Upper North Santiam Watershed Revision

Willamette National Forest
Detroit Ranger District
September 2007

Executive Summary

Since the original Upper North Santiam Watershed analysis was prepared in 1995, there have been a number of natural events and management activities that have reshaped natural processes and management opportunities in the watershed.

Significant natural events since 1995 include two large fires which have burned approximately 15% of the acres in the watershed (the B&B fire in 2003 burned 15,000 acres in the watershed and the Puzzle Fire in 2006 burned another 6,000 acres), the 1996 flood event, and the Pamelia Creek torrent.

Management activities that have helped to reshape the baseline conditions[1] in the watershed since 1995 include the replacement of four Highway 22 bridges, the redefinition of the Northwest Forest Plan (particularly direction related to Survey and Manage and the Aquatic Conservation Strategy), and the increased emphasis on active restoration.

The management activities and natural events of the last 12 years have resulted in some notable changes to the baseline conditions of the watershed. Perhaps most significant is the fire-related change in vegetation patterns. Stands affected by the B&B and Puzzle Fires were largely in the stem exclusion stage. After these fires, it is estimated that 90% of the acreage affected by the B&B Fire and 45% of the acreage affected by the Puzzle Fire have converted back to the stand initiation class.

For aquatics, it appears as though recent restoration activities (including wood placement in streams) and protection of riparian areas are improving the condition of the watershed. Although road densities have dropped in the watershed since 1995, a lack of maintenance on the road system continues to provide management challenges.

Recreation remains a popular activity in the Upper North Santiam. Detroit Lake is now the highest used lake for boating activities. The increased population of the Willamette Valley has resulted in increased recreational pressure on the Detroit Ranger District, particularly in dispersed areas. Accordingly, recent management on the District has focused on the resource concerns associated with this dispersed recreation.

The recommendations contained in this watershed revision largely focus on restoration-type activities and are concentrated in certain "hot-spots." The Upper North Santiam Project Prioritization work (which this watershed revision is based on) identified a number of these "hot-spots" including Detroit Flats, Santiam Flats, dispersed sites around the watershed, Road 2257, and Marion Forks/Marion Basin.

Based on the continued need and emphasis on watershed restoration in the Upper North Santiam watershed, it appears as though this watershed is a good candidate for a stewardship project in the near future. Many of the watershed restoration and maintenance recommendations included in this revision are activities that can be appropriately funded through the stewardship authority. In addition, utilizing stewardship may provide a needed source of income and employment opportunities for the local community.

[1] The baseline conditions referred to here and elsewhere in the document refers to the conditions described in the 1995 Upper North Santiam Watershed.

Table of Contents

Table and Figures

Tables

Figures

I. Why are we doing a watershed revision?

Introduction

The purpose of the Upper North Santiam Watershed Revision is to document changes to the watershed since the 1995 Watershed Analysis. These changes will lead to a project prioritization list for the watershed and help guide future planning efforts. Proposed projects are included in Section III of this document.

The Federal Guide for Watershed Analysis identified the need for "Federal agencies [to] conduct multiple analysis iterations of watersheds as new information becomes available or as ecological conditions, management needs, or social issues change. The time between iterations will depend on factors such as major disturbance events, monitoring or research results, new management objectives, and different regulatory requirements. Subsequent analysis iterations may be triggered when existing analyses do not adequately support informed decision making for particular issues or projects. Future iterations also may be necessary to fill critical data gaps identified during earlier analyses."

The last watershed analysis for this area was completed in 1995. Since then a number of management activities have taken place and there have been a number of natural events that have altered the biological and physical processes in the watershed. These management activities and natural events have triggered a new for a watershed revision.

The Upper North Santiam Watershed is considered a "Tier 2" Watershed, but is the highest priority watershed for the Detroit Ranger District. The District's five-year timber plan identifies a series of projects in this watershed beginning in 2009. It is likely that at least one of these projects will involve stewardship contracting with another focusing on the late successional reserve in the watershed. This revision will update the conditions in the watershed and help direct future planning efforts.

Watershed Revision Process

The watershed revision utilized an interdisciplinary process involving a number of resource specialists. This document incorporates project prioritization work completed for the watershed in March 2006. The project prioritization work involved the identification of desired future conditions and goals for resources in the watershed and prioritized potential projects that would help the meet these goals. In 2007, resource specific updates to the 1995 WA were assembled. The project prioritization work was reviewed and updated as necessary.

Organization of Document

The watershed revision is organized into six sections. Section I provides an introduction and background as to why the 1995 Watershed Analysis is being revised. Section 2 includes a general overview of the watershed. Section 3 contains the resource-specific updates to conditions in the watershed. This section has baseline updates, a list of projects completed in the watershed since 1995 and a summary of the desired future condition/goals for each resource area. Recommendations and proposed projects are in Section IV. Section V and VI contains a list of specialists and citations.

II. Upper North Santiam Watershed Overview[2]

Setting

The North Santiam Watershed, located in northeastern Linn and eastern Marion counties, Oregon, is part of the headwaters of the North Santiam River Subbasin. The North Santiam River Subbasin is a part of the Willamette Basin within the Columbia River System. The watershed has an east/west orientation within the lower portion of the watershed and then shifts to a north /south orientation near the confluence of Whitewater Creek (see figure 1). The elevation range within the watershed is 1,700 feet near Idanha, to 10,500 feet at Mount Jefferson.

Figure 1
Upper North Santiam Watershed Location Map

No change has occurred in the number of 6th field subwatersheds or their names found in the Upper North Santiam Watershed analysis 1995. Minor boundary changes have occurred on the Bugaboo, Pamelia, Straight, and Marion Creek boundary lines. These boundary changes were related to drafting changes on the ridge system to follow to determine the subwatersheds area. As a result of these boundary changes, a portion of the Detroit Tributaries Watershed is now within the Upper North Santiam Watershed.

It is important to note that in the 1995 watershed analysis "planning subdrainages" were utilized along with 5th and 6th field designations to frame the area. The planning subdrainage delineation was based on the 1990 Land and Resource Management Plan for the Willamette National Forest, while the 5th and 6th fields were based on the Northwest Forest Plan. Both are being used at the time of this writing; however, emphasis is being placed on the 5th and 6th field designation (see figure 2).

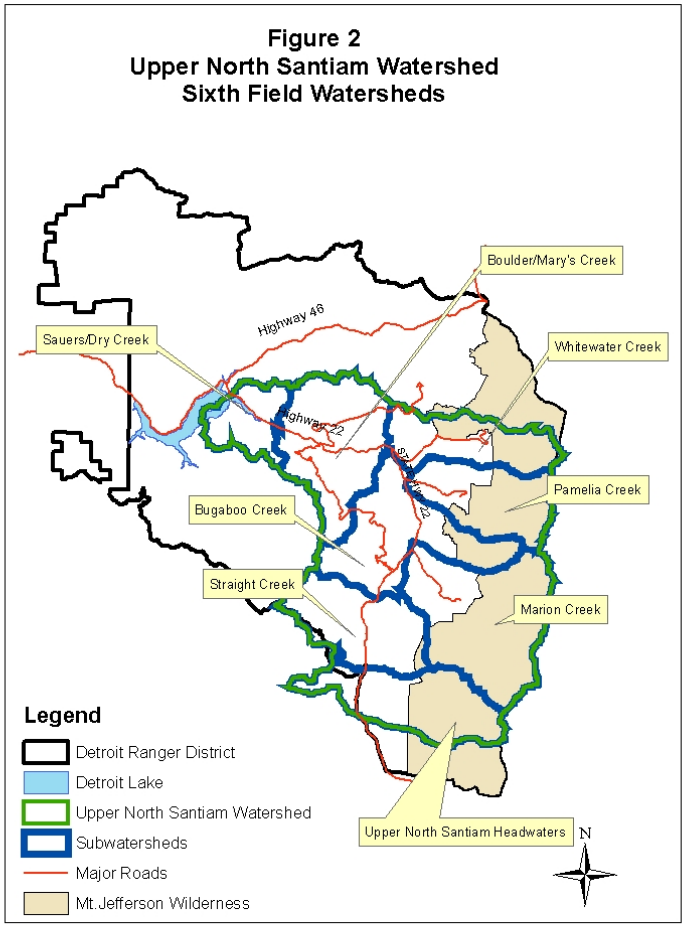
Characterization

The North Santiam River watershed falls within the Western Cascade and High Cascades physiographic province. The dividing line of these two provinces generally follows the North/ South line created by the North Santiam River. At the point of the rivers deflection west the line becomes less distinct with remnants of western and high cascades transitioning into each other.

[2] A full overview of the Upper North Santiam is available in the 1995 Watershed Analysis.

The Western Cascades and High Cascades are generally south and north of the river respectively from Whitewater Creek to watershed mouth.

Within both provinces water has dominated the recent landscape. Historic landscapes are proposed to be formed as the result of a combination of volcanic, glacial, and block thrusts. These rough simple features were then refined by water to the complexity that is apparent today. Channels contain a variety of looks depending upon the material they have encountered.



The western Cascades steep "V" shaped nature of the channels are being altered by earthflow activity—historic and current. These areas contain a complex drainage pattern, dendritic in nature but altered as a result of the earthflows. Discontinuous channels are common in this landscape and small wetland areas are well distributed. These wetlands are generally riverine in nature or are associated to slump features. Bruno Meadow is an example of a wet meadow that is found within the western cascade portion of this watershed.

The High Cascades portion of the watershed contains stepped shape as a result of the lava flow capping historic glacial geology. The channels associated to these areas are fairly stable even thought the parent material is highly erodible. The "steps" occur from overly steepened headwall areas transitioning to gentle valley bottoms. These valley bottoms transition into steep sidewalls of the North Santiam River. The magnitude of the elevation changes is dependent upon the position and size of the tributary streams. Streams positioned lower in the watershed contain a steeper transition to the main river than streams located upstream.

Broad valley bottoms lend themselves to unique and complex stream channels. Multi-channel streams dominated and shaped these valleys. Resulting low gradients depended upon large woody material to sustain and control stream energy. The resulting streams were high in diversity. Utilization of the flood plain was extensive, and channels would adapt and create unique energy signatures across the landscape. High altitude wetlands and lakes provide additional diversity to the High Cascade province. Numerous small lakes and potholes are well distributed across the landscape. These have associated wetland areas that are distributed with comparable frequency.

Management Considerations

The Upper North Santiam Watershed contains approximately 146,000 acres; greater than half of which are either wilderness or in a late successional reserve (see table 1). A large percentage of the watershed is National Forest System land (92%). The watershed contains 52,889 acres of the 111,177 acre Mt. Jefferson Wilderness.

The watershed also contains two roadless areas: Mt. Jefferson – North (3351 acres – total acreage for this roadless area is 4991) and Mt. Jefferson – South (4148 acres – total acreage for this roadless area is 6,036).

Table 1. Land Allocations in the Upper North Santiam Watershed

Allocations	Acres	% of Watershed
Wilderness	52,889	36%
Late Successional Reserve (LSR)	27,374	18%
Administratively w/drawn areas (campgrounds, special interest areas, major water bodies)	2,900	2%
Matrix	52,399	35%
National Forest	135,562	92%
Non-federal	11,003	8%
Total Acres	146,565	100%

Table 2. Management Areas in the Upper North Santiam Watershed

Management Area[3]	Number of Acres	Percentage of Watershed
MA 1 – Wilderness	52,889.8	39%
5a – Special Interest Areas	501.8	<1%
9b – Wildlife Habitat-Pileated Woodpecker	620	<1%
9c – Wildlife Habitat-Marten	99.9	<1%
9d – Wildlife Habitat-Special Areas	210.3	<1%
10b – Dispersed Recreation-Semiprimitive Motorized	2,196.8	1.6%
10d – Dispersed Recreation-Semiprimitive Nonmotorized	1,606.5	1.2%
10f – Dispersed Recreation-Lakeside Setting	464.7	<1%
11a – Scenic-Modification Middleground	7,560.9	5.6%
11c – Scenic-Partial Retention Middleground	2,872.6	2.1%
11d –Scenic-Partial Retention Foreground	3,632	2.7%
11f - Scenic-Retention Foreground	3,482	2.6%
12 a – Developed Recreation-F.S. Site	126.4	<1%
12b – Developed Recreation-Special Use Permits	80.9	<1%

[3] A description of these management areas can be found in the Willamette National Forest Land and Resource Management Plan pp. IV 103-239.

Management Area[3]	Number of Acres	Percentage of Watershed
13a – Special Use Permit Areas	82.5	<1%
13b – F.S. Administrative Use Areas	11.5	<1%
14a –General Forest-Intensive Timber Management	31,047	22.9%
16a – Late Successional Reserve	25,510	18.8%
16b – Late Successional Reserve - 100 acre	1,864	1.4%
Major Water Bodies	701	<1%
Total acres in watershed	~135,560	100%

A number of these management areas do not allow programmed timber harvest. They include MAs 1, 5a, 9b, 9c, 9d, 10f, 12a, 13a, 13b, 16a, and 16b. About 41% of the acres in the watershed have management area prescriptions that prohibit programmed timber harvest. Another 20% of the acres are in late successional reserves which puts significant restrictions on timber harvest of stands older than 80 years of age.

III. Update to Watershed Conditions

Summary of Major Changes in Watershed since 1995

Since 1995 there have been a number of natural and human induced events that have altered the physical, biological, and social character in the watershed. These alterations have changed the watershed's response to certain physical process and their effect. These changes include:

Large scale fire: The Puzzle Fire burned approximately 6,300 acres in 2006 in an area adjacent to the area burned in the B&B Fire of 2003. The B&B Fire was the biggest fire in the area since 1934. Over 90,000 acres burned in the B&B Complex Fires in 2003; approximately 15,200 acres in Mt. Jefferson Wilderness on the Willamette National Forests and in the headwaters of the Upper North Santiam Watershed.

1996 Flood Event: A 30 to 50 year storm event altered all of the channels within the Upper North Santiam Watershed. Millions of yards of material were mobilized and deposited within streams found within the watershed while reestablishing historic cross sectional areas in the channels not seen since the Christmas Food of 1964.

Rerouting of Horn Creek: In 2006 the original confluence of Horn Creek was reestablished through the placement of an oversized pipe under highway 22. This channel confluence has not been utilized for over 70 years due to the rerouting of the channel into Marion Creek during the construction of the highway.

Pamelia Creek Torrent: In 2006 a rain-on-snow event triggered a "Jökulhlaup" a large dam break flood, off of the Milk Creek glacier. This torrent breached the ridge separating the Milk Creek drainage from the Pamelia Creek drainage and spewed material into Pamelia Creek and rerouted Pamelia Creek while destroying a popular trail.

Highway Bridge Replacement: During 2005 and 2006 a major effort was under taken by Federal Highways to replace four highway bridges in the watershed. Whitewater, Pamelia, and

Marion Creeks and the North Santiam River were all crossed with safety being the main concern for the crossings.

Redefinitions of Northwest Forest Plan direction: Numerous court cases have caused a shift in the ability to manage for aquatic species and riparian dependent species. This clarification of intent has affected the ability to implement stewardship type projects within riparian and LSR areas. In 2006 the amendment to clarify the wording in the ASCO was challenged and the court upheld the challenge requiring individual disclosure of all nine objectives for each action taken as opposed to the effect of the project and related actions on the 5th field watershed. Survey and manage has continued to be amended and is currently undergoing change.

Emphasis on Passive and Active Restoration: In 2005, Region 6 placed emphasis in their business plan for Watershed and Aquatic restoration. Passive restoration maintains healthy habitats and high quality water through prescriptive direction constraints. Active restoration complements passive restoration. Prevention of damage is the first priority. The strategy is to address whole watersheds and focus activities in priority areas.

Stratification and adjustment of watershed into 5th and 6th field watersheds. An agreement between various federal and state agencies that defines the watershed boundary lines and the size of the watershed (5th field) and sub watershed (6th field) is pending. Terminology was agreed upon to allow for consistency in reporting. This stratification allows for consistent disclosure of special characteristics for the North Santiam River Watershed.

While additional changes have occurred in various fashions the above mentioned are ones that could be discussed under the scope of this document. Other note worthy changes includes:

- Change of funding available to the agency due to the 9/11 catastrophe
- Declining market values for wood and its effect on the ability to sell sales and generate funds for mitigation/restoration work
- Focused management on managed stands
- Forest Service emphasis on the four threats (Fire and Fuels, Invasive species, Loss of Open Space, and Unmanaged Recreation)

Resource-Specific Updates

For each resource area, the baseline conditions from the 1995 WA were reviewed and any updates or changes, including projects completed since 1995, are described in this section. Where applicable, the desired future condition and objectives for the resource is also included in this section.

Botany

Baseline Update

Rare Plants

The original watershed analysis listed four rare plant species documented in the Upper North Santiam Watershed. Since the 1995 Watershed analysis, six more rare plant species have been documented with only approximately 5% of the total watershed surveyed. In 1997 a forest plan

implementation created a Special Habitat Management Guide. This guide gives direction for classification and management of the special habitats within the Willamette National Forest.

Ten plant species found on the Region 6 Sensitive Plant List have been documented in the Upper North Santiam watershed (see table 3). These species occur in non-forested habitats, such as meadows and rock gardens and in riparian areas. Discussion of sensitive species documented in the watershed is found in Table 3. Prior to 1995, approximately 10-15% of the Forest Service land in the watershed has been surveyed for sensitive plants. Since 1995 to present, approximately 5% more has been surveyed. Most surveys were completed in conjunction with proposed timber sales and other projects. No known surveys for rare plants have been done on private lands in the watershed. Ecoplots have been characterized in the Mt. Jefferson Wilderness, but no systematic sensitive plant surveys have been conducted there.

Table 3 Sensitive Plant Species in the Upper Santiam Watershed

Common name	Scientific name	# of pops	Geographical area
Gorman's aster	*Aster gormanii*	13	Outerson Mtn., Woodpecker Ridge, Bachelor Mtn., Coffin Mtn, Three Pyramids, Whitewater (Tunnel Cr Spring and Sentinel Hills)
Brewer's reedgrass	*Calamagrostis breweri*	3	Jefferson Park
Thompson's mistmaiden	*Romanzoffia thompsonii*	3	Whitewater, Beard Saddle, Three Pyramids
Scheuchzeria	*Scheuchzeria palustris* var. *americana*	1	Camp Creek, N of The Parks,
Naked Rhizomnium*	*Rhizomnium nudum*	1	Hanks Lake
Groundcedar	*Lycopodium complanatum*	1	Bruno Meadows
Rainier pseudocyphellaria lichen*	*Psuedoscyphellaria rainierensis*	1	Camp Creek, N. of The Parks
kidney lichen	*Nephroma occultum*	1	Camp Creek, N. of The Parks
Swaying bulrush	*Scirpus subterminalis*	1	East of the Parks, near HWY 22 and Road 90
Red pored bolete*	*Boletus pulcherrimus*	1	HWY 22, just past the town of Detroit.

* Also on survey and management

Gorman's aster (*Aster gormanii*) populations in the Upper North Santiam watershed are located in the vicinities of Outerson Mountain, the very top of Skunk Creek, Woodpecker Ridge, between Buck Mountain and Bachelor Mountain. Three Pyramids; between North and South Pyramid, Whitewater Creek, and in the Sentinel Hills of Mount Jefferson Wilderness. One

population is bisected by a wilderness trail, (Whitewater) and others are adjacent to system trails (Bachelor, Coffin). One population is included in a regional monitoring program, the population appears to be stable.

There are three documented occurrences of Thompson's mistmaiden (*Romanzoffia thompsonii*) in this watershed. One of these occurrences *Romanzoffia thompsonii* is located north of Whitewater Creek, adjacent to private land while the other two are located on the outskirts of the Watershed; Beard Saddle and Three Pyramids.

