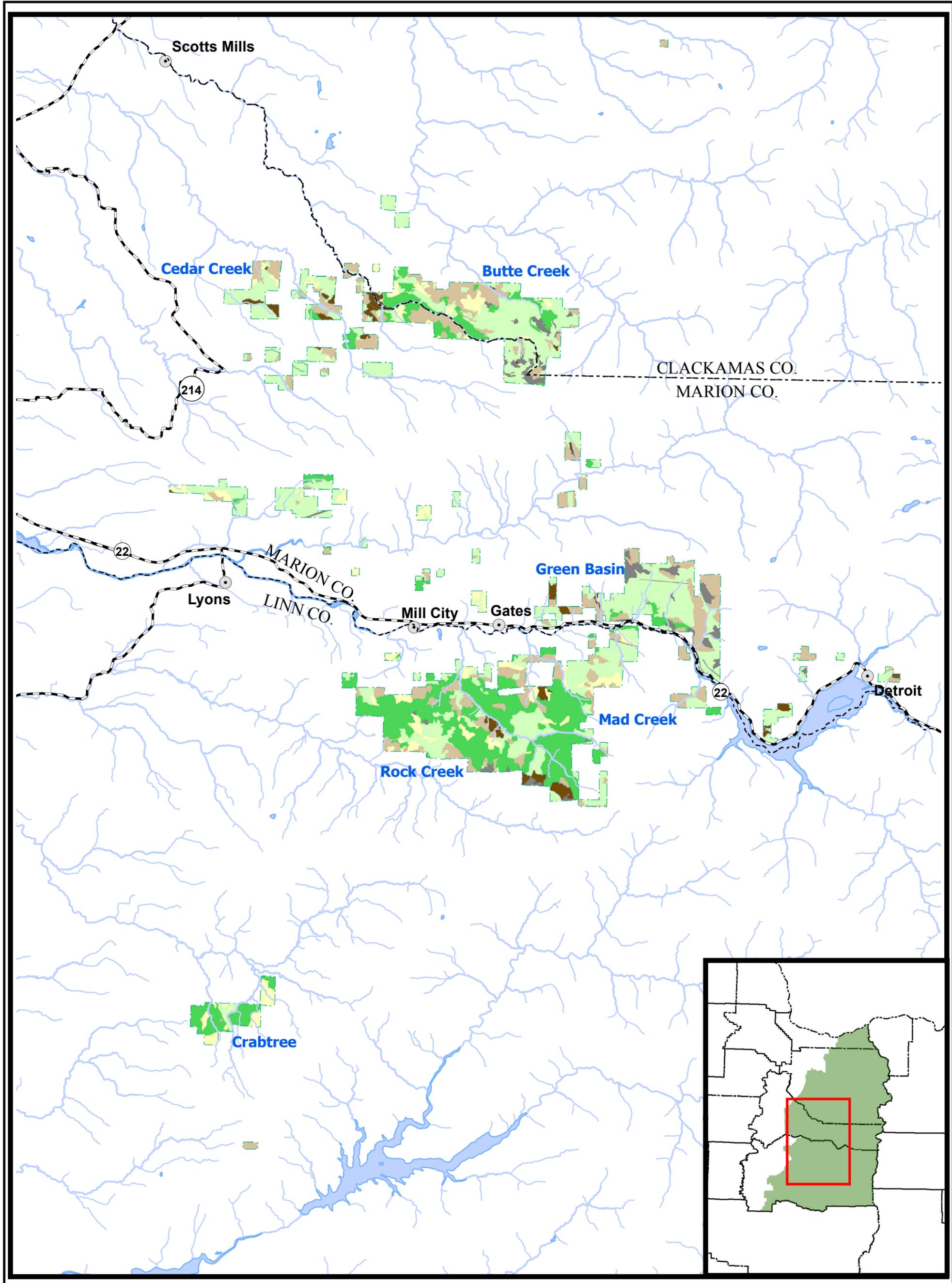
**Ownership**  
 Board of Forestry Lands  
 Common School Lands  
 US Bureau of Land Management  
 US Forest Service

● Towns  
 — Roads  
 — Streams, Large  
 — Streams, Medium



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# North Cascade District Current Condition



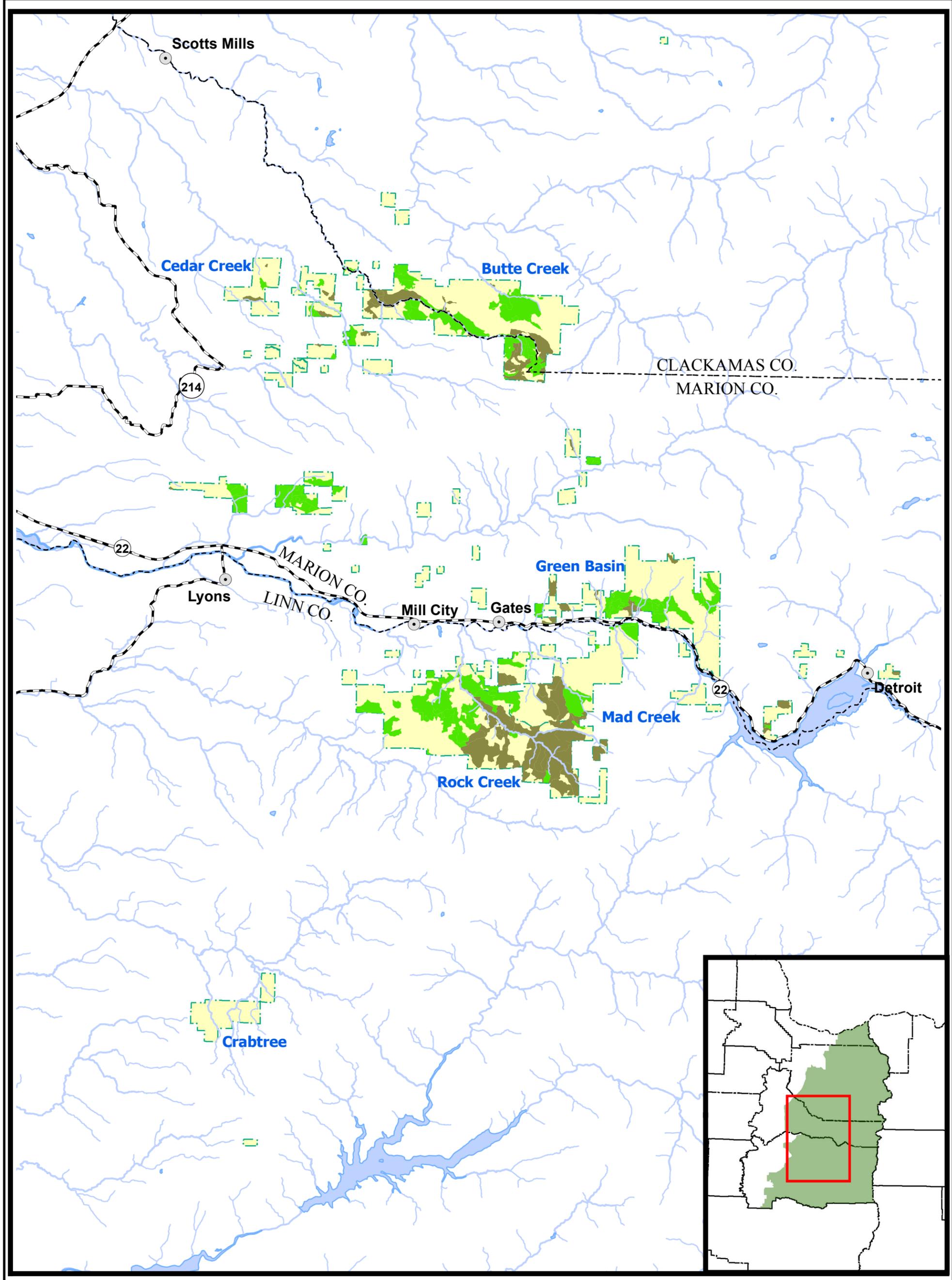
- Stand Structure Type**
- Nonforested
  - Regeneration
  - Closed Single Canopy
  - Understory
  - Layered
  - Older Forest Structure