Brewer's reedgrass (*Calamagrostis breweri*) has only been documented in Jefferson Park. Threats mostly involve recreational use, including trampling and camping outside of designated areas. This population covers a large area, but population trends are uncertain at this time. Visits have not indicated any significant change in this population but we need to set up conduct monitoring to determine if recreational traffic is having an adverse impact on populations.

There is one documented population of Scheuchzeria (*Scheuchzeria palustris var. americana*) that exists within Upper North Santiam watershed and consists of about 55 mats covering 1/4 acre. Threats include hydrology changes and wetland enthusiasts. There are also 3 other populations that exists a few miles away but outside of the watershed. It is reasonable to assume that there are probably more undiscovered populations in between and around these known documented populations.

Naked Rhizomnium (*Rhizomnium nudum*) was documented just south of Hanks Lake in a herbarium collection; this site has not been revisited to determine whether it is extant.

Rainier pseudocyphellaria lichen (*Pseudcyphellaria rainierensis*) and kidney lichen (*Nephroma occultum*) are documented at Camp Creek, North of The Parks; this site has not been revisited to determine whether it is extant.

Swaying bulrush (*Scirpus subterminalis*) is documented in a peatland, saturated sedge, sphagnum and bryophyte wetland adjacent to Highway 22, southwest of Big Meadows on outskirt of watershed.

Red pored bolete (*Boletus pulcherrimus*) is documented adjacent to Highway 22, at the town of Detroit.

Survey and Manage and other Species of Concern

Out of the 10 documented sensitive species located within the watershed or just on the outskirts, 3 of these are survey and management species. These are Naked Rhizomnium, Rainier pseudocyphellaria lichen and Red pored bolete.

In addition to those species that are sensitive, there are seven watch list species, two review list species and five plant species on the concern list documented in the watershed. See table 4 below

Table 4 Survey and Manage and other Species of Concern in the Upper North Santiam Watershed

Common Name	Scientific Name	List	Location
Cascade fleabane	*Erigeron cascadensis*	Watch	Triangulation Peak
Cliff dwarf-primrose	*Douglasia laevigata*	Review	Park Butte
Cusick's checkerbloom	*Sidalcea cusickii*	Watch	Bruno Meadows, Bruno Creek, and Parkett Creek

Cusick's sedge	*Carex cusickii*	Concern	Bruno Meadows
Northern hollyfern	*Polystichum lonchitis*	Concern	Hill Creek
Sierra cliffbrake	*Pellaea brachyptera*	Concern	Straight Creek
Squashberry	*Viburnum edule*	Concern	E. of Duffy Butte
Stiff clubmoss	*Lycopodium annotinum*	Watch	Bruno Meadow
Suksdorf's silene	*Silene suksdorfii*	Watch	S. Side Park Butte
Tall alumroot	*Heuchera chlorantha*	Concern	Horn Cr
Tall cottongrass	*Eriophorum polystachion*	Watch	Tule Lake bog and Bruno Meadows
Talus collomia	*Collomia debilis var. larsenii*	Watch	Park Butte
Yellow coralbells	*Elmera racemosa*	Watch	Park Butte/Park Ridge
Yellow willowherb	*Epilobium luteum*	Review	Hill Creek

The locations that are documented on the Detroit District are from herbarium collections and incidental sightings. Appendix J2 of the FSEIS (Holthausen et al. 1994) provides descriptions of the habitat and range of many of these species.

As of 1995, approximately 5% of the Upper North Santiam watershed has been systematically surveyed for rare plants, mostly in conjunction with proposed timber sales and other projects. A random grid survey was conducted across the region and the *Psuedoscyphellaria rainierensis* and *Nephroma occultum* discussed above came from one of these surveys. Vascular and non-vascular plants that are on both the survey and manage list and the Region 6 Sensitive Plant List suspected or documented to occur on the Willamette National Forest have been subject to survey during the normal course of field work. To this date, habitat descriptions of most fungal species are not specific enough to determine probable locations with existing data

Weed Management

In 2007, the forest produced an Environmental Assessment (EA) for treatment and control of invasive weeds across the entire Willamette National Forest (WNF). The proposed action is to contain established infestations and to eradicate new invader infestations on 9700 acres across the forest for the purpose of reversing the negative impacts caused by invasive plants and to restore ecological communities and function at impacted sites.

This WNF Integrated Weed Management EA provides weed direction to meet the design criteria's established within the EA to eradicate weeds throughout, including within the watershed. This also provides guidelines for treating, preventing, monitoring, and development of restoration goals for treatment of weeds. This Integrated Weed Management AE will be used as a guide for the eradication of weeds within the Upper North Santiam watershed.

Sensitive Habitats

Many of the changes to the botanical resources in the North Santiam Watershed are due to the lack of information and new changes since the last watershed revision. The distribution of special habitats other than the alder/shrub types is concentrated toward higher elevations, mostly in the mountain hemlock zone. Rock, meadows, subalpine, and water habitats are particularly abundant. Harsher climate, undulating topography, and the multitude of soil types associated with the mountain hemlock zone and the High Cascade peaks provide varied habitats for a great

diversity of plants and animals. The silver fir zone (mid-elevation) harbors the most alder/shrub types, and falls between mountain hemlock and western hemlock zones in the number and acres of meadows, rock, and subalpine types. The western hemlock zone (lower elevations) contains just a few more acres of water types than the silver fir zone.

Management disturbance threats to field verified special habitats appear to be harvest units and adjacent roads. An increasing trend in the number of wet meadows surrounded by harvest units and adjacent to roads, and in the number of moist meadows surrounded by harvest units and containing invasive nonnative plants could cause an irretrievable local loss of specific plant communities. Management created openings will increase the exposure of meadows and wetlands to fluctuating wind, sun, precipitation, and temperature conditions that alter the microenviroment which in turn can alter species composition and distribution (Chen 1994).

Roads represent permanently disturbed created openings that foster establishment and long term occurrence of invasive weeds, and harbor propagule sources for further weed expansion. The result is reduction and displacement of various stable native plant communities represented in the landscape.

The occurrence of special habitats (non-forested communities) and their distribution across the landscape is important for biodiversity of plant and animal species. Hickman (1976) estimated that 85 percent of flowering plant species in the central western Cascades are found in non-forest areas such as rock outcrops and meadows, which only comprise about 5 percent of the land base. The forest land management plan standard and guideline FW-211 (WNF 1990) directs us to protect these habitats and their ecotones.

Amendments to special habitat direction for Forest Plan implementation occurred in 1997 with the Special Habitat Management Guide which identified special habitat criteria. According to this guide, all non-forested habitats are treated as special habitats. Some special habitats to survey for, document, protect and monitor are wet habitats (ponds, bogs and various swamps), sedge meadows, vine maple (Talus), Forested devils Club, mesic habitats (various mesic meadows), moist rock gardens, Sitka Alders, caves, mineral deposits, various dry meadows, rock outcrops, dry rock outcrops, shrub lava, talus, and vine maples (rocky soil).

Within the Upper North Santiam Watershed, very little of the above listed special habitats were actually surveyed for and documented excluding the 5% since 1995 that were surveyed for, related to management activities. All currently mapped special habitats within the watershed have not been officially ground-truthed; they were mapped from the existing vegetation layer or from aerial photo interpretation. A more systematic survey is needed throughout the watershed to determine what type of habitats exist in the Upper North Santiam Watershed and what restoration activities are required to maintain or enhance these habitats (USDA FS, 1990, FW-211).

Completed Projects

1. Weed Removal (throughout watershed)
2. Dispersed Site Rehabilitation (Hwy. 22 Corridor)
3. Bruno Meadow road closure/ revegetation
4. Straight Creek road closure/ revegetation

5. Pamelia Lake campsite rehab
6. Monitoring Sensitive species (ongoing)
7. Big Meadows meadow enhancement (Horse Camp)
8. Fruit bearing shrub planting (near Big Meadows)
9. Hunts Cove trail realignment
10. B&B burn campsite & trail rehab, native seeding outside wilderness.
11. Giant Knotweed eradication (Detroit & Marion Forks)

Desired Future Condition

The DFC (desired future condition) for botany in the Upper North Santiam watershed is based on native plant diversity and invasive weed spread. Native plant diversity includes sensitive and S&M (survey and mange) botanical species. Native plant diversity is improved by the retention of intact communities and the promotion of habitat integrity and stability. Native plant diversity is achieved by minimizing disturbance and initiating restoration activities, including native species revegetation and invasive weed removal.

New invader establishments of invasive weeds are prevented. Established weed spread is stopped. By allowing disturbed areas to return to a natural condition, native species habitat is retrained and noxious weeds are prevented dominating these areas.

Objectives

1. Reduce vulnerability of sites to human impact

An inventory of special habitats must be done in order to establish what sites are vulnerable and if there are any threats to rare plants. Since we have only surveyed approximately 15% of the watershed, proposed future projects will include more detailed surveys of not only rare plants but all special habitats as well. Once these inventories have been done then analysis of the effects from human impacts can be more thoroughly looked at and vulnerability of the sites will be established. This in turn will create direction in establishing protections for special habitats therefore reducing the vulnerability of these sites to human impacts.

2. Rehab heavily impacted areas

Each heavily impacted area will have to be analyzed on a case by case basis depending on if there are any rare plants affected and if any special habitats are affected. Some of the methods that may be used for rehabilitation of heavily impacted areas are eradication of any non-native and/or noxious weeds, planting of trees and planting of native grass seed and/or native forbs and shrubs.

3. Remove all new invader weed occurrences

Noxious weeds and invasive nonnative plants are a threat to native plant diversity. These species are able to thrive in a new environment because they arrive without the complement of predators, disease, and other ecosystem components found in their native region of the world. Most of these species take advantage of disturbance gaps such as logged units, roads, rock quarries, the areas surrounding human structures, and trails. Once established, these populations can serve as a seed source for further dispersal, generally along road and trail corridors.

Several new invader species and established noxious species occur in the Upper North Santiam watershed. Spotted knapweed is found in areas adjacent to Highway 22. This species dominates large tracts of land in drier habitats east of the Cascade crest. The spread of this species to west Cascade forests is most likely due increased transportation and recreation activities occurring across the Cascade crest.

Because spotted knapweed spreads quickly, resists conventional control methods, and threatens Willamette Valley agriculture, many sites across the Watershed have been hand sprayed with Rodeo herbicide since 1995 (WNF 1995). Most of the spotted knapweed sites sprayed in the Upper North Santiam watershed occur along Highway 22.

False Brome (*Brachypodium sylvaticum*) is another aggressive new invader that has take over large portions in the Sweet Home district and other parts of the forest resulting in a great deal of manpower and money to fight it. As of now, the Detroit District has only 3 documented populations but has never had aggressive surveys to determine just how widespread this weed is. Plans are in the works to begin surveys for false brome in 2008.

Other new invader species include other knapweeds such as meadow (*Centaurea pratensis*), diffuse (*Centaurea diffusa*) and newly discovered mountain knapweed (*Centaurea montana*). Yellow toadflax (*Linaria vulgaris*) and giant knotweed (*Polygonum sachalinense*), have also been located in disturbed areas near Highway 22 with giant knotweed being extremely aggressive and difficult. There are many other new invaders that are constantly popping up leaving the forest in a constant battle.

4. Control the spread of all invasive weed populations

Constant monitoring throughout the watershed should be done on a yearly basis in order to monitor previously treated weed sites and map any new occurrences that need to be controlled.

5. Use appropriate native plant species for re-vegetation

Native plant re-vegetation should be done using only native plant species that are genetically local. Any seed purchased for the purpose of re-vegetation needs to be certified weed free and content list intact listing all plant species contained within.

6. Use minimally invasive restoration techniques where possible and appropriate

Eradication of non-natives should be done with the least amount of ground disturbance as possible. If ground disturbance is essential to the eradication process, then mitigations to ensure habitat restoration should be put into place to ensure a healthy native landscape.

7. Develop educational materials on native vegetation (sites of interest, responses to disturbance)

Several simple brochures outlining subjects such as current noxious weeds to look for, native plants of the area for stewardship of the lands, boards that list botanic sites of interest and trail signs reminding the public of responses to disturbance are needed throughout the Upper Santiam Watershed.

Geographic Priority Areas "Hotspots"

There are several geographic "hotspots" located within the Upper Santiam Watershed. These sites are considered important because they either contain rare plant species and/or unique special habitats. Some of these sites experience high number recreational use and may be in dire

need of restoration or protective measures put into place. Other sites still need to be determined and analyzed for protective management. These sites are as follows

Detroit Flats – this site is a highly used day use area that has been taken over by blackberries and reed canary grass.

Santiam Flats – is a highly used day use and overnight camping site that contains several patches of blackberries. This site is actively being treated.

Pamelia Lake – this site has been taken over by reed canary grass and mint.

Marion Lake shoreline – this site was disturbed with soil compaction and loss of vegetation due to heavy recreational traffic.

Highway 22 corridor – this highway is a scenic bi-way highly enjoyed by all who travel though it but it has several weed infestions throughout.

B&B Fire area – this burn has now produced a weed invasion due to the disturbed and exposed ground.

Section 33 lakeshore – this is newly acquired land near Big Meadows that has not been adequately surveyed.

Cultural Resources

Completed Projects

1. Hogg Railroad Passport in Time Project—Tunnel Creek Camp
2. Hogg Railroad survey and listing to the National Register of Historic Places
3. Detroit Flats archaeological site evaluation.
4. Bruno Meadow archaeological site evaluation and study on the effects of helicopter logging of blowdown on archaeological sites completed.
5. Independence Prairie GS (NRHP listed site) improvements and maintenance work completed.
6. Bruno Meadow Road 2234-175 and 176 closure/decommissioning.
7. B&B fire area heritage inventory and monitoring of archaeological sites.

Desired Future Condition

Gain an understanding of the historic and pre-contact heritage resources within the Upper North Santiam Watershed. All existing and undiscovered cultural resources are known, preserved and protected from human and natural disturbance processes.

Objectives

1. Gain knowledge of all historic property (pre-contact sites and historic structures, features, road, and trails) locations in the Watershed prior to ground disturbing projects

2. Ensure protection of all eligible historic properties from public and management related disturbances, depredation and natural destruction

3. Maintain the integrity of historic properties

4. Encourage adaptive use of historic structures

5. Foster an understanding of local history, historic values and preservation

6. Evaluate inventoried sites for eligibility to the National Register of Historic Places

Economics and Local Communities

Baseline Update

In the 1995 WA, population, unemployment, per capita income and percent below poverty line numbers were given for the five main communities in the North Santiam Canyon (Idanha, Detroit, Gates, Mill City and Lyons). The largest community in the canyon was Mill City with a population of 1,572. Unemployment and percent of population below the poverty line were relatively high for the area. For example, Detroit had a 16.8% level of unemployment and Gates had nearly a quarter of the population below the poverty line.

In 2006, the Oregon State University Extension Service completed an economic study for the Upper North Santiam Canyon (UNSC). The study found that the trends identified in the 1995 WA continue today. The study analyzed Census data between 1980 and 2003. While over the last 10 years some areas of the state have experienced considerable population growth, the UNSC growth rate was minimal. For example,

> Although its location between the Portland-Salem corridor on the west and the resort towns of Bend, Sisters, and other areas in central Oregon in the east provided high exposure for the UNSC as people traveled through the area on Highway 22, one of the better-maintained routes to central Oregon in all seasons, its communities struggled to retain population and maintain economic viability.
>
> While Deschutes County had the highest population growth rate in Oregon over the past 10 years, the UNSC's growth rate was minimal. People passing through the UNSC might have preferred to recreate for a day, build a second home, or retire closer to the Willamette Valley to avoid crossing mountain passes to reach their destinations, yet the UNSC was not able to capitalize on its geographic proximity or relatively high amenities close to the Willamette Valley to maintain even modest population growth . . . (Oregon State University Extension Service, p.5)

In terms of employment growth and income, the UNSC has also not kept pace with other areas in the state. While employment across the country and in Oregon grew 82.8% and 127.9% respectively between 1970 and 2000, employment in the UNSC only grew by 50.6% during this time period. Likewise, UNSC household income while growing during this 1970-2000 time period, grew by only 80% of Oregon and U.S. growth rates.

It appears, then, that economic and demographic trends identified in the 1995 WA have continued over the last 12 years. This is particularly noteworthy as other areas in the state have experienced significant population growth and economic viability.

Completed Projects

- Nomination and selection of Detroit Lake under the Federal Lakes Demonstration Program and established the Federal Lakes Recreation Committee
- Development of the Detroit/Idanha Tourism Strategic Plan
- Development of the North Santiam Canyon Strategic Plan

- Development of the North Santiam Tourism Assessment.
- Idanha dike repair in the North Santiam after it was destroyed during the Flood of 1996.
- Providing technical assistance and grant oversight as part of the Northwest Forest Plan rural community assistance program for projects in the watershed including Wood Residual Study, Special Forest Products Inventory, Sewage Treatment Study, Commercial Development Phase I & II, Idanha Downtown Master Plan and Design Charette, and Idanha Water System Improvements
- Development of the Salem to Bend Corridor Strategy (Highway 22)
- West Cascade Scenic Byway designation
- Detroit Lake Recreation Area Brochure

Desired Future Condition

Forest management activities, commodities and services including outdoor recreation will continue to support the goals and strategic plans of resource/tourism dependant North Santiam communities and contribute to their sustainability. Recreation and scenic resources are managed in an ecologically sustainable manner that enables local communities to capitalize on the potential of these resources to contribute to the economic well-being. Tourism generated from recreation in the watershed and Highway 22 travel provides the economic base for the Cities of Detroit and Idanha, and supports the diversifying economies of the other North Santiam Canyon communities. Communication, cooperation, and partnerships between the Forest and local citizens will be fostered and enhanced.

Objectives

1. Balance community needs for increased tourism and recreation opportunities within the capacity of ecological and social limits.
2. Diversify opportunities for year-round recreation and expand use season.
3. Increase public understanding of resource management.
4. Provide for a wide variety of forest products.
5. Provide for a sustainable timber supply.
6. Participate in the improvement of infrastructure to achieve economic diversification goals.
7. Reduce recreation and tourism economic impacts as a result of lake level fluctuations

Fire and Fuels

Baseline Update

Introduction

Since 1995 there have been two large fires in the Upper North Santiam Watershed. These two fires represent the most significant changes in the watershed over the past 12 years. Together

they burned about 15% of the Upper North Santiam Watershed. Other activities have included very limited acres of prescribed burning associated with timber sales and several other small fires that were extinguished while still small during initial attack.

Fuel conditions in the Upper North Santiam Watershed are mostly fuel model 8 adjacent to fuel model 10 with a heavy dead and downed component of bug kill trees. Fuel model 8 is classified as closed, short needle timber litter. Fuel model 10 is mature/over-mature timber and understory. Under normal weather conditions fires in these fuel models produce slow burning ground fires. However with increased wind and extended periods of drought which have been common in the watershed over the last decade, fires have been shown to be more explosive with crowning out, spotting, and torching of individual trees (Anderson, 1982).

B&B Complex Fire

Ignition

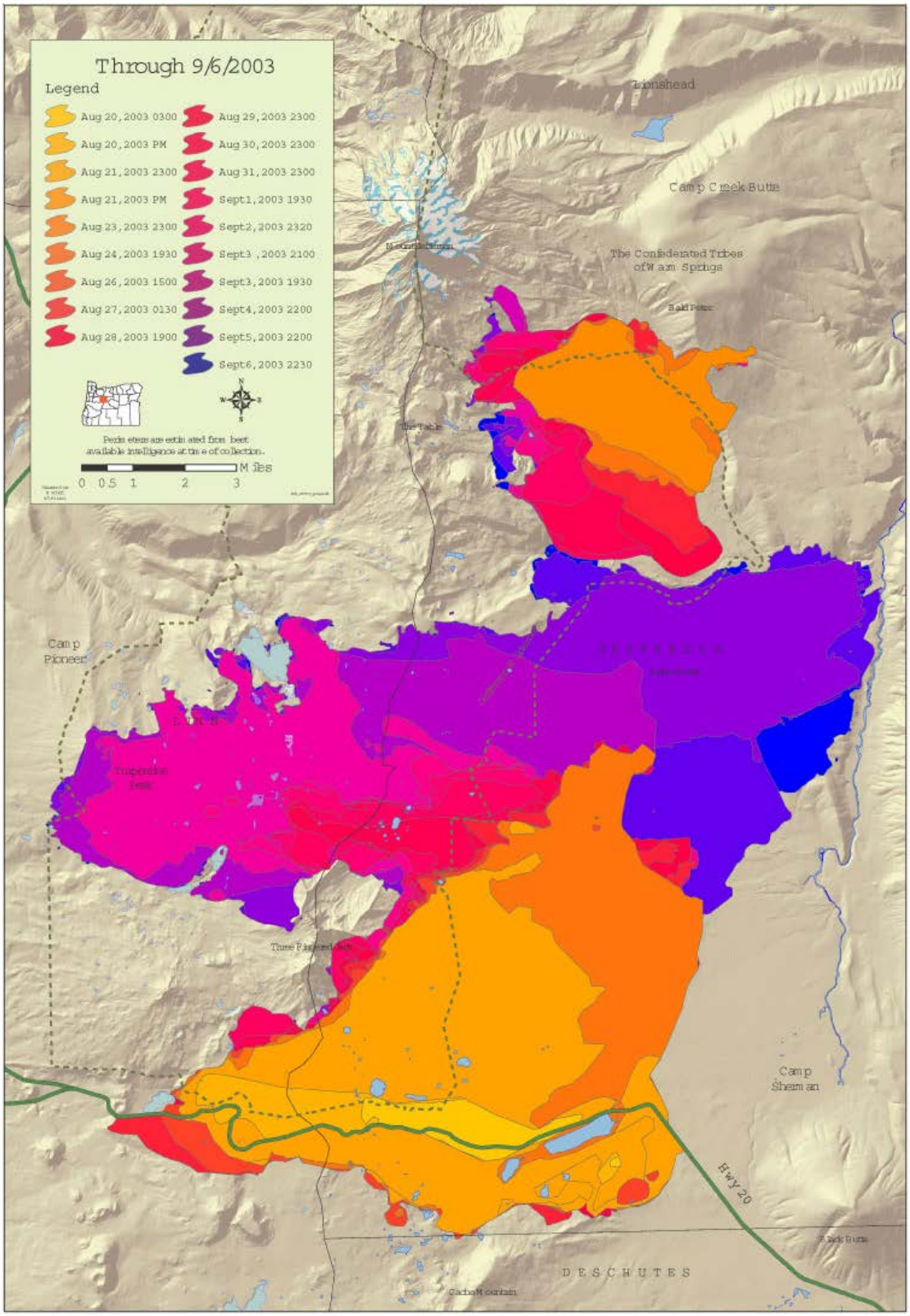
The B&B fire complex was the result of the merging of the Bear Butte and Booth Fires which were both detected on August 19, 2003. The Central Oregon Arson Task Force (COATF) determined the cause of both the Bear Butte and Booth fires to be hold-over starts from a series of lightning strikes that occurred between August 4 and 7, 2003 (Madden, J. and G. White, 2003).

Progression and Acreage

These fires burned into the Upper North Santiam over the Cascade Crest from the east. At times, the fire was fueled by dry east winds which drove the fire down the western facing drainages in the Mt Jefferson wilderness. The eastern lobe of the fire, which burned in the Mt. Jefferson Wilderness, burned in only a few days (Figure 3). This explosive push from the east was driven by east winds and could have continued farther into the Detroit district. Cooler weather prevailed on September 7th, allowing crews to control fire growth.

15,200 of the total 90,700 acres of the B&B fire burned in the Upper North Santiam Watershed. This event consumed about 10% of the watershed's total acres.

Figure 3. B&B Complex Fire Progression



Fire Severity

Fire severity can be classified by how many trees are dead, and the amount of duff or organic matter has been burned. Once duff is removed through burning, mineral soil is exposed to the impact of rain. This increase exposure can result in increased runoff and erosion. Where fire burned extremely hot, soils can become hydrophobic. This restructuring of the chemical components of the soil can cause water to be repelled and runoff the surface of the soil without being absorbed into the earth. Hydrophobic soils along with loss of duff can act cumulatively to increase the probability of flooding and erosion problems that may accompany heavy rain events.

Fire severity can be classified as low, moderate, or high depending on how intensely an area burned. The three classes are further defined as:

- Low severity – resulting in under burn or no burn – Trees may be dead, but brown needles are still in place. The duff hasn't been totally consumed.
- Medium severity – resulting in mixed mortality of trees - Duff is completely consumed, but is mixed with unburned areas...the area has "patchy" ground cover.
- High severity – resulting in stand replacement conditions - Duff is completely consumed over a large area. Smaller branches will be completely consumed.

Table 5 Severity of large fires in the Upper North Santiam Watershed

Severity	% B&B Fire Area Burned in Upper North Santiam	% Puzzle Fire Area Burned in Upper North Santiam
Under burn or no burn	27	40
Mixed mortality	22	14
Stand replacement	51	46

Over 50% of the area burned by the B&B fire in the Upper North Santiam Watershed burned under high severity conditions (Table 5). Pockets of high severity and low severity burn are interspersed and divided by fringes or stringers of mixed severity burn (Figure 4). In 2007, these areas of high severity burn are still dominated by standing dead snags. Trees have lost most of their bark and small branches; only the silver trunks remain standing (Figures 4 and 6). Understory plants are beginning to return. A 2007 walk through the fire area showed many species of native forbs in bloom including vanilla leaf (*Achlys triphylla*), columbine (*Aquilegia formosa*), wild ginger (*Asarum caudatum*), Pacific waterleaf (*Hydrophyllum tenuipes*), white avalance lily (*Erythronium montanum*), bluebells (*mertensia sp.*), Pacific trillium (*Trillium ovatum*) and many others. Beargrass (*Xerohphyllum tenax*) is also beginning to re-sprout in areas where soils were not completely sterilized by high-intensity fires. The fuel profile still consists mostly of standing dead snags and a healthy and diverse component of understory forbes. Brush and downed woody debris components are low, but are anticipated to increase greatly over the next 3-5 years as snags begin to fall and brush species start establishing.

Fire severity for both Puzzle and B&B fires was analyzed using GPS technology and GIS software (Figure 6). The scale of analysis was much finer for the B&B fire; a more coarse analysis was completed for the Puzzle fire. This resulted in very different map products.

Figure 4. B&B fire in Mist Creek drainage from PCT trail north of 3488/4003 junction (McDevitt, 2007)

Puzzle Fire

Ignition

The Puzzle fire started on August 19, 2006 in the Puzzle Creek Drainage.

Progression and Acreage

The Puzzle fire started about two miles northeast of Marion Lake. From its origin it continued to grow rapidly toward the northeast for two days before directional progression slowed and the fire growth began to radiate outward from the existing perimeter. The fire was checked on the east side by the rocky and mountainous Cascade Crest. The western flank was eventually slowed by hand line construction.

The final acreage of the Puzzle fire was 6,340 acres or about 5 percent of the Upper North Santiam Watershed. In the early days after detection the fire grew by a couple thousand acres a day. Then progression slowed to a few hundred acres per day (Figure 5 and Table 6) and grew outward in all directions from the fire perimeter.

Figure 5. Puzzle Fire Progression

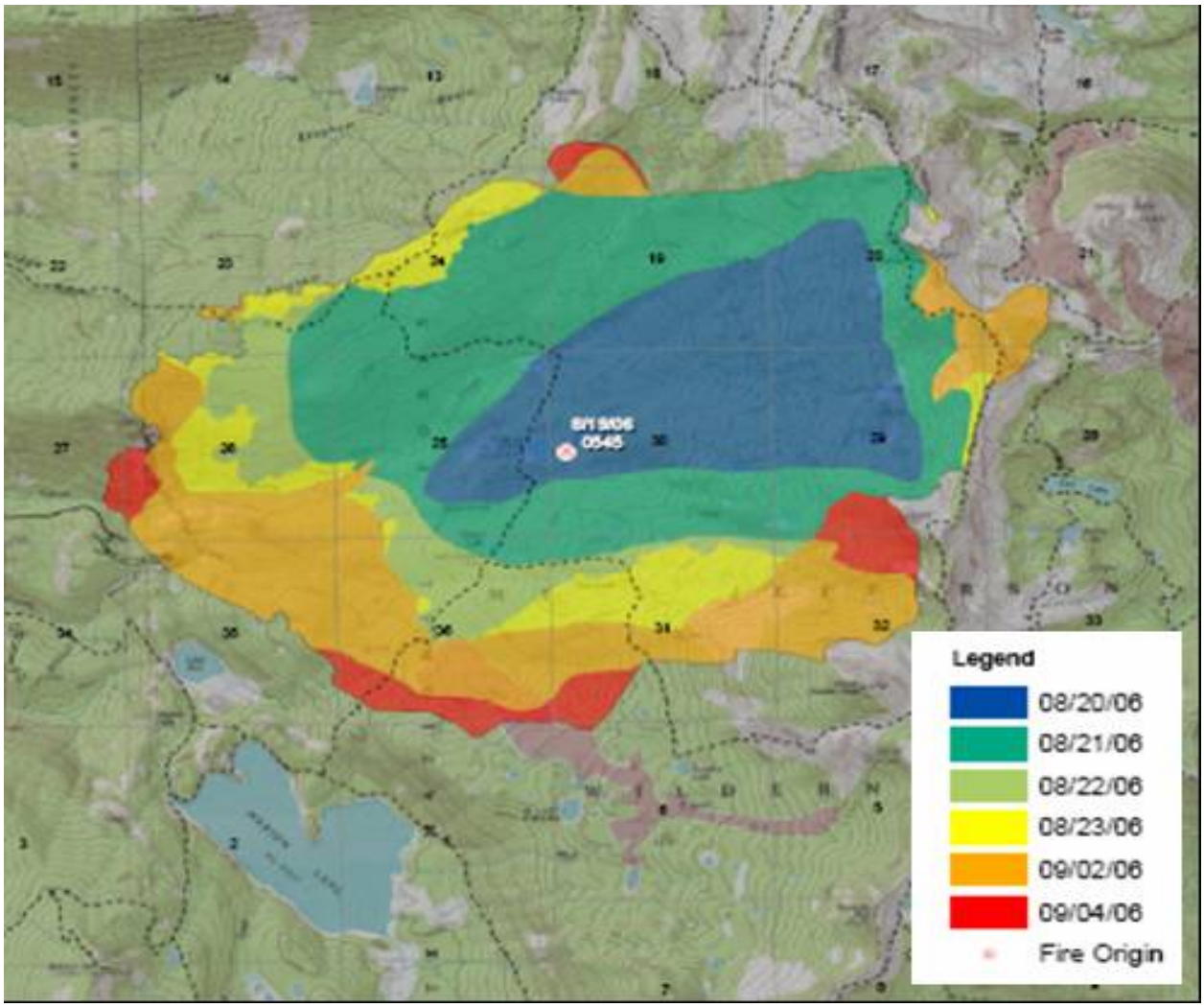


Table 6. Progression of Puzzle Fire

Date	Increase in Acreage	Total Acres
8-20	1329	1329
8-21	2357	3686
8-22	619	4305
8-23	930	5235
9-2	265	5500
9-4	350	5850
9-6	490	6340

Fire Severity

Like the B&B fire, the Puzzle fire also burned with varying degrees of severity and intensity. An area of about 80 acres around the Lake of the Woods has mixed mortality burn conditions

(Figure 7). This core area is surrounded by about 2900 acres of high severity burn where stand replacement conditions are prominent. The remaining 3300 acres around the edge of the fire burned in either medium or low severity conditions. Areas near the Cascade crest were generally low severity due to the high elevation, colder temperatures and lower fuel loadings. Areas along the western portion of the fire perimeter generally burned under more medium severity conditions; probably due to higher fuel loadings, lower elevations and warmer temperatures. A lower percentage of the Puzzle fire area burned under medium severity conditions when compared to the B&B fire. A higher portion of the area burned under high severity and low severity conditions. Table 5 summarizes the relative percentages of low, medium and high severity burn in the Puzzle fire.

One year after the burn (2007) trees in the area are still wrapped in black bark (Figure 8). Understory vegetation is minimal and in many cases there has been no understory re-growth. These areas are anticipated to develop on a timeline similar to the B&B fire and within 5 years should support a healthy blanket of forbs consisting of beargrass and native wildflowers.

Figure 6. B&B and Puzzle Fire Severity & Tree Mortality Analysis

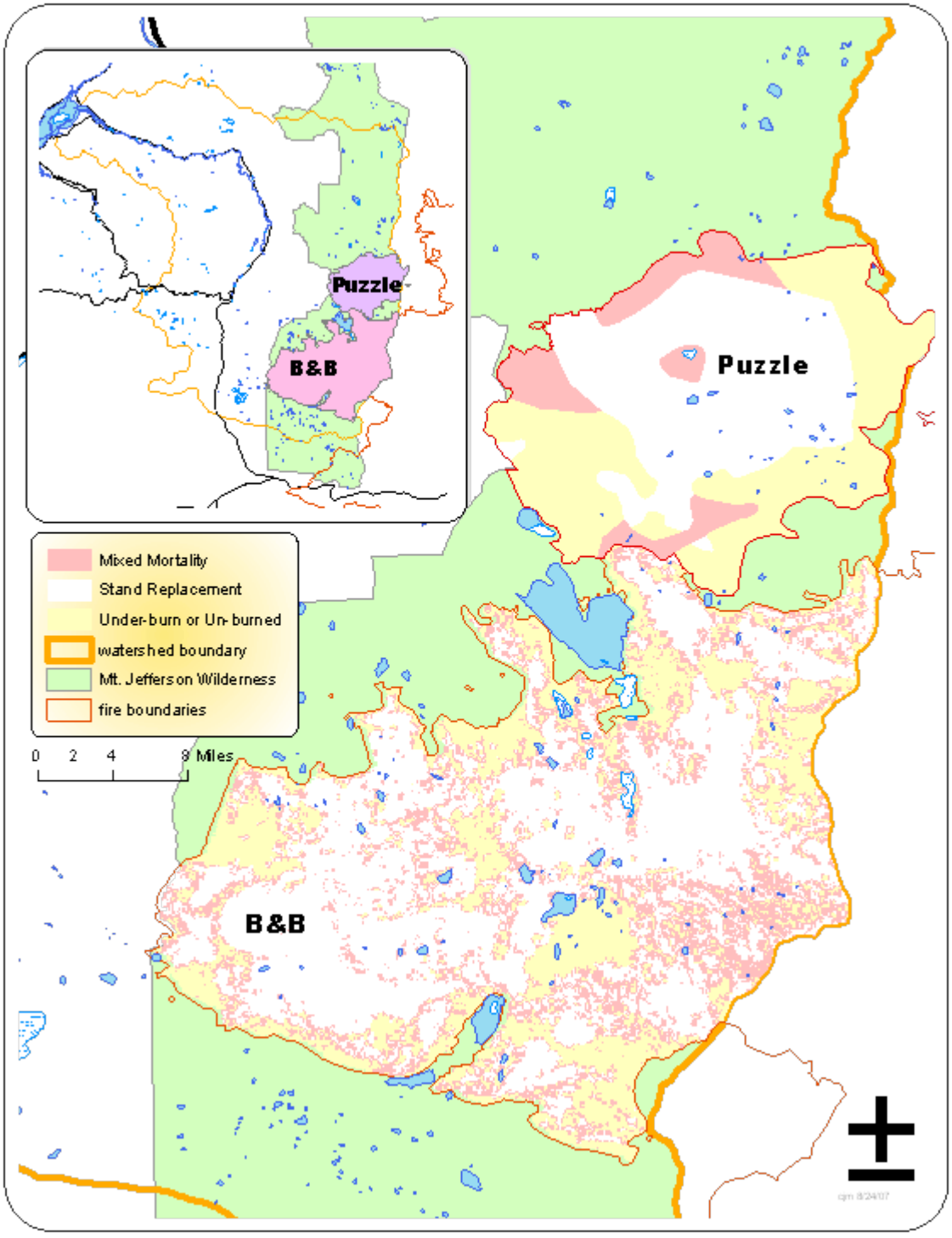


Figure 7. The Puzzle fire's high severity inner core, black area in right of photo is a shadow not a lake. Photo taken from the PCT trail. (McDevitt 2007).

Figure 8. Comparison of high severity burn areas in the Upper North Santiam Watershed left, four years after the B&B fire and right, one year after the Puzzle fire. (McDevitt 2007)

Completed Projects

All completed fire and fuels treatments coincide with the same treatment acres treated by timber sales. All timber sale acres should be considered treated for fuels.

1. Protect resource, social values, and infrastructure during fire suppression activities.
2. Cloudy
3. Canyon East ATV
4. Buzz Salvage
5. Bold Puppy II
6. Dusty ATV
7. Flying Fish
8. Forked Horn
9. Halo Salvage
10. Highway Hazard
11. Gingham
12. Parkaboo
13. Parkaboo II
14. Lynx Ridge Salvage
15. Scout Camp
16. Shore Nuf
17. Sour Fly
18. Sunny View
19. Red 90
20. Runt Salvage
21. Stahman and Marion Forks Summer Home Tract fuel reduction.

Desired Future Condition

Return ecosystems vegetation characteristics, fuel composition, fire frequency, fire severity and fire pattern to the natural range of variability. Reduce the potential for large, high intensity fires and increased rate of spread with vegetation manipulation in order to achieve ecosystem function and land allocation objectives. Improve fire tolerance through stand density management. Alter surface and ladder fuels to limit crown fire occurrence. Modify fuel profiles to lower the potential of fire ignition and rate of spread. Limit wood debris to levels recommended in the forest plan. Defend key ridge tops, waterways and existing roads along private land with well-maintained fuel breaks. Manipulate hazardous fuels to achieve long-term maintenance of natural fire regimes. Reintroduce fire across large areas over a period of time to create a mosaic of stand conditions. Use the timing of prescribed fire to mange seral stage diversity and develop fire

resistant stand mosaics. Improve seedbeds, plant diversity, palatability, nutritional value and animal movement by using fire to achieve nutrient cycling of dead vegetation. Use fire to reduce heavy slash and duff or competitive shrubs and grasses to provide optimum growing space and to control diseases. Fire use is especially important in ecosystems where vegetation is fire-dependent, or visual quality is a potential issue.

Objectives

1. Provide for firefighter and public safety.

2. Preserve the wilderness integrity during fire suppression.

3. Return ecosystems to fire intervals that maintain and enhance landscape functionality.

4. Prevent large scale stand replacement fires by decreasing fire hazard and risk.

5. Reduce high fuel loading in Matrix and LSR.

6. Protect resource, social and infrastructure values during fire suppression activities.

7. Reduce the number of human caused fires.

8. Utilize fire as a tool to enhance wildlife habitat.

9. Protect associated resource and social values, and infrastructure during fire suppression activities.

Fisheries

The 1995 watershed analysis established the baseline for watershed condition, including fisheries biological and habitat characterization. Changes to this baseline include new and updated scientific information and survey data, different forest and riparian management objectives, and natural events such as fires and floods. The biological and physical characterization of the mainstem North Santiam River and Marion Creek in the original assessment remains much the same—heavily influenced by the proximity of roads and people.