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



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# North Cascade District Desired Future Condition



**Stand Structure Type**

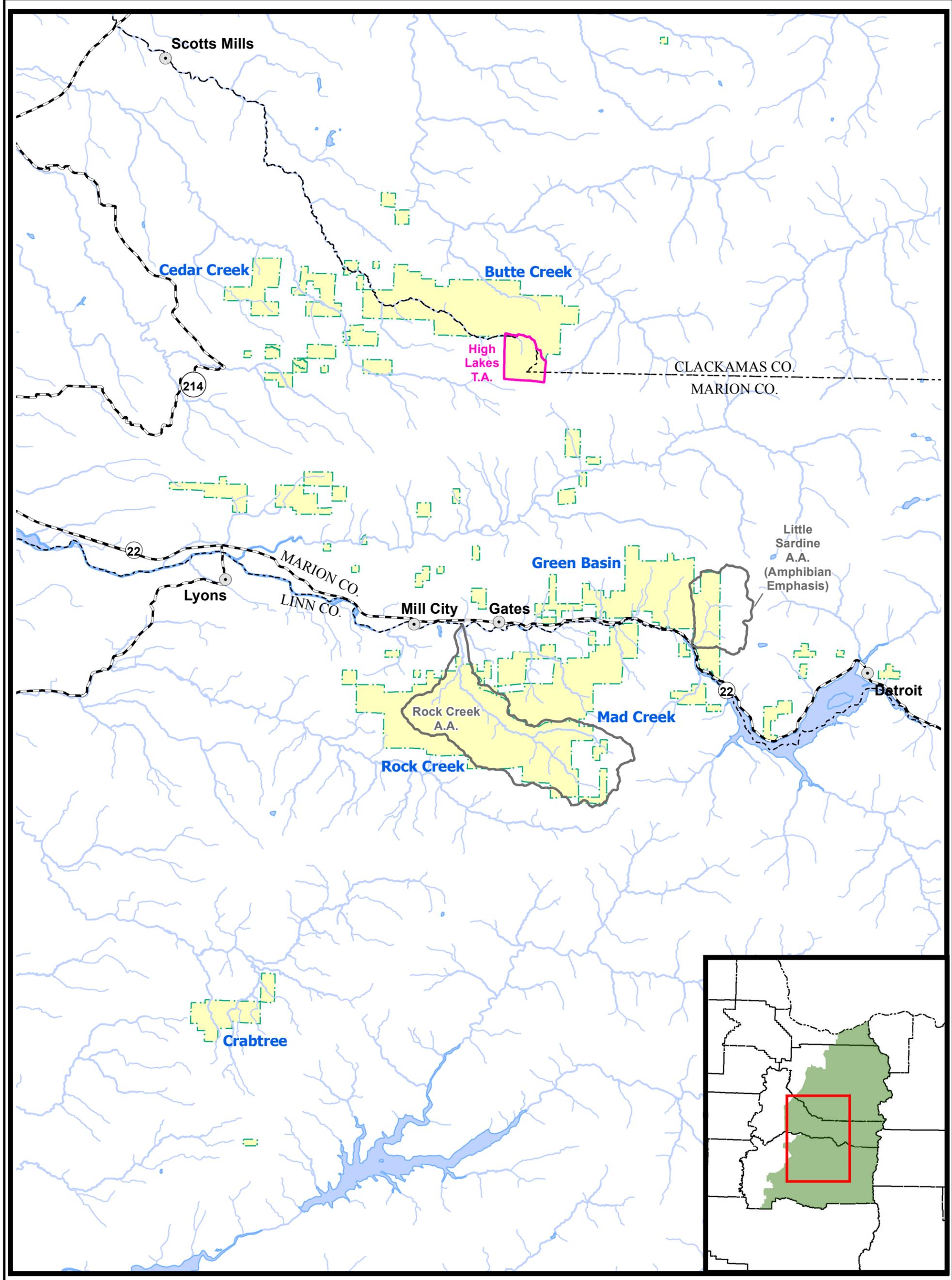
- LYR
- OFS
- Other

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

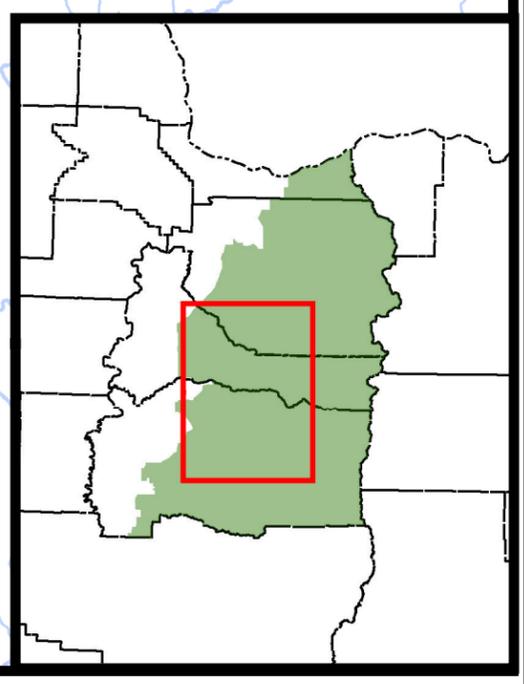


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# North Cascade District Anchor Habitats