Baseline Update

The original watershed analysis listed five key fisheries questions and seven Aquatic Systems data gaps. After 12 years of data collection and monitoring, several of those key questions can be updated and some of the data gaps filled.

1a) The effect of physical barriers, including Detroit Dam and Big Cliff Dam, on native fish species in the watershed

In-stream barriers affect fish distribution and habitat in the North Santiam Watershed. It is clear that Detroit and Big Cliff Dams, including the Minto Hatchery collection facility, are affecting upstream and downstream migrations of spring Chinook salmon and winter steelhead as stated in the original analysis. Recent monitoring has shown that flow timing, water temperature and dissolved gas in the North Santiam River below the dams effects run timing, spawning success, rearing and outmigration of smolts. Some Chinook salmon are rearing in Detroit Lake and naturally spawning without going to the Pacific Ocean to complete their lifecycle.

There are 20 impassable road culverts identified in the North Santiam watershed during a 2003 survey. Numerous others affect stream habitat by restricting bedload movement and large woody material. Two road crossings over the North Santiam River, Parish Lake Road (2266) and Big Meadows Road (2257) have been identified for immediate replacement as funding becomes available.

1b) What is the potential for winter steelhead and spring Chinook in the watershed?

Re-introduction of spring Chinook has been occurring since 2000. The number of fish moved around the dams ranges from 540 to1869 fish per year. Many of those fish are of hatchery origin and return to their natal waters of Marion Creek and Horn Creek, while the remainder spawns in the North Santiam River. A study of fish habitat above Detroit Lake was completed in 2006 by the Corps of Engineers. It showed ample spawning and rearing habitat for steelhead and Chinook salmon increasing the likelihood of successful reintroduction to the watershed. Downstream passage through the turbines in Detroit and Big Cliff dams remains an issue with an estimated 10%-15% survival rate during out migration (G. Grenbemmer, ODFW pers comm.)

Table 7 Chinook salmon released in the Upper North Santiam since 2000

2000	2001	2002	2003	2004	2005	2006
707	540	1680	1869	1689	548	1123

2a) How does the current condition of aquatic habitat relate to the future introduction of steelhead and Chinook? Are conditions within the expected range of variability?

Aquatic habitat quality in the watershed has been degraded by past management activities and it is still unknown if it is functioning within the natural range of variability. Removal of instream wood, reduced large wood recruitment from timber harvest, and roads constructed in riparian areas and floodplains are part of the reason habitat in the watershed is functioning at a degraded range of natural variability. However habitat assessments completed in 2006 show that there is suitable spawning and rearing habitat in the Upper North Santiam watershed, and current trap and haul reintroductions are producing naturally spawned salmon. Watershed restoration activities and protection of riparian reserves are improving the watershed condition.

2b) What, where and in what priority do we complete watershed restoration and habitat enhancement for resident and anadromous fish? What are the priorities by subwatershed?

The Upper North Santiam Priority Watershed Project Identification (WPI) was completed in 2006. An interdisciplinary team prioritized watershed restoration actions for ten high priority project groups. Projects were ranked by multi-resource synergy potential partnerships and agreements, level of public interest or safety, resource benefit and the potential funding. Refer to the WPI for the list of projects, project location, and priority ranking.

2c) Where are the cold water influences in the North Santiam River and how can they be enhanced to decrease water temperatures?

Cold water influences are the same as they were in 1995—tributaries originating in the basalt lava flows of the new cascades. Long-term temperature monitoring for the North Santiam watershed shows stable temperatures. Continued protection of riparian reserves, springs and wetlands will ensure continued coldwater influences to the North Santiam River.

Data Gaps

Class 3 and 4 streams need to be surveyed and classified for fish presence and flow, Minto Creek needs to be surveyed and Class IV streams need mapping.

Stream surveys completed since the original watershed analysis are shown in Table 8. The Level II stream surveys classify the geomorphology, hydrology, stream typing, fish presence, riparian condition, and fish habitat including large wood abundance, quality pools, and substrate. Another data gap identified in the 1995 analysis, a survey of Minto Creek, was completed in 1999. Copies of stream surveys are located at the Detroit Ranger Station and Willamette National Forest Supervisors office. Surveys of Class IV streams are currently being completed during project analysis and updated in the corporate GIS database.

Table 8. Miles of Stream Surveyed 1996-2001

HUC	Year	Stream_Name	Miles Surveyed
17090005	2001	North Santiam River	25
17090005	1999	Minto Creek	4
17090005	1997	Dry Creek	1.4
17090005	1997	Lynx Creek	1.4
17090005	1997	Sauers Creek	0.72
17090005	1997	Straight Creek	3
17090005	1996	Leone Creek	0.59
17090005	1996	Mansfield Creek	2.58
17090005	1996	Marion Creek	4
17090005	1996	Short Creek	1.8

Active Restoration and Natural Events

Many of the changes to the fisheries resource in the North Santiam Watershed are a result of active watershed restoration such as large wood placement and trap and haul of Chinook salmon, or natural events such as fires and floods. The Northwest Forest Plan and its Aquatic Conservation Strategy set watershed changes in motion by establishing Riparian Reserves and providing guidelines for management.

Spring Chinook salmon and winter steelhead originally spawned in the Upper North Santiam watershed. The habitat was blocked by Detroit Dam in 1953 and these anadromous species were extirpated from the watershed. Since 2000, ODFW has trapped and hauled adult spring Chinook salmon around the dams to the Breitenbush River and the Upper North Santiam River to naturally spawn.

This trap and haul effort has changed management in the watershed in a couple of ways. First, it has substantially increased the number of Class 1 anadromous streams in the Watershed. It is assumed that the historically occupied habitat in the North Santiam River is currently being utilized by both adult and juvenile spring Chinook salmon. Second, the National Marine Fisheries Service (NMFS) recently completed their final listing determinations for 16 Evolutionary Significant Units (ESUs) of West Coast Salmon (70 FR 37160; effective August 29, 2005). The Upper Willamette River Chinook salmon ESU is considered to be threatened under the Endangered Species Act (ESA), confirming their earlier determination (64 FR 14308;

effective May 24, 1999). The Upper Willamette River Chinook ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River, and its tributaries, above Willamette Falls, Oregon. Detroit Dam is the upper limit of listed critical habitat for Chinook salmon.

Natural fire and flood events also affect the physical characteristics of the watershed and fish habitat. This change to the baseline condition is discussed in the Hydrology report.

Other active restoration projects completed in the watershed include:

1. Respect the River - Riparian dispersed camping restoration and education.
2. Horn Creek Reroute - restored historic channel under Highway 22
3. Detroit Lake shore-line stabilization
4. Habitat improvement Marion Creek - In-channel large wood supplementation
5. North Santiam large wood placement - In-channel large wood supplementation
6. Big Meadows meadow and riparian protection
7. Moon Creek habitat restoration - In-channel large wood supplementation
8. Parkaboo timber sale riparian treatment
9. Large wood placement Tule Lake
10. Marion Creek Large Wood Placement- In-channel large wood supplementation
11. Road stabilization and water barring

Desired Future Condition

The Desired Future Condition (DFC) is a land or resource condition that is expected to result if goals and objectives are fully achieved. For the Upper North Santiam River watershed, DFCs focus on restoration of Instream Habitat, Riparian Habitat, and Water Quality. Restoration objectives from the watershed prioritization and recommendations from the 1995 watershed analysis set the framework for reaching the desires future condition.

Instream Habitat

The desired future condition for the fisheries resource includes

- Barrier-free instream habitat capable of supporting self-sustaining populations of resident and anadromous fish.
- Representation of all life stages including spawning, rearing, and migration habitat types in the watershed for all aquatic species.
- Reduction of fine-grained sediment and increased stream complexity with more instream large wood frequency, quality of pool habitat, and gravel-sized material in the stream channel for spawning habitat.

Habitat needed for all fish life stages is abundant and fluctuation in habitat availability is within the natural range of variability. The habitat complexity in the watershed is restored with sufficient large woody material in the rivers and tributaries. Water flows sufficient to create

and sustain riparian aquatic and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.

Riparian Habitat

A satisfactory number of pools are available. Natural sediment transport and bed load movement is needed to prevent high levels of substrate embededness which may cause poor spawning conditions and decrease hyporheic function. Hyporheic processes are unencumbered and allow functional nutrient cycling to occur which provides nutrition for fish by promoting healthy populations of aquatic invertebrates. Functioning floodplains and alluvial fans. Riparian zones are managed to promote LSR characteristics allowing for floodplain development, future recruitment of large woody material, enhancement of primary shade zones and complex bank habitat. Year-round input of leaf, needle, wood and insect material from a variety of species provide a variety of food sources for salmonids and invertebrates. Increased stream complexity due to increased frequency of instream and riparian Large Woody Debris.

Water Quality

- Water temperature satisfies state requirements (remains within the range that maintains the biological, physical and chemical integrity of the system, and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities).
- Thermal barriers do not limit access to quality fish habitat.
- Water flows sufficient to create and sustain riparian aquatic and wetland habitats and to retain patterns of sediment, nutrient, and wood routing.
- Reduced summer water temperatures for fish and other aquatic organisms.

Objectives

Objectives to achieve the DFCs for the watershed were determined through an interdisciplinary process and a list of objectives for fisheries restoration in the Upper North Santiam watershed was completed as part of the prioritization in 2006. Completion of these objectives will move the watershed towards restroration and achievement of the DFCs for the aquatic resource.

Restoration objectives from the North Santiam Watershed Prioritization include:

1. Restore quality habitat for resident and anadromous fish.

2. Identify and correct all aquatic passage barriers.

3. Manage riparian areas to develop shade.

4. Restore quality pools in all fish bearing streams.

5. Develop a robust fisheries conservation and education program.

6. Minimize soil erosion potential from management actives.

7. Promote channel bank stability.

8. Use Respect the River to support the Aquatic Conservation Strategy Objectives with recreation sites.

9. Focus recreational fishing in appropriate areas.

10. Implement projects that re-establish, restore and enhance hydrologic function and processes.

Fisheries and aquatic recommendations from the 1995 watershed analysis are still valid and are in agreement with DFCs and restoration objectives. Protection of good existing habitat and restoration of degraded habitat in the North Santiam River and Marion Creek remains the priority for the watershed along with long-term reintroduction of anadromous fish. Riparian areas, including sidechannels and off-channel habitat, are important to protect for both aquatic and upland species. Protection and active restoration of riparian areas is important for attainment of riparian habitat DFCs.

Hydrology

Baseline Update

1996 Flood Event

In February 1996, a 30-to-50 year storm event influenced the areas stream channels by producing streamflows that altered channel bottoms, banks, and sideslopes. Millions of yards of material were redistributed within the watershed through the channel networks. As a result of the influx of material into the channels channel capacities were exceeded and channels changed. Examples included:

- Bank erosion along the North Santiam River closed a segment of highway 22.
- Shallow rapid debris torrents destroyed numerous road segments.
- Overland flow was captured by portions of the road network causing excessive erosion.
- Increased sediment from the upland created sediment wedges within the valley bottom of the stream channel and created flood plain terraces that are unstable.
- Vegetation was removed from preexisting floodplains due to volume of water trying to reoccupy historic channel cross sectional areas.
- Large wood accumulation along flood plain areas.
- Toes of large earthflows eroded and undercut opening up the channel cross-section.

The effects of the above stated examples vary with location and proximity to infrastructure. Other than the road related examples all the above are naturally occurring processes which result from a high water event. Vegetation components of the stream channel are reset with some vegetation being lost through scour, burying, and/or removal. The recovery clock has been set back as a result of this flow event, and vegetation is currently reoccupying open areas along channels disturbed by the flood.

Large scale fire

Two fires have burned in the headwaters of the North Santiam River since the previous analysis. The Puzzle Fire burned 6,348 acres in 2006 in an area north of the area burned in the B&B Fire of 2003. The B&B Fire was the biggest fire in the area since 1934. Over 90,000 acres burned in the B&B Complex Fires in 2003; with approximately 15,200 acres in North Santiam River headwaters. Changes have included increased peakflows coming off the areas due to increased

snow accumulation in the area, increased groundwater recharge due to loss of vegetation, and increase density of small wet areas due to the increase in groundwater storage and localized sheet erosion. Due to this area being wilderness, restoration activities have been minimal with focus on mitigating the effects of recreational trails intercepting the surface runoff and displacing the flow.

It is expected that the area will take 50 years or more to recover hydrologiclly from the fire. Expansion of the channel network will continue due to the additional water found on the landscape until such time the natural interception process is reestablished.

Rerouting of Horn Creek

In 2006 the original confluence of Horn Creek was reestablished through the placement of an oversized pipe under highway 22. This channel confluence has not been utilized for over 70 years due to the rerouting of the channel into Marion Creek during the construction of the highway. Hydrologically this places waters from Horn Creek directly into the North Santiam River upstream of the Marion Forks confluence. This cold water influence will assist in reducing the water temperature of the North Santiam River approximately ½ mile above the Marion Forks confluence. No data is available at this time to determine the effect of this change. Horn Creek is a spring fed stream that does not fluctuate flow, so it is expected that the change to the North Santiam River will be constant through time.

Pamelia Creek Torrent

In 2006 a rain on snow event trigger a "Jökulhlaup" a large dam break flood, off of the Milk Creek glacier. This torrent breached the ridge separating the Milk Creek drainage from the Pamelia Creek drainage and spewed material into Pamelia Creek and rerouted Pamelia Creek while destroying a popular trail.

This change in flow patterns off Mount Jefferson could affect future routing of failure material off the Mount Jefferson. Milk Creek flow is redirected approximately 1 mile upstream of its preexisting confluence to Pamelia providing a pathway by which material from future failures could reach the Pamelia Creek trailhead and potentially Highway 22. Given this information it is important to consider the potential effect of future failures on management activities and infrastructures.

Highway Bridge Replacement

During 2005 and 2006 a major effort was under taken by Federal Highways to replace four highway bridges in the watershed. Bridges over Whitewater, Pamelia, and Marion Creeks and the North Santiam River were all replaced with safety being the main concern for the crossings. These new bridges provide unobstructed flow of water and debris during storm events.

Redefinitions of Northwest Forest Plan direction

Numerous court cases have caused a shift in the ability to manage for aquatic species and riparian dependent species. This clarification of intent has affected the ability to implement stewardship type projects within riparian and LSR areas. Its effect on aquatics, hydrology and watershed restoration is additional expense and time required to develop projects initially envisioned in the 1995 analysis.

Emphasis on Passive and Active Restoration

An agreement between various federal and state agencies that defines the watershed boundary lines and the size of the watershed (5th field) and sub watershed (6th field) is pending. Terminology was agreed upon to allow for consistency in reporting. This stratification allows for consistent disclosure of special characteristics for the North Santiam River Watershed.

Defining the restoration activities in a watershed under these definitions has placed an emphasis upon resource cooperation across the funding lines. Projects that have multiple benefits to numerous resource areas tend to gain momentum and become implemented. Passive restoration prescriptions incorporate the needs of other resource areas and consider preventing future degradation as a result of the project. This insures that the trend for the resources in question is positive towards the desired goal for the watershed and area.

Stratification and adjustment of watershed into 5th and 6th field watersheds

In 2007 agreement (pending) was reached by various federal and state agencies on the watershed boundary lines and the size of the watershed (5th field) and sub watershed (6th field). Terminology was agreed upon to allow for consistency in reporting (see appendix A). Only minor shift to the 6th field watershed lines were implemented. This change has no real effect on the hydrology or stream channels in the area.

Watershed Road Densities

Road densities in the area have dropped since the 1995 analysis. This is due to the lack of funds to maintain the roads and the roads being decommissioned and hydrologically stored.

Hydrology Completed Projects

1. Shore-Nuf riparian thinning
2. Detroit lake shore-line stabilization
3. Bruno Meadow road closure/ decommissioning
4. Bruno Meadow bypass/road decommissioning
5. Habitat improvement Marion Creek
6. North Santiam large wood tie-down
7. Big Meadows meadow and riparian protection
8. Moon Creek habitat restoration
9. Hunts Cove trail realignment
10. B&B burn restoration and erosion control.
11. Parkaboo timber sale riparian treatment
12. Gingham Timber Sale riparian treatment
13. Large wood placement Tule Lake
14. Hoover Campground channel reestablishment and debris removal

Desired Future Condition

This area will provide a continuous and diverse habitat for riparian dependent species and high water quality in riverine, wetlands, and floodplain areas. The water bodies and associated riparian areas will contribute to the diversity and dispersion of fish, wildlife and plant species within sub-drainages and also the larger watershed level.

Stream channels will provide diverse, stable habitat for aquatic species as well as maintaining or enhancing water quality. Vegetation on adjacent lands will be managed to provide diverse stands of conifer and hardwood vegetation which provide habitat for riparian dependent species. The amount of large woody debris, both down and standing will be maintained at or above current levels providing for natural appearing and improved channel conditions.

Objectives

1. Restoration of erosion-prone areas
2. Minimize erosion potential from management activities.
3. Minimize effect of peak flows
4. Maintain desired levels of minimum flows
5. Promote channel bank stability
6. Meet state water quality standards for temperature
7. Balance the social and biological needs within the watershed. (applies to many areas)
8. Recreation sites support the Aquatic Conservation Strategy Objectives (ACSO).
9. Implement projects that reestablish, restore and enhance hydrologic function and processes. (widely applicable)

Lands and Minerals

Completed Projects

- Over 100 personal use mineral permits a year issued for McCoy, Minto, Hawkins, Woodpecker, Downing, Homestead rock pits.
- Bridge replacement on Highway 22 including new entrance to Marion Road and Marion Forks Fish Hatchery, Campground and Guard Station.
- Realignment of Blowout Road at Highway 22 to improve sight line.
- Highway 22 widening at Whispering Falls Campground entrance.
- Road easements: Blowout and McCoy Roads.
- Three major ODOT rock crushing operations in watershed rock pits.
- FS acquired Marion County land adjacent Detroit ODOT maintenance facility.

Recreation[4]

Baseline Update

The Upper North Santiam provides diverse, high quality, all-season recreation opportunities, ranging from developed and dispersed activities along Blowout Road and the North Santiam Highway to pristine back country experiences within the Mt. Jefferson Wilderness. Detroit Lake is now the highest use boating lake in the State. The watershed is within a 2 hour drive of 80% of the State's population making it a growing backyard destination. The unique long and narrow configuration of the Mt. Jefferson Wilderness provides easy access to numerous attractive destinations.

Developed recreation sites within the watershed include nine campgrounds: Southshore, Cove Creek, Hoover, Santiam Flats, Riverside, Whispering Falls, Marion Forks, Piety Island and Big Meadows Horse Camp that are located at Detroit Lake or along the North Santiam River. Hoover and Cove Creek also have a group site. Mt. View Park, a privately owned campground and RV park, is located on the North Santiam River in the city of Idanha. One day use site is located at Detroit Flats south of the City of Detroit, and is popular for fishing, birding and picnicking. There are also various special use permits that provide seasonal recreational occupancy in the area. These include Camp Pioneer Boy Scout Camp located at Pine Ridge Lake, 18 Marion Forks summer homes along Marion Creek, 70 Stahlman summer homes and North Santiam Sportsmans Club adjacent Detroit Lake, and the Chemeketan Outdoor Club cabin near Whitewater Creek.

Table 9. Campsites within the Upper North Santiam (Inventoried Sites)

Type of Site	Number of sites
Dispersed Sites within the Mt. Jefferson Wilderness	865
Dispersed Sites outside the Mt. Jefferson Wilderness	300+
Developed Campground Sites	259
Mt. View Park (private campground)	27

Portions of all of the Forest Services developed campgrounds, organization sites, summer homes, and over 80% of the dispersed campsites lie within Riparian Reserves.

McCoy winter recreation area and portions of Maxwell and Big Springs Snow Parks lie within the watershed. These are the closest winter recreation areas to a large percentage of the Mid-Willamette Valley population.