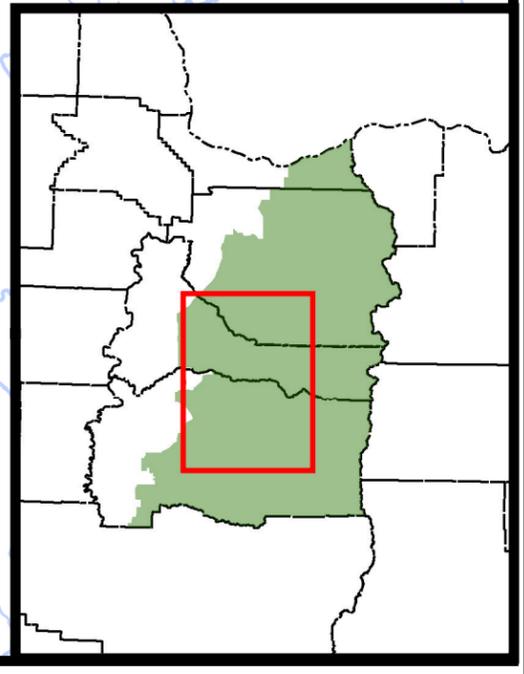
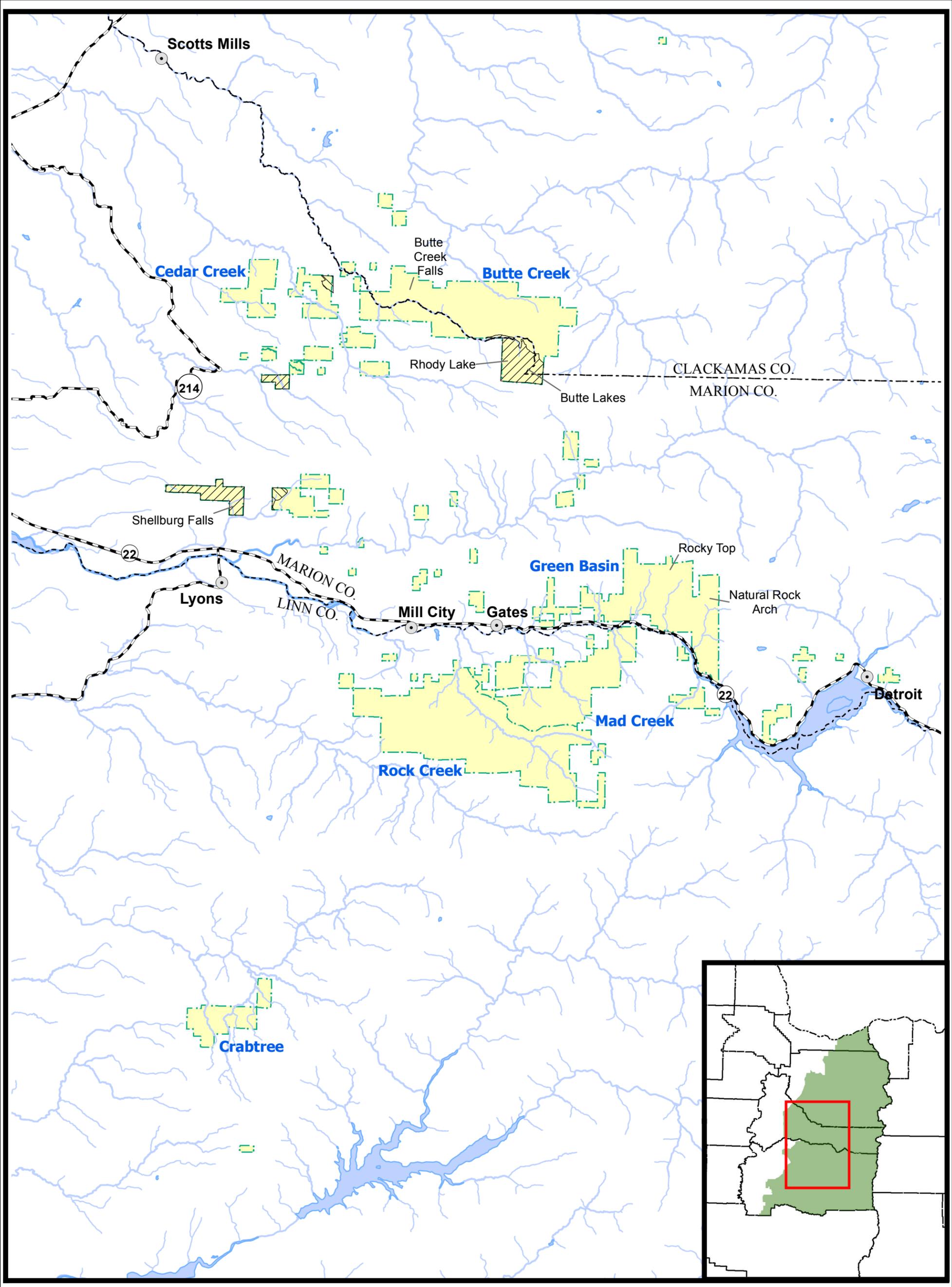


- Terrestrial Anchor
- Aquatic Anchor - Applicable to State Forests Only
- Roads
- Streams, Large
- Streams, Medium
- Management Basins



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# North Cascade District Recreation Activity Zones



## Activity Zones

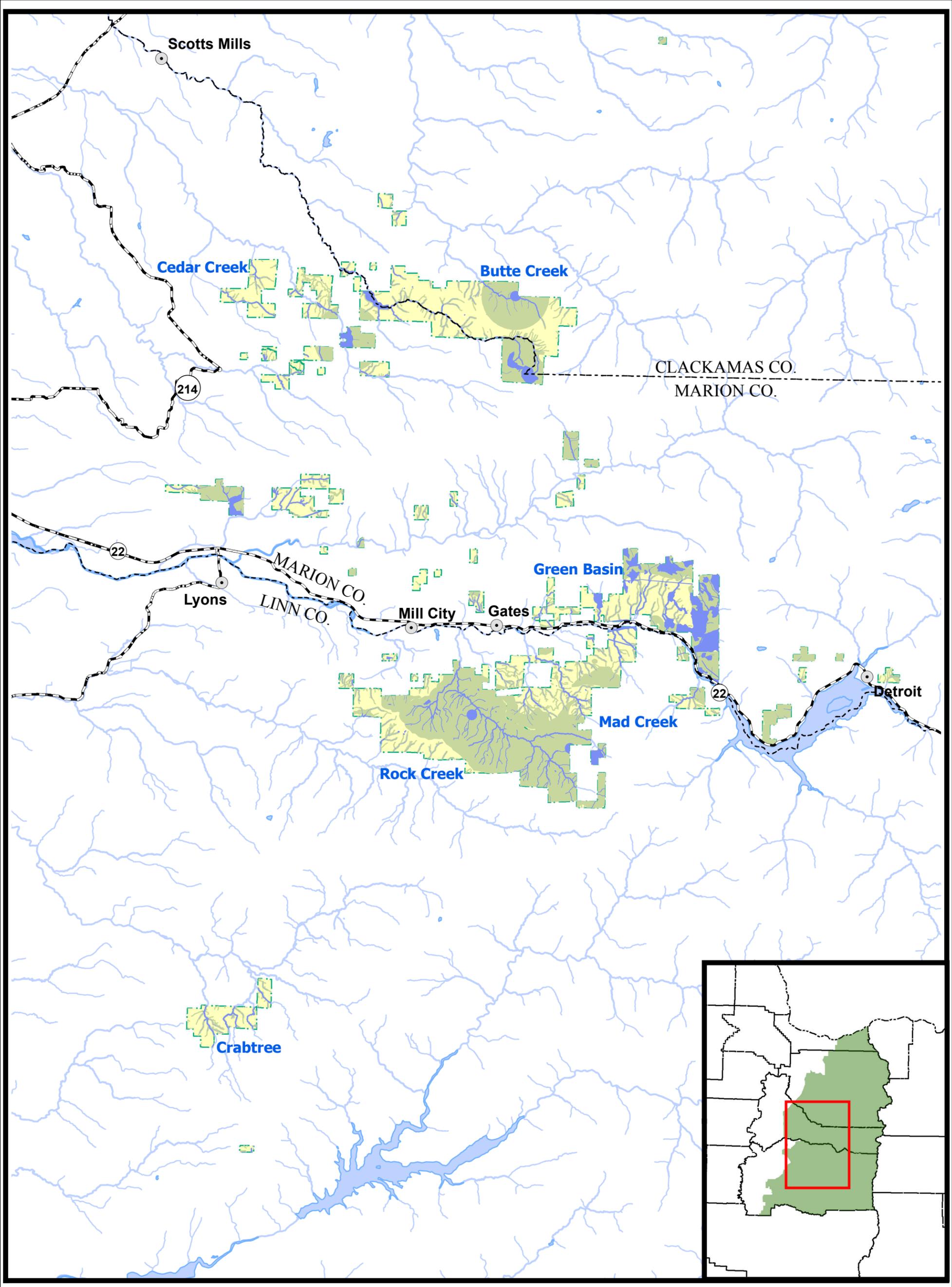
- Motorized Zone
- Non-Motorized Zone
- General Zone