New plans and strategies have been developed that give guidance and drive need for projects. The following are a list of plans, strategies and other guiding documents that apply in the watershed.

(*New plans completed since UNS WA in 1995 or Detroit Tribs WA in 1997.)

[4] Note some of these changes are a result of the watershed boundary being redrawn to include a portion of the Detroit Tributaries Watershed.

- Forest Plan

Recreation

- Willamette NF Niche (2006)*
- National Recreation Agenda*
- Regional Recreation Focus*
- Detroit Lake Area Composite Management Guide (1992)
- Recreation Site Facility Master Plan and 5 Yr Action Plan (2006)*
- Recreation Lodging Feasibility Study (2007)*
- West Cascades National Scenic Byway Corridor Management Plan (2007)*
- Coffin-Bachelor Mountain Dispersed Recreation Area Implementation Guide (1997)*
- Winter Sports Management Plan
- Canyon Journeys North Santiam Canyon Alternative Transportation Link Feasibility Study (2006)*
- Access & Travel Management Report (2003)*

Wilderness

- Mt. Jefferson Wilderness Plan (1992)
- 10-Year Wilderness Stewardship Challenge*
- Wilderness Management Strategy and Wilderness Implementation Schedule

Scenery

- Scenery Management Systems Handbook*
- Built Environment Image Guide*

According the 2005 Marine Board 'Boating in Oregon' Triennium Survey, Detroit Lake is now the highest use lake for boating activities. Population is increasing in the Willamette Valley and Portland Metro area, placing more demand for recreation and pressure on resources particularly in dispersed areas of the forest. Detroit Lake Composite Area Management Guide (DLCAMG) was completed in 1992 and is becoming outdated. The guide provided general direction for the orderly development of the area as they relate to the public recreation needs and desires, and environmental protection. Several developments, improvements, management actions including regulations have been implemented since the creation of the guide to enhance recreation and improve resource conditions. Many issues still remain the same. Some trends have shifted since the development of the DLCAMG. We are seeing a wider variety of boating types and bigger boats, different water sports, more RV camping, more family/group camping of which were not fully anticipated in the DLCAMG.

The 2001-year was extremely dry, and the water demands for endangered fish habitat, hydropower, irrigation, and downstream flows were great. To meet these demands, Detroit Lake was selected as the first priority of the 13 reservoirs within the Willamette Basin to draw water

from to augment downstream demands. Recreation interests were not given equal weight in deliberations regarding how to manage the water levels in the North Santiam portion of the system. Given the situation, hydrologists and other biological specialists agree that the decision to draw first from Detroit was sound. However, the decision was not understood, and not accepted by the local communities that suffered severe economic losses from the lack of recreation or by the urban dwellers that were not able to enjoy their normal recreational pastimes. As a result of the drought of 2001 and affects to the economy, Detroit Lake was nominated as one of 32 nationally designated "Federal Recreation Lakes." An active Federal Recreation Lakes Committee consisting of many agencies, recreation providers, communities, individuals interested in the management of the lake recreation and its resources. Their main focus is on sustaining lake levels for recreation use while providing for downstream demands, and finding ways diversify recreation opportunities in the Detroit Lake area.

The number of dispersed campsites has increased and so has the area impacted by recreation use. Soil compaction caused by camping and vehicle and foot traffic in riparian areas has reduced or eliminated vegetation. Resource concerns associated with soil compaction and loss of vegetation include increased runoff, degraded water quality as sediment delivery increases and riparian shade decreases. Disposal of human waste in dispersed recreation sites a public health and water quality issue as well as unsightly. Illegal dumping and litter left behind by campers is on the rise all throughout the watershed. Tree scarring, tree felling and mudding are illegal and destructive activities occurring in and adjacent to dispersed recreation sites. Many green trees are damaged or cut down by forest visitors which reduces shade and creates a safety hazard as trees die.

Recreation Completed Projects

1. Constructed Cove Creek Campground and Group Site. Fixed water system lines.
2. Developed recreation site improvements and restoration:

- **Detroit Flats:** Converted the site from dispersed camping to day use area and established Code of Federal Regulation's including no off road driving. Installed picnic tables, interpretive area, barrier posts, traffic control barriers and minor shoreline stabilization.
- **All Campgrounds:** Upgraded sanitary facilities by replacing vault toilets with CXT's. Established campground group size limits, and developed CFR's to protect resources and minimize social conflicts
- **Santiam Flats Campground:** Upgraded this dispersed site to a formal campground by designating 32 sites, and installed picnic tables and fire rings. Improved entrance to the site and road surface. Installed new toilets, a water system, fee tube and informational signing.
- **Hoover Campground:** Replaced septic system and flush toilet buildings. Installed barrier posts for traffic control. At boat launch, created kids fishing area and picnic sites, installed new toilet and replaced docks.
- **Hoover Group Site:** Replaced roof on historic group picnic shelter and created additional parking.
- **Riverside Campground:** Replaced picnic tables

- **Southshore Campground:** Installed new boat launch and new dock, fixed water system lines, created wheelchair accessible tent camping sites, replanted and rehabilitated sites, and replaced barrier posts for traffic control.
- **Whispering Falls Campground:** Upgraded drain fields for septic system
- **Marion Forks Campground:** Eliminated water system, reduced the size of campsites, delineated parking spurs and replaced picnic tables.
- **Big Meadows Horse Camp:** Replaced rails to protect meadow
- **Piety Island Campground:** Reconstructed campground by designating sites and installing picnic table, fire rings and tent spaces; reconstructed trails; installed toilet facilities; site identification and informational signing.

3. Law enforcement and education: Active Forest Protection Officer program with focus on recreation hotspots within the watershed.

4. Summer Home Improvements: 50% of the Stahlman summer homes, or about 35 homes, have installed approved septic systems, and one at Marion Forks. Stahlman Summer Home Association replaced their water tank. Installed power to summer homes at Stahlman. Stahlman Summer Home Association constructed footbridge between tracts.

5. Installed new water treatment building at Marion Forks Fish Hatchery

6. Vegetation treatments in developed sites: Two major timber sales in campgrounds to treat storm damage. Southshore Campground thinning treatment to improve stand conditions and increase light on forest floor for understory vegetation growth and screening.

7. Removed hazard trees in all developed recreation sites, trailheads, permit areas, and high use roads.

8. Camp Pioneer site restoration. Thinning treatment for stand health, placed chips to establish designated trails and decommissioned user trails, scarified compacted areas and replanted, constructed lodge and shower building, updated drain field and septic system, removed old facilities from riparian areas, rehabilitated and closed access to riparian areas, improved parking, move llama pen from lake area.

9. Established and enforced a no vehicle forest order on the lakebed to reduce resource impacts.

10. Closed access roads on the south side of lake to reduce social conflicts and resource impact issues (eg Sauers Creek, summer homes, Santiam Flats)

11. Dispersed site maintenance: Marion County Corrections crew and Linn County youth crew does regular cleanup throughout the watershed.

12. Dispersed site restoration: Began implementation of the "Respect the River" program: placed boulders, wooden barriers, and signing to delineate campsites and parking areas to reduce resource impact at high use campsites along Highway 22.

13. Developed public education on minimum impact dispersed camping including a brochure, posters and website information.

14. Designated West Cascades as a National Scenic Byway, installed route identification signs, and developed the West Cascades National Scenic Byway corridor management and interpretive

plan Installed confidence signing and kiosk with panel for Quartzville Backcountry Byway. Developed brochures for byways.

15. Trail/Trailhead maintenance and improvements: Improved Marion, Pamelia, Duffy, and Whitewater trailheads by adding picnic tables, garbage service, and interpretation. Replaced toilets at Marion and Pamelia trailheads; installed new toilet at Whitewater trail; and provide portable toilet at Duffy trailhead. Added more routes to expand the winter trail system at McCoy and Maxwell. Relocated Bruno Meadow trail/trailhead. Perform annual summer and winter trail maintenance.

16. Implemented no target shooting corridor within ½ mile from the Detroit Lake shoreline.

Desired Future Condition

Forest Niche Emphasis: The Willamette National Forest is a recreation connection for Oregon. From east to west and north to south, scenic travel corridors connect growing urban and rural communities to a landscape rich in biological diversity, natural resources, cultural history, and opportunity. Visitors find short-duration, year-round opportunities for renewal through recreation often associated with unique water features from reservoirs to waterfalls. Unique geologic, natural and cultural features provide a connection with visitors that fosters education, interpretation and respect for this incredible place. Day use is predominate but some overnight accommodations are provided. The recreation program accommodates changing demographics and visitor preferences and provides opportunity for interpretation and education. Volunteers, partners, permittees and outfitter guides are a significant part of recreation program delivery.

The watershed fosters public use and enjoyment to the level that ensures protection of its scenic, recreational, cultural, natural, and ecological values. Recreational opportunities are provided consistent with the demand for a variety of activities and settings ranging from dispersed non-motorized primitive to highly developed motorized settings. The Highway 22 corridor and Detroit Lake area focus on developed recreation, interpretation and serve as a hub for summer and winter recreation activities. High cascades wilderness provides non-motorized dispersed recreation settings where minimal facilities are needed for resource protection, health and safety, and trail access. Interior mid-elevation forests provide rustic settings for managed OHV and dispersed use, where fewer facilities and amenities needed for resource protection and health and safety are provided.

Detroit Lake provides an important setting for lake-based recreation to the mid-Willamette Valley and Portland metro population and offers many amenities for visitor convenience and comfort. This area serves as a backyard destination to many visitors living within a few hours drive. Detroit Lake is a bustling place for all types of boating activity. The setting is developed in nature with new overnight facilities focused on the south side of the lake. A higher level of development including new overnight facilities on the south side of the lake is focused around the reservoir. New development is necessary to accommodate use and demand, while protecting resources and scenic integrity. Management, law enforcement presence, onsite visitor management and controls are obvious and emphasize visitor health and safety.

Use and occupancy within the watershed are managed to protect natural and cultural resources, minimize depreciative behavior, prevent use conflicts, and ensure healthy, safe and enjoyable recreational experiences. Managed dispersed camp areas retain the appearance of natural

conditions, are compatible with other resource values, and managed to minimize user conflicts and wildfire risk.

Interpretation is focused on the scenic byway corridor to foster a land steward ethic, and the interconnectedness of land and people. Interpretation enhances the recreation experience, influencing visitor behavior and providing information to protect the resource.

Objectives

1. Reduce recreation impacts to resources and improve the aesthetic environment especially in riparian areas.

2. Reduce user conflicts caused by congestion, conflicting use, visitor behaviors and differing expectations.

3. Reduce law enforcement problems and encourage respectful user behavior that complies with laws and regulations and allows reasonable visitor security.

4. Provide for public health and safety including reducing exposure to hazards, potential of fire, and sanitation concerns.

5. Provide recreation facilities and opportunities consistent with the Forest niche that meets public demand, use levels, and user expectations while reducing resource impacts, social issues and health and safety concerns.

6. Recreation opportunities reflects changes in demand based on changing technology, visitor preferences, and needs of people with disabilities, minorities, low income and underserved populations.

7. Maintain and enhance recreation settings with vegetation management practices.

8. Maintain the condition of facilities and quality of services provided to meet visitor satisfaction (as reported through National Visitor Use Monitoring customer satisfaction surveys).

9. Foster and expand partnerships to enhance and sustain program delivery and goals.

10. Initiate projects by maximizing leveraging of funding grants, Payco, partners, volunteers, recreation fees and other various sources.

11. Apply sound business practices to recreation.

12. Reduce deferred maintenance backlog to 20% by 2010, 70% (2015), and 90% (2020).

13. Recreation facilities are financially sustainable and meet national and regional quality standards.

14. Meet maintenance standards required for trails program.

Recreation – Scenery Resources

Baseline Update

Over the past decade, the timber program has shifted to predominantly commercial thinning activities. Regeneration harvest stands that were previously in a “disturbed condition” as defined in the Forest Plan have since recovered. Although recent harvest activities are consistent with

Forest Plan standards, the sizes, arrangements, and geometric character of treatments of the past 50 years have had a lasting effect on the scenic quality of the area. The visibility, distribution and concentration of various treatments in contrast with older uncut stands contribute significantly to the current quality of the scenic resources.

A potential threat that can alter visual quality is poor stand health and high fuel loading. Stands with high densities are susceptible to insects and disease that can kill many acres of trees, and high fuel loadings can more readily carry fire causing larger scale wildfires. Many stands with high densities and fuel loadings exist especially within LSR's and other protected areas.

Projects completed in the watershed in the last ten years

1. Shorenuf Timber Sale: Purpose was to enhance scenic conditions along the Blowout Road and adjacent recreation facilities by improving stand health, promoting stand diversity and visual variety, and creating lake views. Reduced the visual effects of past regeneration harvests on private lands by feathering techniques to soften edges. Improved stand health and reduced fuel loadings is expected to have a beneficial effect on scenic quality.

2. Scenic mitigation projects as a result of timber sale operations along Highway 22 and other important travel corridors and recreation sites.

3. Highway 22 bridges façade design and landscape mitigations.

Desired Future Condition

To the average visitor, the forest landscape appears:

- Moderately altered in matrix lands where management activities are obvious;
- Naturally appearing within the highway corridor and Detroit Lake; and
- Naturally evolving and intact within the Mt. Jefferson Wilderness.

The valued landscape character and sense of place is expressed at a high level within the North Santiam Viewshed. Within the Viewshed, deviations may be present but repeat the form, line, color, texture and pattern common to the landscape character and at such a scale that they are not evident. It reflects the diversity, beauty, and ecology of the west Cascades temperate forest. Management activities are conducted in such a way that they are subordinate to the character of the natural landscape and not evident to the casual Forest visitor. Sensitive forests foregrounds and along travel corridors maintain a natural setting. Developments harmonize with the natural environment. Disturbance by human activity and development is managed to mitigate and reverse impacts on scenic resources.

Objectives

1. Maintain the highest possible quality of landscape aesthetics and scenery commensurate with other appropriate uses, costs and benefits.

2. Implement management actions to minimize adverse impacts to scenic quality (eg. project and facility design and placement on the landscape, harvest unit design).

3. Improve the image, aesthetics, sustainability, and overall quality of Forest Service facilities.

Roads/Trails

Roads: To accommodate public use and resource management and protection, the current transportation system within this watershed consists of about 402 miles of Forest Service system roads. Dominant roads in this area include Road 11 at Straight Creek and Blowout Road 10. Paved between Sweet Home Ranger District and Detroit Ranger District, Road 11 provides access to historic Quartzville mining area from the north. This road is designated a Back Country Byway by the Bureau of Land Management. The remaining system of collector and local roads provides access to federal, state and private land. The portion of Highway 22 in the watershed is a nationally designated scenic byway.

Trails: Within the wilderness, visitors can access an abundance of subalpine lakes, meadows, volcanic cones and other topographic scenic features through 95 miles of trails, including the Pacific Crest Trail. Outside of the wilderness, 29 miles of hiking trails exist with a network that links Coffin Mountain, Bachelor Mountain, Bugaboo ridge and Bruno Meadows, Stahlman Point Trail adjacent Detroit Lake, and Independence Rock near Marion Forks. Numerous trails that enter the wilderness originate outside of the boundary.

Roads Completed Projects

1. Horse Camp road reconstruction
2. Bruno Meadows road reconstruction
3. Marion Creek road reconstruction
4. Parkett road reconstruction
5. Bruno Meadow road realignment
6. Parish Lake road reconstruction
7. Bruno Meadows road decommissioning
8. Twin Meadows road reconstruction
9. McCoy Creek road reconstruction
10. Boulder Ridge road reconstruction
11. Pigeon Prarie ERFO
12. Tom Creek ERFO
13. Cove Creek campground, Shore Nuf reconstruction
14. Blowout Road/Highway 22 reconstruction to improve line of sight and access to Santiam Flats (DE Tribs WA 97 project)

Desired Future Condition

The Road system provides the minimum necessary access to meet resource needs and manage existing stands. New construction, reconstruction and road maintenance are planned and implemented at the lowest mileage and standards required to provide for the efficient transportation of goods, safety of forest users, and minimize impacts to forest resource values.

Objectives

1. Manage road stability, erosion and mass movement.

2. Reduce new road construction.

3. Reduce open road densities.

4. Inventory and monitor the road system.

5. Evaluate and determine watershed access needs.

6. Develop road system to address resource needs including recreation, safety, resource protection, wildlife needs and costs.

7. Forest development roads are constructed, operated and maintained for the administration of national forest lands.

8. Facilitate safety and maintenance projects along Highway 22.

Soils

Baseline Update

Twelve years have passed since the Upper North Santiam WA was completed. Significant major environmental altering activities, that included both floods and fires, have occurred in this basin in that intervening period. These include the flood of 1996 and subsequent lesser flood events in the latter part of that decade. Major wild fires, including the B & B, and Puzzle, have burned over thousands of acres in the wilderness area of this basin in the 2003 and 2006 respectively. Despite that level of disturbance, the findings in the 1995 WA are still valid today.

The storms of 1996, 1997, and 1998 were widespread and extensive, with the largest occurring in the fall of 1996. Parts of the North Santiam River received flooding at a 30 to over 50 year recurrence interval. Numerous road fill failures and hillside slope failures occurred through the northern half of the Willamette National Forest and extended onto the Mt. Hood National Forest. As would be expected, most of the Upper North Santiam did not show much effect from the storm. The generally stable areas of McCoy, Straight, Bruno Mountain, Jefferson and Meadows landform blocks performed as was anticipated. Very few road failures or wash outs occurred in any area in this part of the basin. A few additional smaller failures were noted in the Mary landform block, which again, was not unexpected, given the naturally unstable nature of this terrain.

The large fires in the early years of the first decade of the second millennium were also not unanticipated. As the report states, “Uncontrolled fire at high fuel loadings and low fuel moisture will increase fire severity and cause soil damage and nutrient loss. This situation does not change significantly whether the area is untreated slash after logging, a late successional reserve, or wilderness.” The B & B and Puzzle Fires (2003 and 2006 respectively) intensively burned many thousands of acres in the wilderness areas of this watershed. Extensive work on the Burned Area Emergency Response programs for both these fires indicated that, as expected, they resulted in the volatilization and removal of large amounts of stored nutrients and the detrimental heating of numerous, small, localized soil sites.

One area of concern expressed in the 1995 Soils and Geology Report was the expected excessive amount of compaction that likely occurred in the older managed plantations in all landform blocks with gentle side slopes, but especially within the Meadows landform block. The report concluded that detrimental soil compaction probably approached or exceeded the 20% Regional and Forest standard in many units in the Meadows area, and this compaction may be cumulatively significant at some sites.

The 1995 report recommended that management actions be implemented to reduce potential risks to the soil resource. The recent development of the Presley's Twin environmental assessment and proposed timber harvest in the Meadows landform block is intended to help alleviate both the concerns of excessive wildfires and compaction. The development of a major north / south oriented full break along the wilderness boundary will help control the rapid spread of future wildfire leaving the wilderness. Timber harvest and slash reduction within the proposed units will help reduce fuel loadings. Finally, the proposed ground based harvest of many of the units will provide the opportunity for either purchaser or post sale subsoiling of compacted skid roads. Based on experience with subsoiling, it is expected that over all compaction levels in many units will be less than currently exists prior to the implementation of the Presley's Twin sale.

Special Management Areas – Late Successional Reserves

LSR Completed Projects

1. Removed hazard trees on the Whitewater road
2. Completed the snow breakage timber sale

Desired Future Condition

Connectivity to the Quartzville LSR (late successional reserve) will be maintained and enhanced. Interior forest will be intact and development of old growth characteristics of species diversity, horizontal and vertical structure, legacy trees, and patch size will be accelerated. Road density is reduced. Improve public health and safety as well as recreational opportunities where prudent. Prevent large scale disturbances from fire by working to restore fire dependent ecosystems. Develop sustainable, late-successional vegetative structures and species composition that correlates with the natural fire regime and reduces fuel loading. Protect down woody debris and snags at levels recommended in the LSR assessment.