- Roads
- Streams, Large
- Streams, Medium
- Management Basins



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# North Cascade District Stewardship Classifications



**Stewardship Classifications**

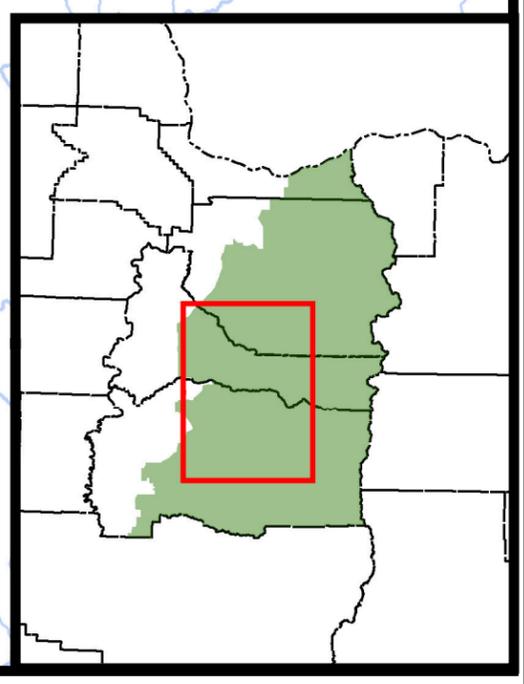
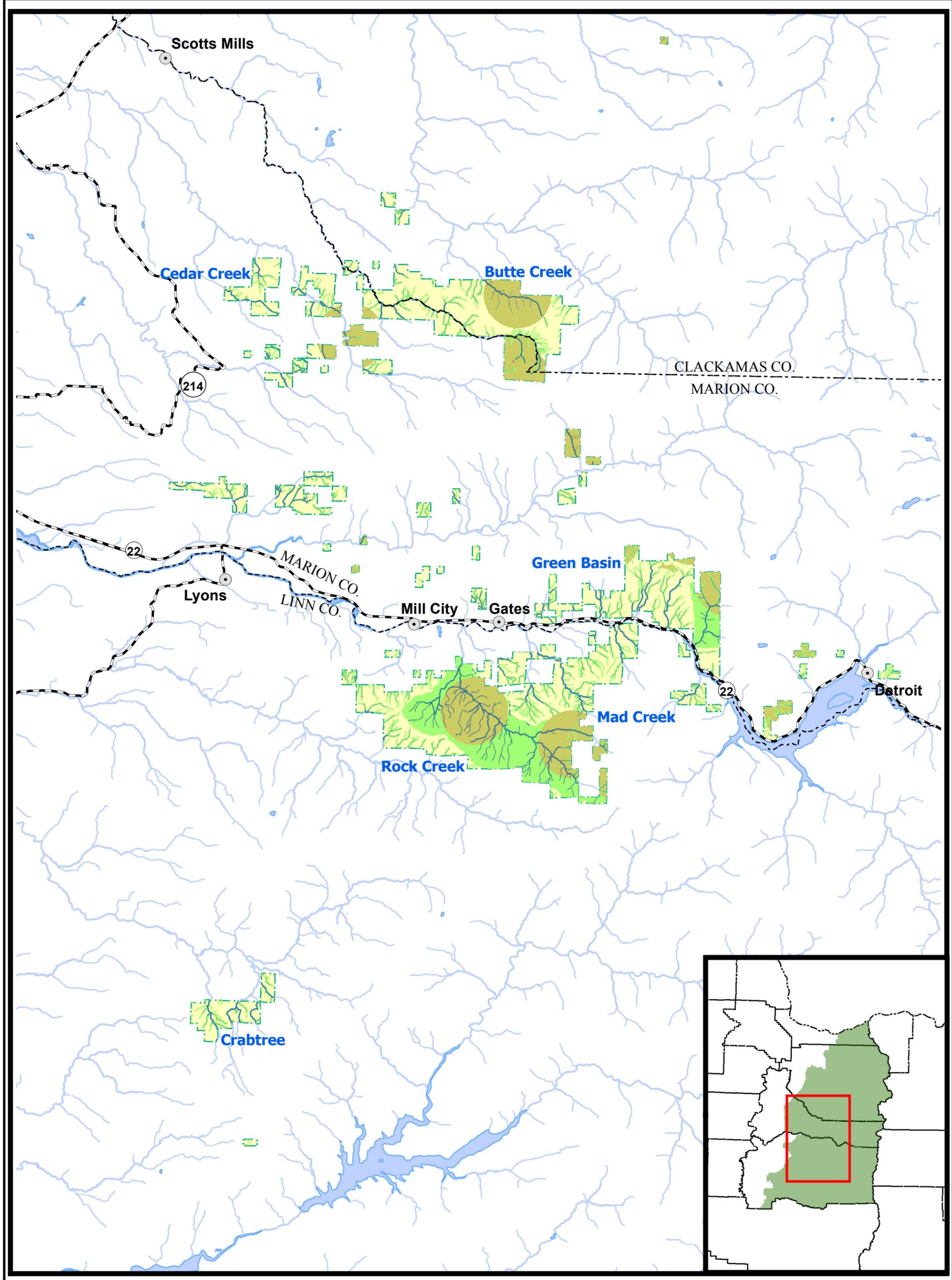
- Special
- Focused
- Other

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



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# North Cascade District Stewardship Classifications - Biological Subclasses