Improve resiliency of forest conditions to fire with fuels treatment activities. Decrease stand density with mechanical vegetation management. Reduce natural and mechanically created surface and ladder fuels to minimize extreme fire behavior.

Objectives

1. Maintain and enhance connectivity between the Jefferson and Quartzville LSR's.
2. Buffer commercial thinning boundaries adjacent to interior forest.
3. Reduce miles of road to no more than 1.5 miles/square mile in Bruno and Mary's high emphasis areas within the LSR.

4. In moderate emphasis areas, maintain no more than 2.6/2.4 miles/square mile of roads.
5. Improve health and safety for recreation users in the Pamelia Lake basin.
6. Reduce the risk of large scale fires.
7. Establish prescribed fire opportunities and fuel breaks.
8. Pre-Commercial Thin (PCT) stands <20 years old.
9. Commercial thin stands <80 years.
10. Create snags and Large Woody Debris in deficit areas.

Special Management Areas – Wilderness

Baseline Update

In 2005, the Chief of the Forest Service adopted the "10-Year Wilderness Stewardship Challenge" (10YWSC) recommended by the Chief's Wilderness Advisory Group. The 10YWSC renews Forest Service commitment to bring all wildernesses to a minimum level of stewardship within 10 years. Currently, the Mt. Jefferson Wilderness does not meet minimum stewardship level especially in the following areas: fire management plan, non-native/invasive plants treatment, education plan and baseline workforce or staffing to support the Wilderness program.

Wilderness Completed Projects

1. Designated limited entry areas.
2. Designated campsites Pamelia and Duffy Lakes.
3. Established campfire bans Marion and Ann Lakes.
4. Extinguished B&B fire.
5. Produced the post-fire recreation displacement monitoring study.
6. Annually maintained 200+ miles of trail/signs.
7. Performed Limits of Acceptable Change (LAC) surveys to inventory and evaluate campsite conditions.
8. GPS mapped campsites.
9. Completed bridge condition surveys.
10. Performed backcountry wilderness patrols and education.
11. Completed burn rehab on the B&B, Marion Mountain and Rockpile Fires and associated trail reconstruction.
12. Erosion control in the B&B fire area including along trails.
13. Completed burn rehab on the B&B, Marion Mountain and Rockpile Fires.
14. Performed education programs at Camp Pioneer and elsewhere.

15. Established Partnerships with Chemeketans, Oregon Equestrian Trails and The Backcountry Horsemen of America.

16. Removed toilet at Marion Lake.

17. Completed trail reconstruction of Pamelia and Milk Creek Crossing on the PCT that were destroyed as a result of a debris torrent from the Milk Creek glacier that breached Milk Creek.

18. Relocated the trail in the Hunts Cove area.

19. Reduced hazard trees at the Whitewater trailhead.

20. Eradicated or controlled non-native, invasive plants.

Desired Future Condition

Visitors find exceptional natural scenic beauty and opportunities for primitive and unconfined recreation, closeness to nature, inspiration, independence and solitude. Visitors are challenged by a natural environment with a moderate to high degree of risk that requires self-reliance. To the extent practical, wilderness is protected and managed to preserve its natural conditions, heritage, and allow natural processes to occur. Natural ignitions are allowed to burn within Wilderness boundary. Native vegetation thrives and non-native, invasive plants are eradicated or controlled. Highly impacted areas are protected from degradation or rehabilitated with site recovery projects, user education and user management.

Objectives

1. Restore safe access to wilderness with roads, trails and bridges.

2. Educate the local public to understand why fires are important in this system, when considering fire use.

3. Provide for public health and safety to wilderness standards.

4. Keep natural ignitions within the wilderness.

5. Manage fires for resource benefit when they are within prescription.

6. Educate visitors and the public on wilderness values and ecosystems that instills appreciation and protection.

7. Reduce the number of infection points to zero over a 10 year period by using weed free hay and managing livestock.

8. Manage human impacts to resources especially in riparian areas and alpine meadows.

9. Reduce encounters per day to meet standards for wilderness resource spectrum.

10. Reduce conflicts between wilderness values and social expectations.

11. Reduce conflicts among user groups.

12. Meet the 10 year Wilderness Stewardship Challenge set forth by USFS Chief.

13. Minimize disturbance by fire and humans to cultural resources.

14. Maintain wilderness boundary.

15. Meet Forest Plan standards for solitude and social experience.

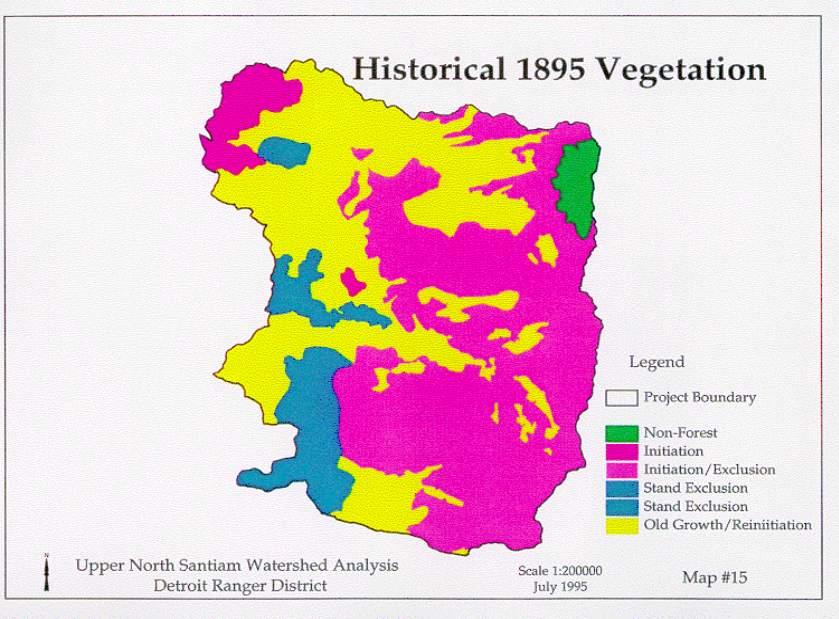
16. Eliminate non-native, invasive plants.

Vegetation

Baseline Update

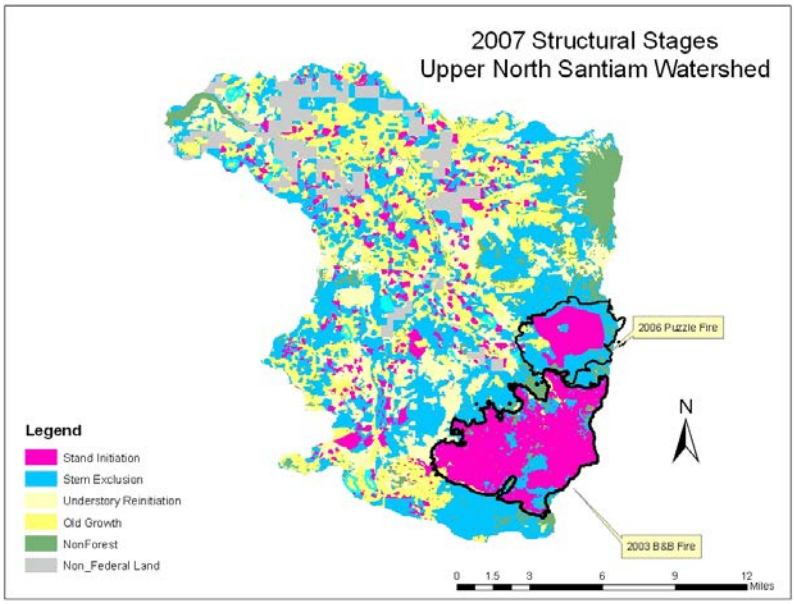
In 1995 the landscape vegetation patterns, composed of different forest structural classes, were assessed and compared to the conditions that existed in 1895. As described in the watershed analysis, four structural classes were identified: stand initiation, stem exclusion, understory reinitiation, and old growth. Historical structural stages were derived from stand data and based on historical maps. The current structural stages were updated in 2007 and derived from stand data contained in the Willamette National Forest VEGIS oracle database, recent fire activity, and aerial photo-interpretation. This coarse-scale comparison of current and historic landscape patterns provides some perspective on the vegetation changes that have occurred over time (see Figures 9 and 10).

Figure 9. Historic 1895 Vegetation Structural Stages



Since the 1995 watershed analysis, two fire events have caused a significant change in the current vegetation patterns: the 2003 B&B fire and the 2006 Puzzle fire. Both of these fires occurred in areas that were dominated by the stem exclusion stage. Based on the intensity assessment and 2005 aerial photos, it is estimated that 90% of the B&B fire acreage in the UNS watershed burned severe enough to convert stands back into the stand initiation class. Based on the severity assessment of the Puzzle fire, it is estimated that 45% of the fire acreage in the UNS watershed burned severe enough to convert stands back into the stand initiation class.

Figure 10. 2007 Vegetation Structural Stages

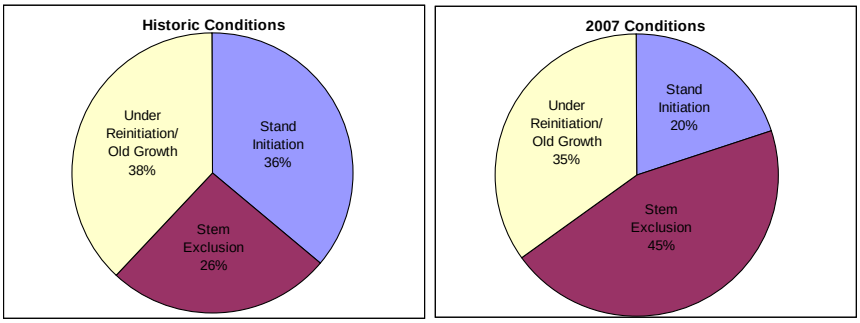


Other important changes to current vegetation patterns since 1995 include:

- A reduction in the amount of clearcutting in the watershed since 1995 has resulted in a reduction in the rate and amount of new stand initiation stands being created (outside of the fires described above),
- Many of the stands identified in 1995 in the stand initiation stage have now reached crown closure and moved into the stem exclusion stage.

In the 1995 watershed analysis, the primary changes identified from historic conditions to current conditions included a reduction in stand initiation stands, an increase in stem exclusion stands, and a reduction in understory reinitiation and old growth stands. This still holds true today (see figure 9) and the percent acreage among the structural stages has not significantly changed since 1995. The biggest change has been the distribution of the stand initiation stage across the landscape. Due to the two large fires discussed above and the progression of many of the small scattered young stands into the stem exclusion stage, the location of the stand initiation stage is now largely concentrated in the southeast corner of the watershed (see figure 10).

Figure 11. Percentage of Vegetation Structural Stages



The 1995 watershed analysis also identified a change in the pattern of structural stages across the landscape from historical conditions. Historically vegetation patches were larger than today due to past fire patterns that tended to create large blocks of early seral stands. Timber harvesting and fire suppression activities have resulted in a more fragmented pattern of conditions across the landscape than what existed in 1895. The two large fires in 2003 and 2006 did result in large blocks of acreage in the stand initiation stage but the overall landscape remains fragmented.

Insect and Disease Activity Changes

The 1995 watershed analysis identified insect and disease as one of six key processes influencing the biophysical conditions of the UNS watershed. Predominant tree diseases in the watershed include root rots (primarily *Phellinus weirii* and *Armillaria mellea*) and white pine blister rust (*Cronartium ribicola*). Infection levels from these pathogens were discussed in the original watershed analysis and likely have not dramatically changed since 1995.

Predominant insects affecting trees in the watershed include the Western Spruce budworm (*Choristoneura occidentalis*), bark beetles, and the balsam wooly adelgid (*Adelges piceae*). The Western Spruce budworm has been a significant defoliating insect affecting the Pacific silver fir, mountain hemlock, Douglas-fir, and Engelmann spruce in this watershed. The most recent outbreak began in 1987 and continued through 1993. The annual USFS Region 6 insect and disease aerial detection surveys have not shown any new budworm activity since that time. However, the 1987-1993 outbreak did affect a large portion of the eastern half of the watershed resulting in reduced tree growth and mortality across the landscape that still exists today.

The primary bark beetles in this watershed include Douglas-fir beetle (*Dendroctonus pseudotsugae*), mountain pine beetle (*Dendroctonus ponderosae*), and fir engraver (*Scolytus ventralis*). The 1995 watershed analysis identified increased populations of Douglas-fir beetles in blowdown after the 1990 windstorm. Aerial surveys since 1995 have only identified scattered pockets occurring in the watershed. The original analysis identified the mountain pine beetle occurring primarily in older stressed white pine and sugar pine. The regional surveys since 1995 have identified a sharp increase in mountain pine beetle activity in the watershed mostly in the lodgepole pine stands. The mountain pine beetle has been causing damage and mortality in stands east of highway 22 with the most recent outbreak beginning in 2004 (see Table 10).

Table 10. 1996 - 2006 Annual Mountain Pine Beetle Damage in the UNS Watershed[1]

Year	Total Acres Affected	Mean Dead Trees/ac.
1996	297	0.6
1997	107	1.3
1998	0	0
1999	47	0.5
2000	0	0
2001	10	1
2002	3152	6.6
2003	60	0.3
2004	2841	10.1
2005	6699	8
2006	8800	5.4

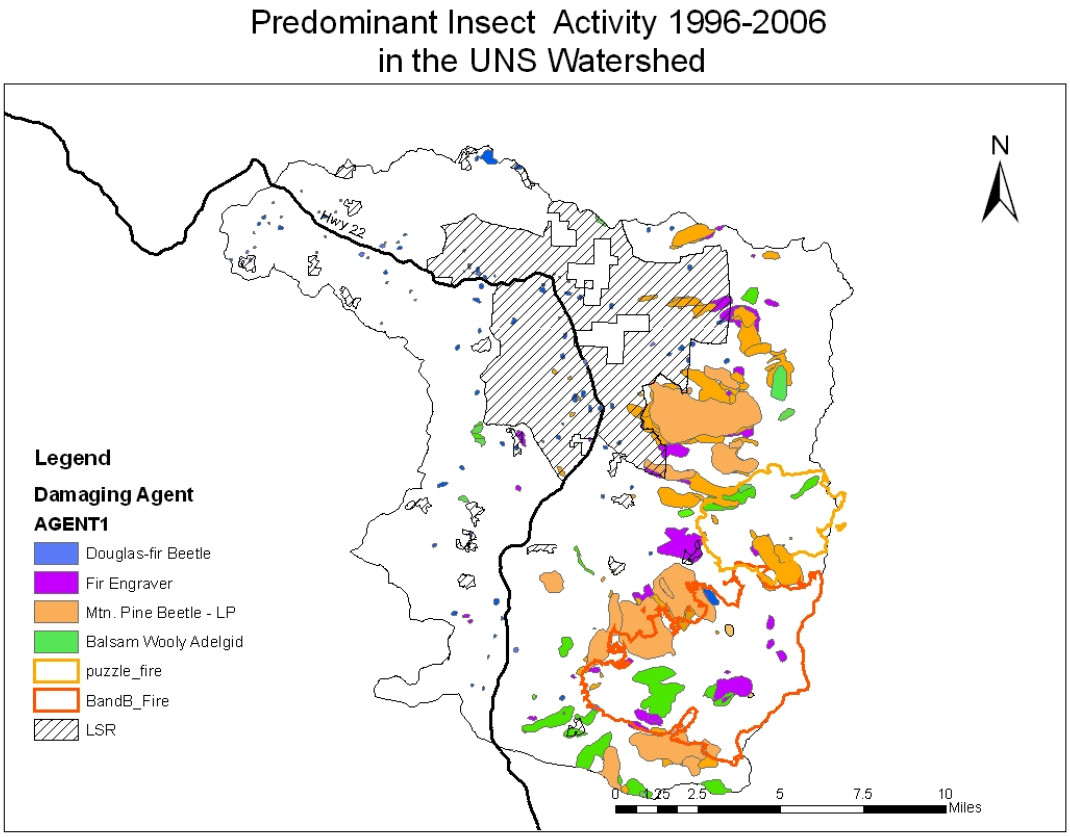
[1]Data collected from the USFS Region 6 insect and disease aerial detection surveys. Annual acreage identified often overlaps previous affected acres so a cumulative total acreage could not be calculated.

The fir engraver primarily attacks grand fir and white fir but occasionally attacks Douglas-fir, mountain hemlock, and Engelmann spruce. In the last 10 years there have been three pulse years for fir engraver activity in the UNS watershed: 1293 acres were affected in 1996, 2740 acres were affected in 2003, and 370 acres were affected in 2006.

However, mean dead trees per acre was only 2 trees per acre for each of these pulse years and populations do not seem to be increasing or causing much mortality in the watershed.

The Balsam wooly adelgid causes damage and mortality in Pacific silver fir and grand fir. Most of the adelgid activity identified in the UNS watershed in the last ten years occurred in 2003 when 3546 acres were identified. No mortality was identified however, only branch infestation causing branch flagging ranging from low to high in severity.

Figure 12. Predominant Insect Activity 1996-2006 from USFS Region 6 Insect and Disease Aerial Detection Surveys



Vegetation Management Completed Projects

1. See timber sales from the last 10 years under Fire and Fuels.
2. Removed overhanging red alder on Blowout Road to improve safety of travel route.
3. Noxious weed removal at Santiam Flats, Detroit Flats, Blowout Road.
4. Blowout Road removal of overhanging red alder for safety.

Desired Future Condition

Forest vegetation management is one of many healthy relationships among all resources within the forest ecosystem. Vegetation is managed to conserve natural resources, promote vigorous long-term productivity, sustain yield, and enhance environmental quality. Vigorous growth and stand treatment is maintained by selecting genetically superior stock, fertilizing, precommercial and commercial thinning and protecting stands from insects, disease, and damage (Willamette LRMP p. IV-227).

Objectives

1. Maintain and enhance growth and health of managed and natural stands.

2. Increase ecological diversity by creating forage and restoring the role of under burning.

3. Maintain and restore meadow features.

4. Provide a variety of forest products.

5. Provide a sustainable timber supply.

6. Reduce the number of overstocked young stands.

7. Accelerate stands toward late-seral stand characteristics.

8. Drive vegetation management activities with silvicultural needs.

9. Balance controversial and more straight-forward harvest locations when choosing areas for silvicultural treatment.

Wildlife

Baseline Update

Since 1995 there have been a number of natural and human induced events that have altered the physical, biological, and social character in the watershed. These alterations have changed the wildlife habitat characteristics, legal requirements and habitat improvement needs. These changes include:

Large scale fire: The Puzzle Fire burned 6,348 acres in 2006 in an area adjacent to the area burned in the B&B Fire of 2003. The B&B Fire was the biggest fire in the area since 1934. Over 90,000 acres burned in the B&B Complex Fires in 2003; approximately 15,200 acres in Mt. Jefferson Wilderness on the Willamette National Forests and in the headwaters of the Upper North Santiam Watershed.

Survey and Manage provisions of the Northwest Forest Plan: Survey and manage provisions of the Northwest Forest Plan have undergone alterations and are at this time changing. Some species were removed from the survey and manage list and added to other programs such as the regionally sensitive species list.

Delisting of the American Peregrine Falcon and the Bald Eagle: The American Peregrine Falcon and Bald Eagle were de-listed and are no longer federally Endangered or Threatened. These species are now managed by the U.S. Forest Service in Region 6 (Pacific Northwest) as sensitive species. Fourteen regionally sensitive wildlife species have habitat within the watershed.

Northern Spotted Owl management focus: Prior to 1995 surveys for spotted owls were conducted in project areas to determine activity center locations and effects to them. Since 1995 habitat is assumed to be occupied and activities seasonally restricted to protect pairs which may be nesting in the area. Surveys are rarely conducted and they are focused on clearing a specific activity. Currently the USFWS is developing a recovery plan for the Northern Spotted Owl which focuses more on the number of acres needed to support the desired number of pairs. Additional threats to the spotted owl have also been identified and are being integrated into the recovery plan such as west Nile virus, barred owls and sudden oak death disease. An increase in documented activity centers from 36 to 41 was noted since 1995.

Big game survival and habitat availability: Since 1995 big game survival and herd size appear to have decreased due to a number of factors including increases in predator, disease, harvest permit numbers, habitat quality and damage to road closure devices. Predator numbers have increased and hunting success has decreased in the cougar and black bears populations. A ban on using dogs to track cougars and bears in Oregon has limited hunter success for these species. A new disease is deer hair loss syndrome in Western Oregon which results in higher winter/spring mortality. Deer with this disease have been seen on the Detroit Ranger District to the west of the analysis area. Harvesting of female deer and elk have dramatically increased through gender-specific hunts. Forage quantity and quality have dropped as a result of clearcut areas returning to young forest conditions and excluding forage species. Damage to road closure devices have allowed more roads to be open than planned and reduced effectiveness of habitat.

Fires have recently increased forage quality and quantity in wilderness areas in the southeastern portion of the watershed.

Management plans for special management areas and special interest areas in the watershed have not been completed as scheduled. Existing conditions and species use is unknown and as a result habitat restoration or improvement needs cannot be determined. Willamette Forest Plan Management area types in the watershed are old growth groves, pileated woodpecker, pine marten, special wildlife habitat areas, and lakeside areas.

Changes related to Desired Future Condition

1. Large Scale fires (B&B, Puzzle) in the wilderness have caused a significant decrease in Spotted Owl dispersal habitat. The same fire eliminated dispersal habitat on thousands of acres on the east side of the Cascade crest adjacent to this watershed. Maintaining connectivity between large habitat areas suitable for spotted owl nesting is important. The central portion of the watershed has been identified as an area of concern for the North-South and East-west dispersal of spotted owls. The elimination of this habitat type by wildlife in the eastern part of the watershed makes the maintenance of remaining dispersal habitat in the rest of the watershed more important.
2. Large scale fires (B&B, Puzle) in the wilderness created an imbalance in big game habitat types eliminating thermal, optimal thermal and reducing hiding cover while increasing forage values in high elevation summer range. A mixture of forage, hiding, thermal and optimal thermal habitat is desired and produces higher habitat effectiveness values. The importance of summer forage has recently been identified by studies in NE Oregon to be more important than previously thought. Based on the model and assumptions in the Willamette Forest Plan this area will have lower than desired habitat effectiveness values for hiding, thermal cover and optimal thermal cover. A reevaluation of the base assumptions in the Willamette Forest Plan is needed to integrate current science and determine if the model and/or assigned management levels are still valid.
3. Large scale fires (B&B, Puzzle) have altered the snag and downed wood levels on thousands of previously forested acres in the wilderness. The two recent fires burned in areas where historical fire patterns were very similar. Snag recruitment is maximized in the recent fire areas which is a normal naturally occurring pattern in the area where these fires occurred. Snag numbers are maximized for approximately 30-40 years followed by low snag levels and high downed wood levels while the forest regrows. The natural range of variability in snag numbers is much narrower in managed stands outside the

wilderness. Managed stands provide a balance to the high intensity natural events in the wilderness. The managed areas with lower levels of snags which are maintained over longer periods of time provide a refuge for the species dependant on snag and downed wood habitat while wilderness forests regrow.

4. Large scale fires (B&B, Puzzle) burned the nest grove and nest tree of the Marion Lake Bald Eagle pair. The pair established a nest in a nearby grove the following year. The conservation strategy for these Bald Eagles has not been updated since the fire. Following the fire and delisting a new conservation strategy is needed for the known pair at Marion Lake.
5. Target values for big game forage cannot be attained in many areas based on forest management guidelines changing since the Willamette Forest Plan was written. New science has altered what was assumed in the original plan and management direction is not reflecting the new science. Revisions to the Forest Plan have not happened to alter basic assumptions, revised the habitat effectiveness model, addressed changing conditions or integrated changing population management decisions of the Oregon Department of Fish and Wildlife.
6. Big game populations are no longer monitored to determine numbers or distribution. A connection should be made between habitat capability to support big game and the number of animals being maintained in the BGEA's by ODFW. Big game numbers appear to be much lower than the level existing habitat conditions could support. Without monitoring we cannot determine if our efforts to manage habitat are having a positive affect on big game populations. Predation on big game by cougars and black bear is occurring but is not being monitored for extent or impact on population levels. Determining what is limiting populations in the watershed is important as this would identify what factors need to be managed or what assumptions need to be changed.
7. Roads identified for closure in open road analysis EA's should be closed to reduce road densities to those desired in the watershed. Current open road numbers are above those recommended. Some roads have been closed due to flood damage and other factors. A road analysis should be conducted to determine current and desired values for all planning subdrainages or big game emphasis areas in the watershed to determine what needs are present.
8. Connecting habitat between late successional reserves needs to be revisited to determine if adequate habitat is being maintained. An additional gap appears to exist in the Idanha area related to private land ownership patterns which was not identified in the original W.A. One Pine Marten and one Pileated Woodpecker management area were retained in areas where habitat connections are inadequate which were not mentioned in the original W.A. Connecting habitat in the Coffin Mountain and Upper Straight Creek areas also appears to be limited.

Wildlife Completed Projects

Removed lodgepole pine saplings to prevent dry meadow encroachment

Desired Future Condition

Habitat components for native terrestrial wildlife species are diverse and well distributed. Areas of connectivity among the Quartzville and Jefferson LSRs as well as the small LSRs are identified and protected to allow adequate dispersal and migration patterns by spotted owls and other wildlife. Habitat is managed to maintain viable populations of all native, existing and desired non-native animal species. Down woody material and standing snags are monitored and maintained at desired levels. Species of concern in critical areas are managed with plans that provide current and effective objectives for desired population levels. Sufficient habitat for neotropical migrants is provided by hardwoods such as willow and cottonwood in riparian zones Disturbance of neotropical migrants is minimized during the breeding season. Corridors of late successional characteristics between LSRs are developed with strategically placed riparian treatments. Green tree retention patches are persistent over time and sustained through effective management practices. Habitat enhancement projects focus on areas and species where a direct connection to population improvements can be made.

Objectives

1. Revise management objectives for all big game management areas.

2. Develop a strategy to determine the factors which are limiting big game population levels in each Big Game Emphasis Area and improve habitat where needed.

3. Develop a strategy to connect projects to improve big game habitat effectiveness with non-habitat related factors affecting recruitment/survival such as predation, population levels, disease, hunting season type and length which is controlled by ODFW.

4. Identify and protect habitat corridors connecting late successional habitat reserves used by spotted owls and other late successional forest related species, especially between LSR areas.

5. Identify key spotted owl dispersal habitat in areas with connecting habitat limitations created by private land ownership patterns, past harvesting practices or natural disturbance. Tier to the Northern Spotted Owl Recovery Plan when it becomes available.

6. Implement USFWS Spotted Owl Recovery Plan.

7. Maintain sufficient down woody material to meet levels specified in the Willamette Forest Plan, Northwest Forest Plan and Late Successional Reserve Assessment.

8. Increase average stand diameters.

9. Maintain sufficient snags to meet levels specified in the Willamette National Forest Management Plan, Northwest Forest Plan and Late Successional Reserve Assessment.

10. Develop management plans for species of concern in unique or limited habitat types such as wetlands.

11. Enhance habitat for neotropical migrants in riparian zones.

12. Manage green tree retention areas (GTRs) for maintenance and monitoring.

13. Monitor the benefits of habitat improvement projects for wildlife populations.

14. Develop and implement a conservation strategy for the Marion Lake known Bald Eagle pair.

15. Develop management plans for the Pileated Woodpecker and Pine Marten habitat areas in the watershed.

IV. Recommendations

Potential Projects

Watershed-wide Projects (not tied to a specific resource area)

1. Prevention and clean up dump sites including abandoned vehicles.

Botany

1. Rehab Detroit Flats w/weed removal and native plantings

A very popular picnic site at Detroit Lake shoreline adjacent to the city of Detroit, has a very high concentration of invasive weeds that tend to dominate plant communities including Himalaya blackberry, reed canary-grass, Scotch broom, and some giant knotweed. This project would combine weed removal with some native vegetation planting, and educational materials. Intermittent work on weed removal has been ongoing for over six years with force account crews and correction crews. Potential cooperators: North Santiam Watershed Council, Marion and Linn Counties, Corps of Engineers, ODOT, ODA, ODFW, City of Detroit Potential Funding: OWEB, KV, Allocated, CCS, Payco, USFWS Grants.

2. Remove blackberry and plant native species at Santiam Flats

Similar situation as Detroit Flats, blackberry and Scotch broom are the major weed problems. The project will blackberry patches with willow and cottonwood. Planting reestablish conifer components on the flats and promote root strength of the bank areas. Methods used include temporary fencing or planting of site and education. Potential cooperators: North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, DLRABA, Federal Lake Committee, Corp of Engineers, ODFW Potential Funding: OWEB, KV, Allocated, CCS, Payco.

3. Remove reed canary-grass and mint with horse and plow at Pamelia Lake

Use horse and plow to uproot patches of reed canary-grass and mint along the shoreline of Pamelia Lake during periods of low water level. Potential cooperators: Chemeketans, High Country Horsemen. Potential Funding: Allocated, CCS, Payco.

4. Marion Lake disturbed site de-compaction and revegetation

Break up compacted soil, local transplanting of native vegetation around the edges, and natural structure landscaping to rehab large areas of campsite disturbance. Potential cooperators: North Santiam Watershed Council, Marion County, Marion Forks Investment, Chemeketans. Potential Funding: Allocated, CCS, Payco, USFWS Grants.

5. Toad Creek vicinity wetlands weed removal and interpretation

Tansy ragwort and recent invasions of spotted and diffuse knapweeds need continuous removal and monitoring, and this location should be considered for special interest area designation. Potential cooperators: Oregon Native Plant Society, North Santiam Watershed Council, Linn

County, Marion Forks Investment, Rocky Mtn. Elk Foundation, Oregon Hunters Assoc. Potential Funding: Allocated, CCS, Payco, Rocky Mtn. Elk Foundation.

6. Monitor weed invasion into B&B fire area

Much of the B&B fire area west of the Cascade Crest is along or near the Highway 22 corridor. Many weeds reside or are transported to or from the highway 22 corridor. The fire area created large openings that could be prime targets for weed invasion. The Mt. Jefferson Wilderness is amazingly weed free for an urban forest, this project is an effort to maintain its weed free status. Potential cooperators: Oregon Native Plant Society, North Santiam Watershed Council, Linn County, Chemeketans, Rocky Mtn. Elk Foundation, Oregon Hunters Assoc. Potential Funding: Allocated, CCS, Payco, Rocky Mtn. Elk Foundation.

7. Perform a vegetation evaluation of Section 33 and its lakes (2#)

This newly acquired square mile of land near Big Meadows has not been adequately surveyed for weed occurrences and restoration needs. The focus for restoration should be on lakeside shoreline. Potential cooperators: Oregon Native Plant Society, North Santiam Watershed Council, Linn County, Santiam High School, Stayton High School, ODFW Potential Funding: OWEB, KV, Allocated, CCS, Payco.

8. Native Plant Communities interpretation at Outerson Mtn.

Outerson Mountain is a native vegetation hotspot within the Upper North Santiam Watershed. The area around Outerson Mountain supports many different forested and non-forested communities. Short trails lead to many areas where plant community interpretation would be ideal. There is also a major wilderness trailhead in this area. Potential cooperators: Oregon Native Plant Society, North Santiam Watershed Council, Marion County, Santiam High School, Stayton High School, ODFW Potential Funding: OWEB, KV, Allocated, CCS, Payco.

9. Complete sensitive habitat inventory surveys.

Many sensitive plant species exist, thrive and in some cases only exist in these unique forest sensitive habitats. Not only has the watershed hardly been systematically surveyed, but focusing on sensitive habitat surveys will also begin this process of rare plant inventory within the watershed as well. Large portions of this watershed fall within several wilderness areas that could potentially be a goldmine of not only sensitive habitats, but sensitive plant species as well.

Cultural Resources

1. Protect Big Meadows Horse Camp Site

Years of equestrian use in the Campground have begun to compromise the integrity of the cultural site (both historic and prehistoric). Subsurface testing in the early 1990s determined the boundary of the site. Deterioration of the fence has led to more impacts on the cultural. Restricting the area to foot traffic through fencing or other means would help protect integrity of the site.

2. Restore Big Meadows (2257) Historic Road

Continued heavy use of Road 2257 over the past decades has resulted in a loss of base material. This loss of base material and continued use has created large water catchments areas that have no means to drain away from the road. The project would help restore the historic integrity of

the road and preserve water quality. Potential Cooperators: North Santiam Watershed Council, Equestrian groups, Linn County, Boy Scouts of America, Oregon Historic Trails Advisory Council. Potential Funding: KV, Allocated, CCS, Payco, USFWS, OWEB Grants, BSA.

3. Rehab dispersed sites in the Whitewater Drainage to protect heritage sites

Whitewater Creek dispersed use has caused archaeological damage to a potentially significant site. Over the past decade, recreation users have dug holes in the ground, excavated soil at their camping spots, brought in porta-pots, dug along the river embankment, sorted through surface artifacts creating large piles of lithic material. Methods for improvement to this area may include, archaeological site testing to determine the effects to the site from dispersed camping and evaluation for inclusion to the National Register of Historic places. If the site is deemed eligible for historic register status, the area would be protected through hardening or closure. Potential cooperators: North Santiam Watershed Council, Oregon Archaeology Society. Passport in Time Project, Funding: Payco, Allocated.

4. Create an Interpretive Trail to Independence Prairie guard station

This is a three fold project: 1) Construct a trail to Independence Prairie Guard Station; 2) Provide interpretation for the public through a combination of an interpretive kiosk at the trailhead, a Detroit RD Front Office display; or a brochure. 3) Heritage stewards will monitor the site on a regular basis. Potential Cooperators: Linn or Marion County, Heritage Stewards. Potential Funding: Scenic Byway Grants.

5. Develop a plan for reuse of Marion Forks guard station, a National Register listed site.

A plan is needed to determine the best use of Marion Forks Guard Station. One option is to include in the Fee Demo Rental program. Completing a business plan for this site would help determine if the rental program is feasible. Funding: Allocated

6. Address the effects to Heritage Resources from dispersed recreation along both Highway 22 and other major travel routes, determine mitigation needs.

Highway 22 is the second most popular east-west corridor in the State Oregon. This has resulted in numerous dispersed camping spots along these corridors. Recreation use of these areas has led to a loss of vegetation, which in turn has intensified the erosion created from heavy rains and snow run-off. Along with this recreation users have tend to modify their camping spots by excavating the soils, cutting live trees, digging holes. These human and natural disturbance processes have an effect on many archaeological sites associated with dispersed camping spots. The intent of this project is to determine the archaeological site boundaries and possibly the site's significance. Sites would then be protected through hardening or closure. Potential cooperators: North Santiam Watershed, Funding: Passport in Time, KV, Allocated, Payco.

7. Restore and protect the Minto Mountain Meadow Restoration

The integrity of Minto Mountain Meadow complex has been maintain for thousands of years by Native Americans, sheep herders and fire process. This project proposes to reduce conifer encroachment by tree girdling, felling and then leaving small trees in place and through prescribed fire. Potential Cooperators: Tribes, Botanists, ODFW, Oregon Hunters Association potential Funding sources: Payco, KV, allocated, volunteers.

8. Create an interpretive trail at Hogg Railroad and Camp.

This project involves the planning and design of an interpretive facility. The project includes developing a detailed interpretive plan, environmental assessment, engineering survey and design and contracting as well as conceptual designs. The historic RR camp is one of the most significant sites on the Oregon Pacific railroad system with its most impressive features including a completed grade segment, and adjacent camp with several stone bread making ovens, housing features, and camp remains. The site is listed on the NRHP and its intrinsic historic quality contributed the designation of the West Cascades Scenic Byway. Potential Cooperators: ODOT, National Scenic Byway Program, Railroad groups. Funding: National Scenic Byway Grants, Payco, Allocated.

9. Replace sill logs at Independence Prairie, a National Register Listed Site.

Potential Cooperators: Linn County Correction, Crew, Heritage Stewards. Potential Funding: Volunteer, Allocated, Payco.

Economics

1. Continue to expand partnerships with local communities and organizations to develop and manage recreation opportunities that benefit local economies and quality of life.

2. Continue to work with Federal Lakes Committee and federal agencies to address water level allocations at Detroit Lake to sustain recreation use while providing for downstream demands.

3. Support and provide technical assistance to local communities to help them implement a community sewer treatment facility proposal.

4. Implement recreation projects (listed under Recreation) that help achieve North Santiam economic and tourism strategy goals.

Fire and Fuels

1. Create fuel breaks along roads through thinning and prescribed fire. (Wilderness boundary, recreation areas, Boy Scout Camp Pioneer, Highway 22)

Fisheries

Physical processes are the driver for the biological health of fisheries populations and aquatic organisms in the watershed. Physical processes include habitat forming features such as sediment recruitment and transport, large wood recruitment, and a connected floodplain with healthy riparian habitat. As land managers, we can manage and restore these physical processes to achieve both physical and biologic DFCs for Instream Habitat, Riparian Habitat, and Water Quality.

Physical processes retarding attainment of instream DFCs include lack of Large Wood, undersized culverts, roads located in riparian areaas and floodplains, and physical barriers created by roads. Past removal of instream wood for salvage and misguided flood relief and fish passage efforts has severely reduced habitat quality in the watershed. There is a need for large wood supplementation, especially large key pieces, in the North Santiam River and Marion Creek. Small tributary streams such as Boulder Creek, Whitewater Creek Pamilia Creek, Minto Creek, Straight Creek, Horn Creek, Moon Creek and Puzzle Creek would benefit from any large wood addition.

Roads negatively impact fisheries and aquatic organisms. Undersized road culverts in the watershed block wood and sediment transport and create passage barriers for aquatic organisms. Poor road locations reduce floodplain connectivity and degrade riparian function. To achieve the DFCs for the watershed the problem crossings should be replaced and roads obliterated or relocated. A list of surveyed culverts for the watershed is located in Appendix 1. Culverts in the North Santiam River and Marion Creek should be replaced before moving into samller tributaries.

Riparian habitat DFCs can be achieved by continued protection of riparian areas and active restoration. Road construction on the floodplains of the North Santiam River and Marion Creek has caused channel straightening that has caused downcutting and disconnection from the floodplain. Adding wood to the streams and reconnecting sidechannels will increase hyporheic flow and improve streamside vegetation. Riparian thinning in the watershed would improve current and future wood recruitment to streams. Thinning in riparian areas releases larger trees to mature faster and increase the size of trees recruited to the stream in the long-term—200-300 years. In the near term, thinned trees can be yarded into streams to increase large wood, and left on the floodplain for future recruitment during flood events. Areas in the watershed that are identified for riparian thinning should be considered for this treatment. Roads in riparian areas, that are no longer needed, should be obliterated to restore riparian and floodplain function.