**Special Stewardship**  
 Aquatic and Riparian Habitat  
 Plants  
 Wildlife Habitat

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

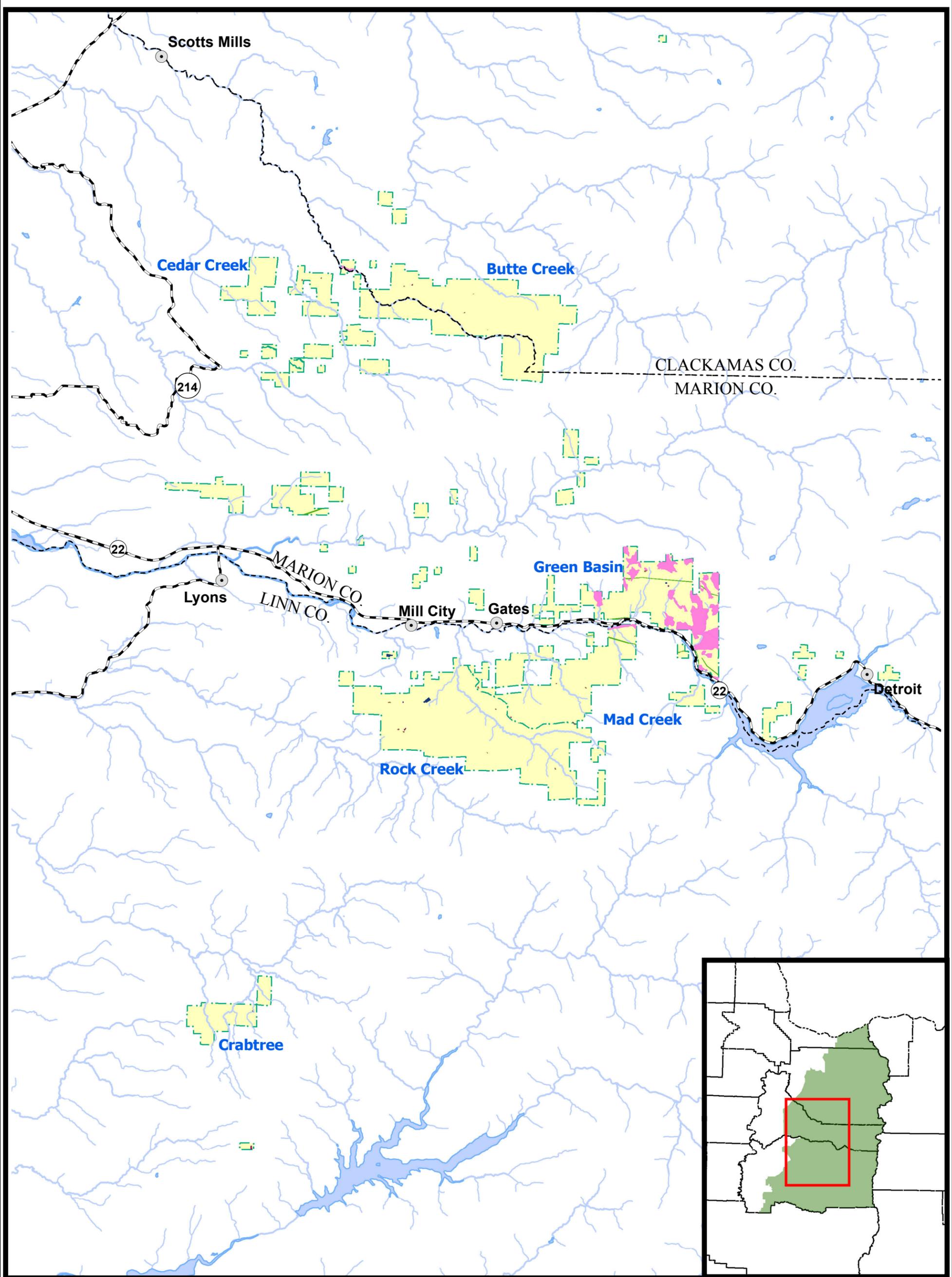
Towns  
 Roads  
 Streams, Large  
 Streams, Medium  
 Management Basins



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 JTH 4/18/2012

# North Cascade District

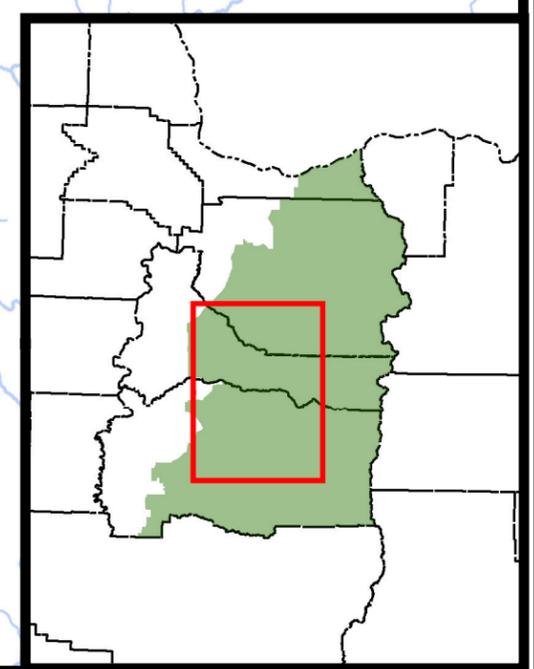
## Stewardship Classifications - Management Subclasses



- Special Stewardship**
- Administrative Sites
  - Research/Monitoring
  - Easements
  - Transmission
  - Energy and Minerals
  - Operationally Limited

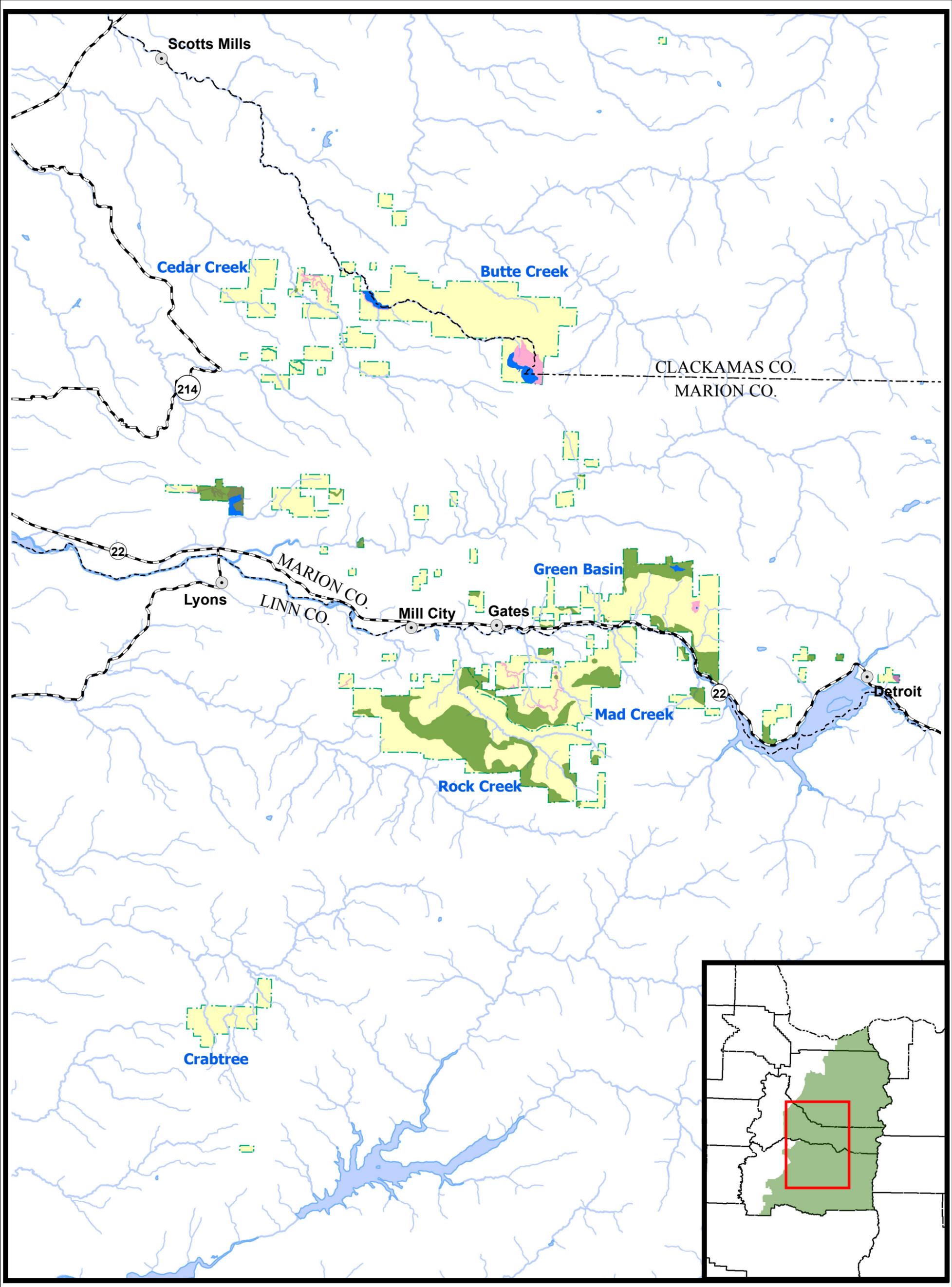
- Focused Stewardship**
- Research/Monitoring

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



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# North Cascade District Stewardship Classifications - Social Subclasses



- Special Stewardship**
- Recreation
- 
- Focused Stewardship**
- Domestic Water Use
  - Visual
  - Recreation

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



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# Oregon

John A. Kitzhaber, MD, Governor

## Department of Forestry

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"STEWARDSHIP IN FORESTRY"

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

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.



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Doug Decker  
State Forester

6.25.14

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Date

# APPENDIX A

## Forest Land Management Classification System (FLMCS) Major Change Notification

The FLMCS 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 FLMCS 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 Areas. Subclasses are assigned for the specific forest resources that require a Focused Stewardship, Special Use, or High Value Conservation Area classification.

A major modification of the FLMCS is defined as one that cumulatively exceeds 500 acres within one year. A 45 day public comment period will be held in conjunction with the FY 2015 AOP comment period.

The current FLMC for the North Cascade District was revised in 2013. The Board of Forestry has approved an additional FLMC rule change for FY 2015 that replaces the Special Stewardship classification with two new classifications: High Value Conservation Areas and Special Use Areas. Pending the Public Comment Period, this reclassification is scheduled to take effect July 1, 2014. At the close of the Public Comment Period, the District Forester will forward these changes along with any public comments to the NWO Area Director and the State Forester for review and approval.

The following tables from the North Cascade District Implementation Plan, 2012 have been modified to reflect this change:

Table 10. North Cascade District Acres, by Stewardship Class and Fund

<b>Classification</b>	<b>Board of Forestry</b>	<b>Common School</b>	<b>Total Acres</b>
Focused Stewardship	54039	933	54972
Special Use	3621	6	3628
High Value Conservation Area	5347	83	5430
General Stewardship	12094	182	12277

\*Acres include overlapping classifications.

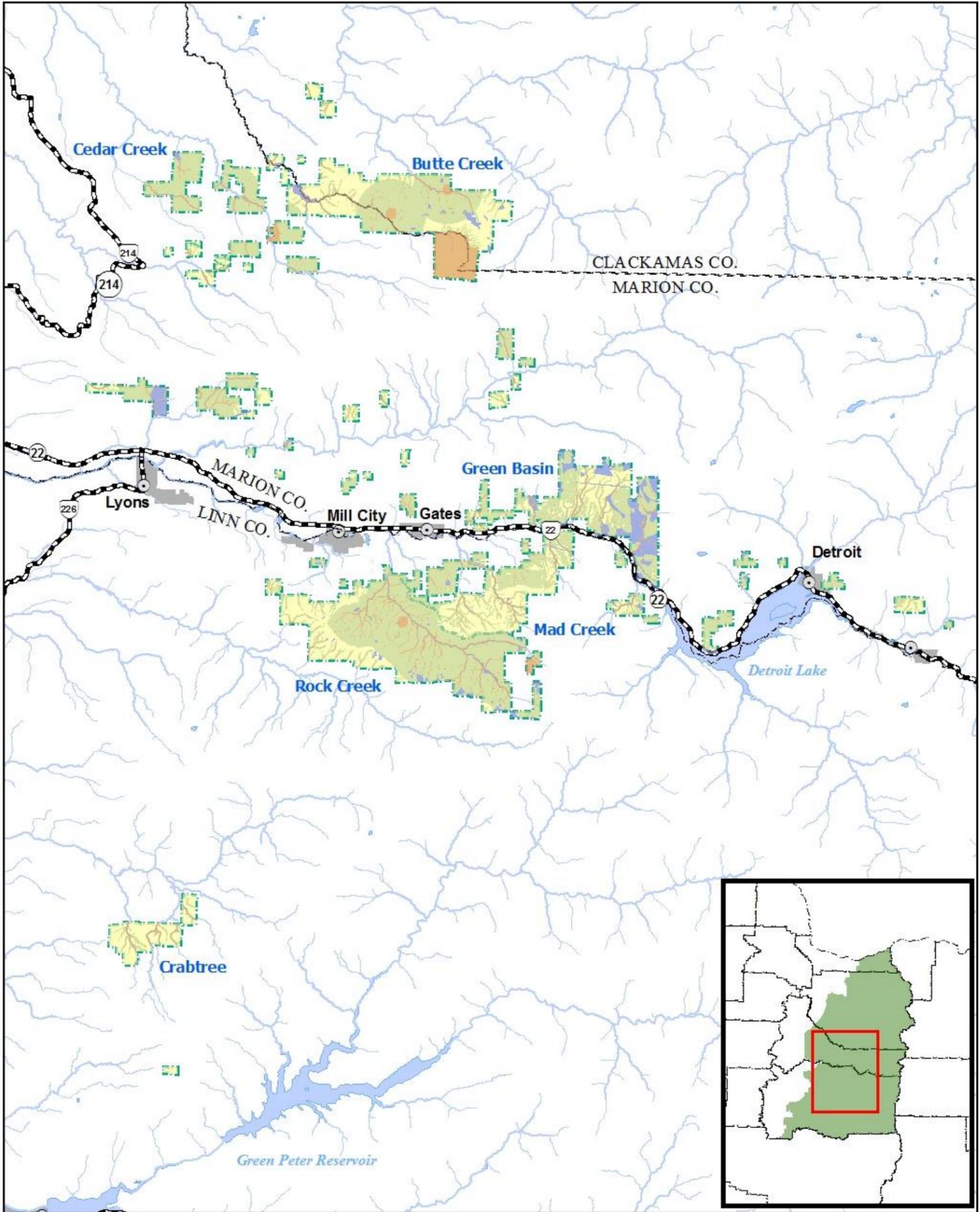
Table 11. North Cascade District FLMC – Focused and Special Subclasses (Acres)

	<b>Focused Stewardship</b>	<b>Special Use</b>	<b>High Value Conservation Area</b>
Administrative Sites		11	
Aquatic and Riparian Habitat	8914		3528
Cultural Resources	2	24	
Domestic Water Use	15944		
Energy and Minerals		36	
Operationally Limited - NEF <sup>1</sup>		2771	
Plants			86
Recreation	620	492	
Research and Monitoring	24	24	
Transmission		197	
Visual	7992	73	
Wildlife Habitat	21478		1817

\*Acres include overlapping classifications

1. Not Economically Feasible

# North Cascade District Stewardship Classifications



**Legend**

- Stewardship Class
- High Value Conservation Area
- Special Use
- Forest
- General
- County
- Town
- Highway
- Streams
- Stream Size
  - Stream, Large
  - Stream, Medium
- Lake
- Management Seams
- Urban Growth Boundaries

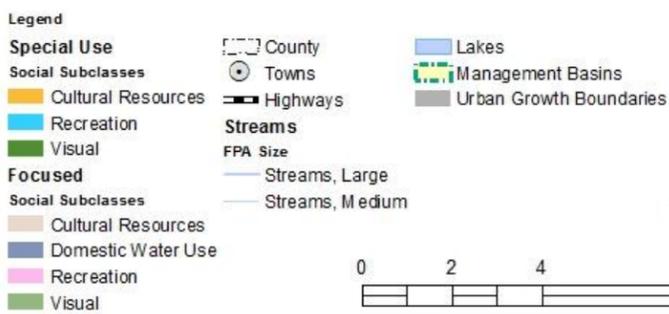
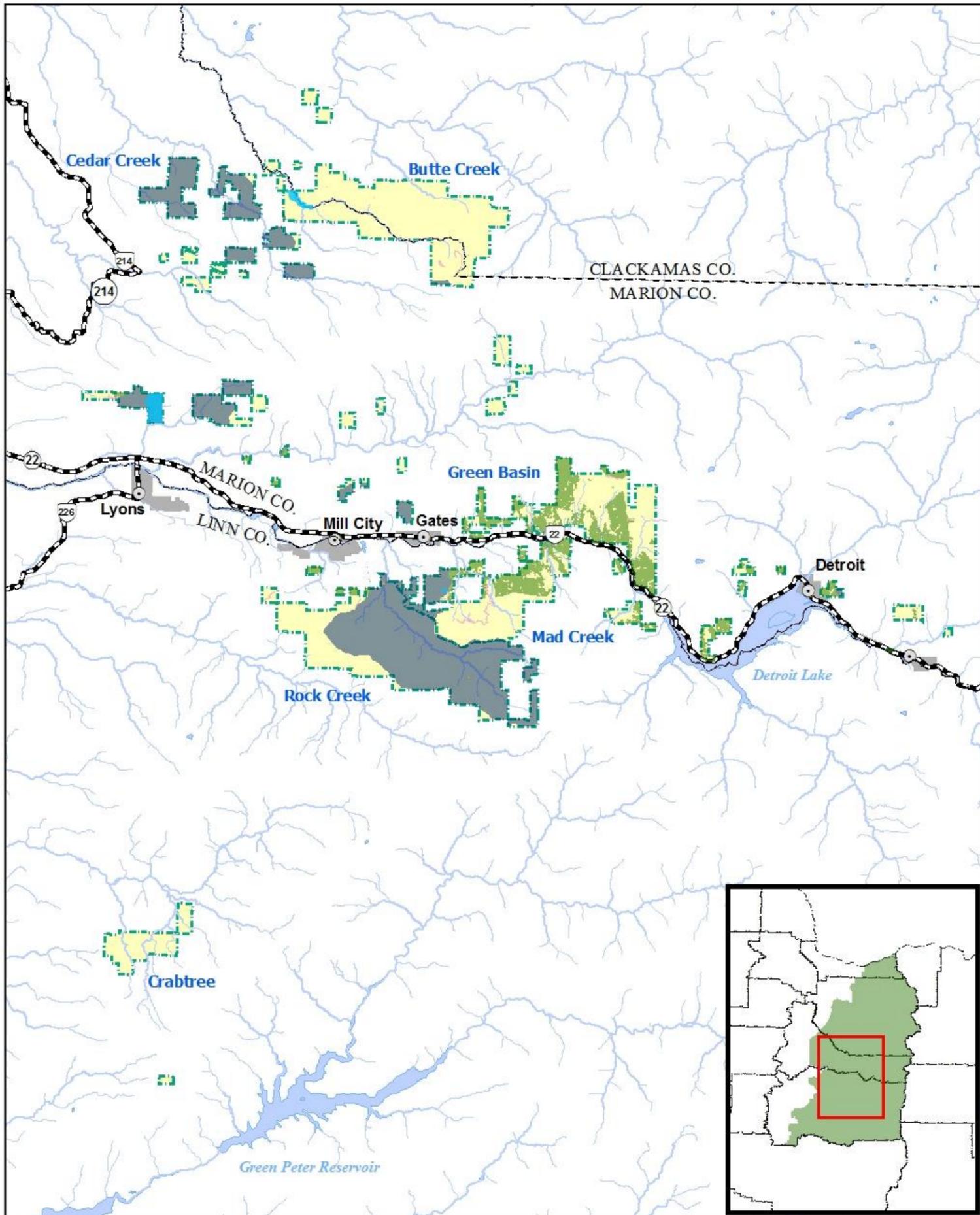
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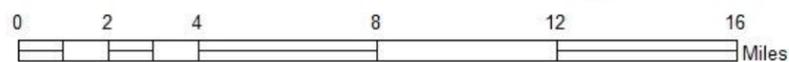
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Created By: Kyle Kaupp  
Date: 3/13/2014

# North Cascade District Stewardship Classifications - Social Subclasses



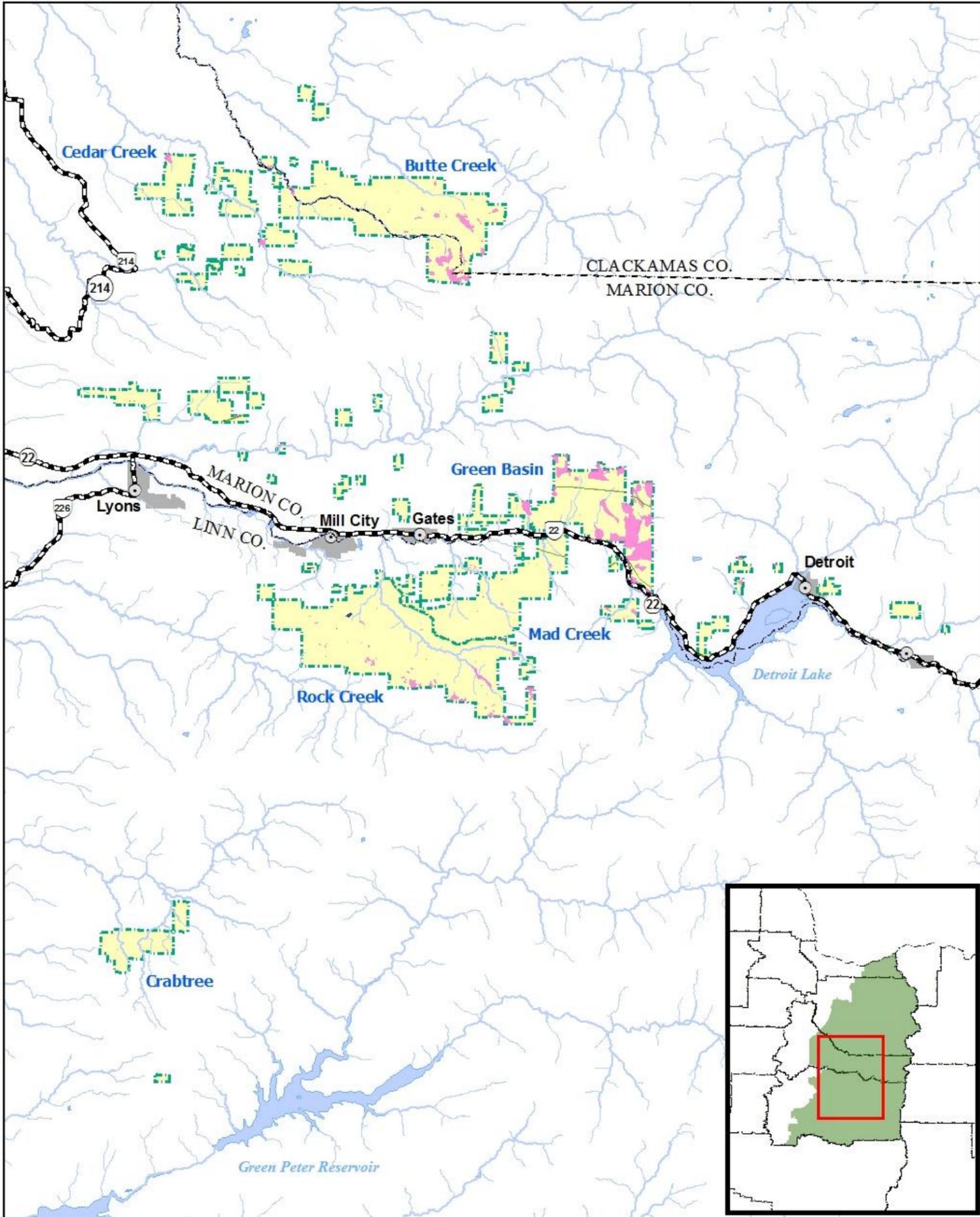
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Created By: Kyle Kaupp  
Date: 3/13/2014

# North Cascade District Stewardship Classifications - Management Subclasses



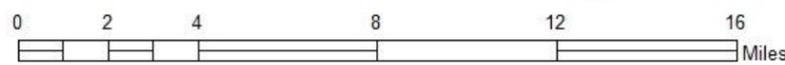
**Legend**

- |                              |                 |                         |
|------------------------------|-----------------|-------------------------|
| <b>Special Use</b>           | County          | Lakes                   |
| <b>Management Subclasses</b> | Towns           | Management Basins       |
| Administrative Sites         | Highways        | Urban Growth Boundaries |
| Energy and Minerals          | <b>Streams</b>  |                         |
| Operationally Limited - NEF  | FPA Size        |                         |
| Research/Monitoring          | Streams, Large  |                         |
| Transmission                 | Streams, Medium |                         |
| <b>Focused</b>               |                 |                         |
| <b>Management Subclasses</b> |                 |                         |
| Research/Monitoring          |                 |                         |



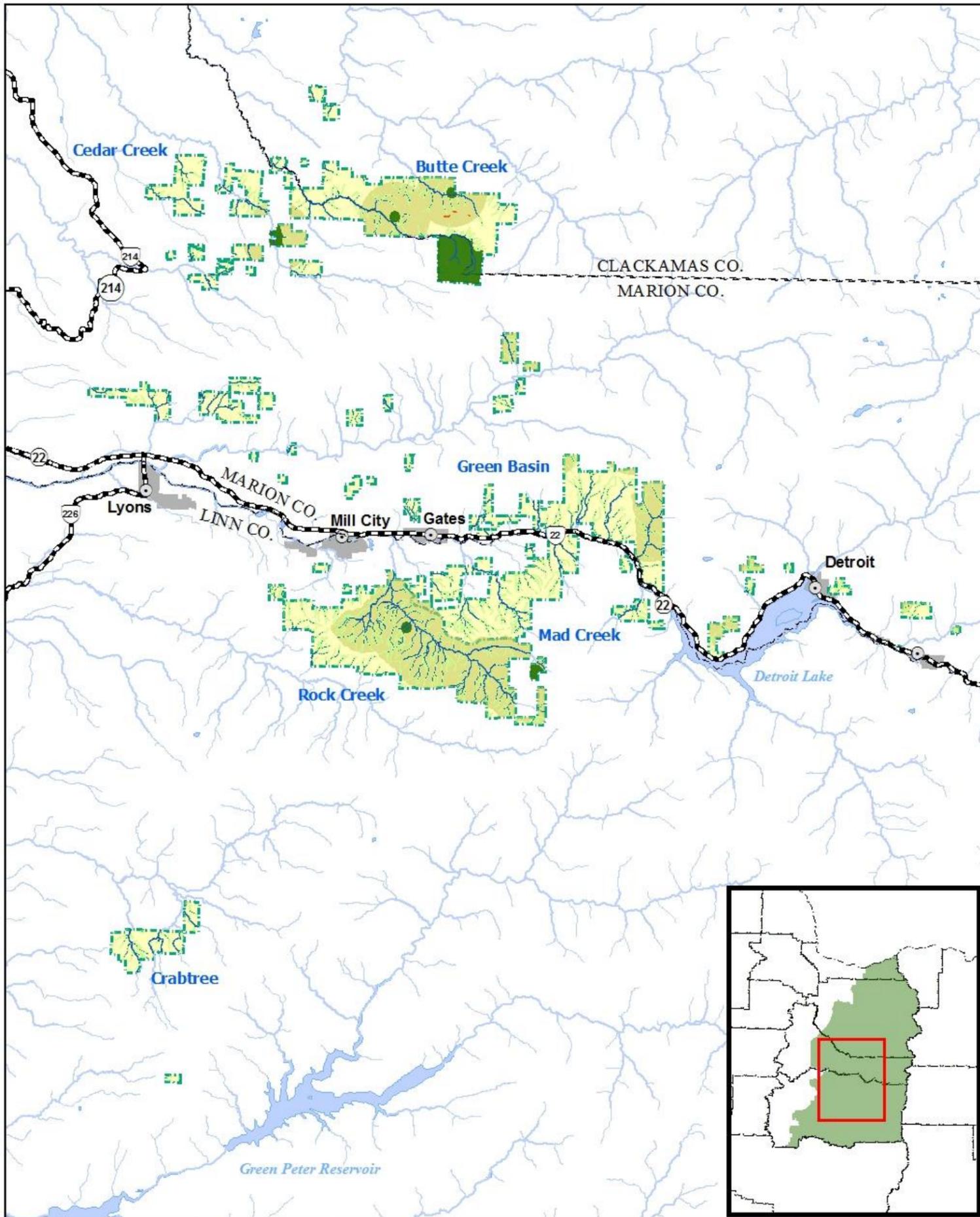
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1 in = 3 miles



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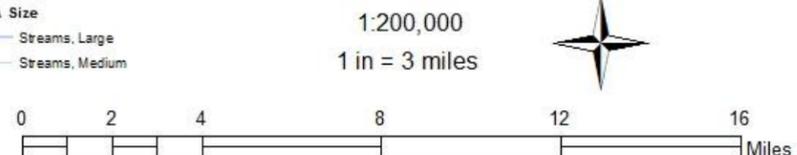
# North Cascade District Stewardship Classifications - Biological Subclasses



- Legend**
- High Value Conservation Area**
- Biological Subclasses**
- Aquatic and Riparian Habitat
  - Unique, Threatened or Endangered Plants
  - Wildlife Habitat
- Focused**
- Biological Subclasses**
- Aquatic and Riparian Habitat
  - Wildlife Habitat

- County
- Towns
- Highways
- Lakes
- Management Basins
- Urban Growth Boundaries

- Streams**
- FPA Size**
- Streams, Large
  - Streams, Medium



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