Lower water temperatures and reduced input of fine sediment will move the water quality indicator towards attainment of the DFC. Lower water temperatures can be achieved by protecting coldwater sources such as springs, seeps, wetlands, and riparian areas. Shade from solar radiation is also an important solution for reducing water temperatures. Revegatation of riparian habitat and management and protection of riparian areas is important. Decreasing the impacts of dispersed recreation throughout the watershed will move the watershed the DFC. Much of the fine sediment input to streams that is above natural levels can be attributed to roads. Proper drainage and stormproofing of roads, especially those in clolse proximity to streams should be a priority. Obliteration of unneeded roads should be considered whenever possible. Roads increase the drainage network of the watershed and intercept overland and subsurface flows, which changes peak and base flows and routes sediment to streams.

The Upper North Santiam Priority Watershed Project Identification provides an excellent ranking and rationale for restoration activities. Although the restoration opportunities, goals and objectives change over time, the restoration prioritization offers a starting point with specific projects identified.

The restoration objectives and recommendations include:

1. Enhance Riparian habitat and structure in LSR.

Create a Riparian Reserve Management Program (RRMP) that works cooperatively with the Watershed Program. This RRMP will work cooperatively with the timber program to utilize the tool of timber sales to enhance the heath of our Riparian Reserve Management Areas during already planned harvest activities.

Past management activities within the LSR has created previously managed stands that are over stocked. Structural development of the riparian reserves needs to be evaluated and prescriptions developed to help areas if warranted to obtain late successional characteristic. Methods include; timber sales, contracts, cooperative agreements and partnerships. Potential cooperators: North

Santiam Watershed Council, Marion and Linn County, ODFW, small business owners, purchasers, Potential Funding: OWEB, KV, Allocated, CCS, Payco, USFWS, Grants

2. Continue the Respect the River restoration public conservation and education program.

3. Supplement large wood in Boulder Creek.

Placement of woody debris within Boulder creek to create complexity and reduce flow energies will improve the connectivity of the flood plain and reduce stream water temperatures. 303(d) listed stream for water temperature. Potential cooperators: North Santiam Watershed Council, Marion County, Marion Forks Investment, Freres Lumber. Potential Funding: KV, Allocated, CCS, Payco, USFWS Grants.

4. Improve shade in the riparian zones of Boulder Creek.

Plantings and silvicultral treatments within Boulder Creeks Riparian Reserve to encourage canopy development and complexity of the riparian vegetation. 303(d) listed stream for water temperature. Potential cooperators: North Santiam Watershed Council, Marion County, Marion Forks Investment, Freres Lumber. Potential Funding: KV, Allocated, CCS, Payco, USFWS Grants

5. Supplement large wood in Bear Lake Creek.

Place large wood in Log Creek to reduce energy and create habitat, cover, hiding, shade, for resident fish. Methods used would be equipment placement or yarding of material into channel area. Potential cooperators: ODFW. Potential Funding: KV, Allocated, CCS.

6. Implement Respect the River dispersed sites along Whitewater Creek.

Whitewater Creek dispersed site has been overused and as a result erosion and vegetation loss is occurring. Intent of this project would be to restore, the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators: North Santiam Watershed Council, Whitewater Creek conservation Association (WCCA) and ODFW. Potential Funding: OWEB, KV, Allocated, CCS, Payco, USFWS Grants

7. Supplement large wood and develop the floodplain in Marion Creek.

Habitat improvement projects have been accomplished through the past decade on Marion Creek. Storm and natural process have altered or damaged the structures to a point that additional work is imperative to retain the created habitat. Methods would include additional tie down of wood to maintain it in the system to placement of additional wood to improve or maintain a desire habitat unit. Potential cooperators: North Santiam Watershed Council, Linn County, ODFW. Potential Funding: KV, Allocated, CCS, Payco, USFWS , OWEB Grants, ODFW

8. Supplement large wood in the North Santiam River.

Habitat improvement projects have been accomplished through the past decade on the North Santiam River. Storm and natural process have altered or damaged the structures to a point that additional work is imperative to retain the created habitat. Methods would include additional tie down of wood to maintain it in the system. Potential cooperators: North Santiam Watershed

Council, Linn and Marion County, ODFW. Potential Funding: , KV, Allocated, CCS, Payco, USFWS , OWEB Grants, ODFW.

9. Supplement large wood in Straight Creek.

Place large wood in Straight Creek to reduce energy and create habitat, cover, hiding, shade, for resident fish. Methods used would be equipment placement or yarding of material into channel area. Potential cooperators: ODFW. Potential Funding: KV, Allocated, CCS.

10. Restore Santiam Flats with native plant species.

High use of the flats area has created channel banks that are actively eroding. Lack of vegetation from use and past high water has remove vegetation and resulted in loss of root mass which helps stabilize channel banks. Planting would be done to try and reestablish conifer components on the flats and promote root strength of the bank areas. Methods used include temporary fencing of planting and site and education. Potential cooperators: North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, DLRABA, Federal Lake Committee, Corp of Engineers, ODFW Potential Funding: OWEB, KV, Allocated, CCS, Payco, USFWS Grants

11. Restore dispersed recreation sites and riparian areas around Presley Lake.

Non Wilderness drive in lakes have become high use areas with various types of use occurring. Riparian values have been lost as a result of these uses. Intent of these projects would be to restore, the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators: North Santiam Watershed Council, Linn County, Santiam High School, Stayton High School, ODFW. Potential Funding: OWEB, KV, Allocated, CCS, Payco, USFWS, Grants.

12. Restore dispersed sites around non-wilderness lakes.

Recreation sites found outside the wilderness are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators: North Santiam Watershed Council, Linn County, Boy Scouts of America. Potential Funding: KV, Allocated, CCS, Payco, USFWS , OWEB Grants, BSA.

13. Maintain Big Meadows Horse Camp for soil and water protection.

Years of use have caused the deterioration of the structures that controlled use with in the site. Portions of the site are found with in a riparian reserve and as the result of these lost structures damage is occurring to the riparian area. Methods would include the repair of structures to help restrict the area impacted. Planting of lost vegetation to restore site and hardening of site. Potential cooperators: North Santiam Watershed Council, Linn County, Boy Scouts of America, Northwest Youth Corp, Various horse clubs. Potential Funding: KV, Allocated, CCS, Payco, USFWS, OWEB Grants, BSA.

The Upper North Santiam River watershed is the Detroit Ranger Districts priority for aquatic restoration. Reintroduction of spring Chinook salmon, ESA listed as threatened, to the watershed was a dream in 1995 and is a reality in 2007. This is the single most important change that has occurred since the original watershed analysis. Restoring instream habitat, riparian areas, and water quality to achieve the DFCs for the triumphant return of anadromy to this watershed is

now the most important goal of the district fisheries program. Successful restoration of Chinook salmon habitat will lead to the desired future condition for the watershed because they are one in the same. The recommendation for restoration of aquatic resources is continued implementation of the projects outlined in the restoration prioritization to achieve DFCs and restore historical salmon habitat.

Hydrology

1. South Shore Detroit Reservoir dispersed site restoration

Due to the use found around the reservoir numerous dispersed sites are being compacted and overused accelerating erosion off the site and loss of vegetation from the riparian reserve. Intent of these projects would be to restore, the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, DLRABA, Federal Lake Committee, Corp of Engineers, ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS Grants

2. Riparian Planting Santiam Flats

High use of the flats area has created channel banks that are actively eroding. Lack of vegetation from use and past high water has remove vegetation and resulted in loss of root mass which helps stabilize channel banks. Planting would be done to try and reestablish conifer components on the flats and promote root strength of the bank areas. Methods used include temporary fencing of planting and site and education. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, DLRABA, Federal Lake Committee, Corp of Engineers, ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS Grants.

3. Habitat improvement Structure placement Log Creek

Place large wood in Log Creek to reduce energy and create habitat, cover, hiding, shade, for resident fish. Methods used would be equipment placement or yarding of material into channel area. Potential cooperators, ODFW. Potential Funding KV, Allocated, CCS.

4. Structure Placement Boulder Creek

Placement of woody debris within Boulder creek to create complexity and reduce flow energies will improve the connectivity of the flood plain and reduce stream water temperatures. 303(d) listed stream for water temperature. Potential cooperator: North Santiam Watershed Council, Marion County, Marion Forks Investment, Freres Lumber. Potential Funding, KV, Allocated, CCS, PayCo, USFWS Grants.

5. Riparian Improvement (shade) Boulder Creek

Plantings and silvicultral treatments within Boulder Creeks Riparian Reserve to encourage canopy development and complexity of the riparian vegetation. 303(d) listed stream for water temperature. Potential cooperator: North Santiam Watershed Council, Marion County, Marion Forks Investment, Freres Lumber. Potential Funding, KV, Allocated, CCS, PayCo, USFWS Grants.

6. Structure Placement Bear Lake Creek

Place large wood in Log Creek to reduce energy and create habitat, cover, hiding, shade, for resident fish. Methods used would be equipment placement or yarding of material into channel area. Potential cooperators, ODFW. Potential Funding KV, Allocated, CCS.

7. Riparian Evaluation of Developed recreation Sites

Developed Recreation sites found within the watershed are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Potential cooperator: North Santiam Watershed Council, Marion and Linn County, Concessionaires. Potential Funding, KV, Allocated, CCS, PayCo, USFWS , OWEB Grants.

8. Dispersed site Improvement Whitewater Creek

Whitewater Creek dispersed site has been overused and as a result erosion and vegetation loss is occurring. Intent of this project would be to restore the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators, North Santiam Watershed Council, Whitewater Creek conservation Association (WCCA) and ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS Grants

9. Dispersed recreation off road vehicle damage and rehabilitation.

ATV use is increasing within the watershed. The off road nature of these vehicles allows them to enter riparian areas and disturb vegetation and channel banks. Loss of vegetation increases the risk of erosion and aquatic degradation. Methods used include education, signage, hardening of routes, establishment of low risk routes, and restoration of high impact areas.

Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, Off-road vehicle clubs, Motorcycle clubs and dealers, ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants.

10. Spring development, Minto Meadow

Historic spring development (70-80's) has degraded to where it is ineffective, erosion results from the dilapidated structure. Return site to a more natural water source by creation of a water holding area. Found within the Jefferson wilderness area. Method would be a simple as digging a catchment basin and lining with clay material to some sort of structure. Potential cooperators, North Santiam Watershed Council, Marion County, Santiam High School, Stayton High School, ODFW, OHA and Rocky Mountain Elk Foundation. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS Grants, RMEF,OHA.

11. Marion Forks Riparian Evaluation

Developed sites found within the Marion Forks area are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Potential cooperator: North Santiam Watershed Council, Linn County, Concessionaires, Summer Home associations ODFW. Potential Funding, KV, Allocated, CCS, PayCo, USFWS , OWEB Grants, ODFW.

Structural maintenance/ Floodplain development Marion Creek

Habitat improvement projects have been accomplished through the past decade on Marion Creek. Storm and natural process have altered or damaged the structures to a point that additional work is imperative to retain the created habitat. Methods would include additional tie down of wood to maintain it in the system to placement of additional wood to improve or maintain a desire habitat unit. North Santiam Watershed Council, Linn County, ODFW. Potential Funding, KV, Allocated, CCS, PayCo, USFWS , OWEB Grants, ODFW.

13 Dispersed recreation/riparian restoration Presley Lake

Non Wilderness drive in lakes have become high use areas with various types of use occurring. Riparian values have been lost as a result of these uses. Intent of these projects would be to restore, the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators, North Santiam Watershed Council, Linn County, Santiam High School, Stayton High School, ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants.

14. Riparian Use evaluation and restoration Pioneer Basin

Recreation sites found within the basin are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan. The B&B and Puzzle fire has placed additional pressures on those areas unburned and intact. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Methods used could include closure, hardening the site to the use or development of site Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America. Potential Funding, Allocated, CCS, PayCo, USFWS , OWEB Grants, BSA.

15. Riparian use/evaluation and restoration Marion Basin

Recreation sites found within the basin are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan or Wilderness direction. The B&B and Puzzle fire has placed additional pressures on those areas unburned and intact. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Methods used could include closure, hardening the site to the use or development of site Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America. Potential Funding, Allocated, CCS, PayCo, USFWS, OWEB Grants, BSA.

16. Road drainage and restoration for historic road

Due to the historic nature of the 2257 road maintenance and drainage problems have occurs. Loss of base material has occurred resulting in catchment areas pounding water and not draining. Project would allow complete evaluation of the 2257 road to occur and natural drainage to occur preserving the water quality of the area and protecting the heritage integrity. Method would include historic road construction practices. Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America. Potential Funding, KV, Allocated, CCS, PayCo, USFWS, OWEB Grants, BSA.

17 Restoration hardening non-wilderness lakes dispersed sites

Recreation sites found outside the wilderness are all or partially within riparian reserves and may not be compatible to the direction within the Northwest Forest Plan. Evaluation would address the condition of the sites and their compatibility and prescribe a long range plan for compliance. Methods used could include closure, hardening the site to the use or development of site.

Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America. Potential Funding ,KV, Allocated, CCS, PayCo, USFWS , OWEB Grants, BSA.

18. Erosion control work within burned areas of the wilderness and non wilderness.

Trail systems lost structure, duff, and soil characteristics making them susceptible to increased erosion from public use. Project would allow for the evaluation and maintenance of these trails to reduce the off site erosion and stabilize the trail. Methods include water barring, spreading of liter, signing and relocation. Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America, Northwest Youth Corp. Potential Funding, KV, Allocated, CCS, PayCo, USFWS, OWEB Grants, BSA.

19. Wilderness education erosion, water quality, camping.

Increase use of wilderness areas places additional risks on the aquatic system and associated riparian system. Methods: education, site condition sureveys, and restoration plans. Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America, Northwest Youth Corp. Potential Funding, KV, Allocated, CCS, PayCo, USFWS, OWEB Grants, BSA.

20. Maintenance and restoration of Big Meadows Horse Camp for soil and water protection.

Year of use have caused the deterioration of the structures that controlled use with in the site. Portions of the site are found with in a riparian reserve and as the result of these lost structures damage is occurring to the riparian area. Methods would include the repair of structures to help restrict the area impacted. Planting of lost vegetation to restore site and hardening of site. Potential cooperator: North Santiam Watershed Council, Linn County, Boy Scouts of America, Northwest Youth Corp, Various horse clubs. Potential Funding, KV, Allocated, CCS, PayCo, USFWS, OWEB Grants, BSA.

21. Highway 22 and major travel routes evaluation and hardening of dispersed sites in riparian reserves.

Due to the use found around travel corridors numerous dispersed sites are being compacted and overused accelerating erosion off the site and loss of vegetation from the riparian reserve. Intent of these projects would be to restore, the site to allow vegetation and natural permeability to be reestablished. Methods used could include closure, hardening the site to the use or development of site. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, ODOT, Northwest Youth Corp, ODFW. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants,

22. Structure maintenance North Santiam River.

Habitat improvement projects have been accomplished through the past decade on the North Santiam River. Storm and natural process have altered or damaged the structures to a point that additional work is imperative to retain the created habitat. Methods would include additional tie down of wood to maintain it in the system. Potential cooperators, North Santiam Watershed Council, Linn and Marion County, ODFW. Potential Funding, KV, Allocated, CCS, PayCo, USFWS , OWEB Grants, ODFW.

23. Structure Placement Straight Creek

Place large wood in Straight Creek to reduce energy and create habitat, cover, hiding, shade, for resident fish. Methods used would be equipment placement or yarding of material into channel area.

Potential cooperators, ODFW. Potential Funding: KV, Allocated, CCS.

24. Wilderness trail stream crossing evaluation and restoration.

Trail systems with in the Mt Jefferson wilderness area cross numerous stream channels with various techniques and various protection results. Methods would include survey and describe all stream crossings and evaluate for consistency with Northwest Forest Plan and wilderness objectives. And development of restoration plans consistent with the plan. Potential cooperators; North Santiam Watershed Council, Linn County, Boy Scouts of America, Potential Funding, KV, Allocated, CCS, PayCo, USFWS, Grants, BSA.

25. Aquatic Development on the Flats

Detroit flats wildlife area and picnic area shoreline diversity and stabilization

Methods include planting and structural work to maintain the shoreline and provide diversity for migrating species. Potential cooperators, North Santiam Watershed Council, Marion County, Santiam High School, Stayton High School, DLRABA, Federal Lake Committee, Corp of Engineers, ODFW Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants,

26. Riparian development in LSR

Past management activities within the LSR has created previously managed stands that are over stocked. Structural development of the riparian reserves needs to be evaluated and prescriptions developed to help areas if warranted to obtain late successional characteristic. Methods include; timber sales, contracts, cooperative agreements and partnerships. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, ODFW, small business owners, purchasers, Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants,

27. Structural development in Riparian reserves.

Past management activities within the riparian reserves has created previously managed stands that are over stocked. Structural development of the riparian reserves needs to be evaluated and prescriptions developed to help areas if warranted to obtain late successional characteristic. Methods include; timber sales, contracts, cooperative agreements and partnerships. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School, ODFW, small business owners, purchasers, Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants

28. Slope stabilization/cutbanks and fill slopes.

Access and travel ways have opened and created numerous cut and fill slopes that are prone to rapid soil loss from heavy precipitation. Methods include mulching of slopes, terracing of slopes and revegetation techniques used to reduce impact of falling rain. Potential cooperators, North Santiam Watershed Council, Marion and Linn County, Santiam High School, Stayton High School. Potential Funding OWEB, KV, Allocated, CCS, PayCo, USFWS, Grants.

Land and Minerals

1. Coordinate with ODOT on STIP projects along Highway 22.

2. Whitewater cell tower installation

3. Issue personal use mineral permits at McCoy, Minto, Hawkins, Woodpecker, Downing, Homestead rock pits.

Recreation

1. Implement actions to manage use of dispersed site hotspots:

Using an interdisciplinary approach, update site assessment methods, evaluate dispersed sites, and implement actions to manage use. Remedial actions may include:

- Increase information, education and enforcement programs including establish new regulations;
- Site restoration, rehabilitation or relocation;
- Continue to expand the "Respect the River" program across the watershed
- Site improvements to manage use, such as hardening sites, establishing minimum setbacks from features, barriers and site controls to manage access or parking, facility development for health and safety or resource protection;
- Regulate or limit use such as designated campfires and/or campsites; restricting types of use, where use occurs, or number of users (e.g. group size, day use, designating parking, camping areas);

Potential Partners: North Santiam Watershed Council, Adopt-A-program, ODOT, City of Detroit, County Sheriffs, Horse group. Potential Funding: Challenge cost-share, KV, Payco, COE, correction crew, youth crews, NWYC

2. Manage dispersed sites along Blowout Road Phase into long-term goals to convert dispersed camping to developed campgrounds including areas at Sauers Creek, Southshore East, Stahman Creek and near Sportsmans Club.

Consider small group campsites, yurt or camper cabins, road improvements, campsite establishment, and installation of toilets. Close selected spur roads between Hoover and Cove Creek Campgrounds to public vehicle access. Designate campsites with fire rings, decommission spur road and establish parking area, scarify soil and plant at "Southshore West." Determine development potential for the area adjacent the Sportsmans Club and include in prospectus for concessionaire complex. Potential Partners: Concessionaire. Potential funding: KV, CIP, COE timber sale purchase, correction and youth crews.

3. Construct "Canyon Journeys" Alternative Transportation Link Trail

The Canyon Journeys North Santiam Canyon Alternative Transportation Link Feasibility Study was completed in 2006. Begin design, planning and construction of ATL trail system on southside of Detroit Lake and connection with the Cities of Detroit and Idanha. Partners: ATL MOU partners, Federal Lakes Committee. Potential Funding: COE, trail and federal highway grants.

4. Improve Piety Island Campground

Install dock and a new toilet, and put under concessionaire management. Potential Partners: Concessionaire, Marine Board. Potential Funding: COE funding, Marine Board, CIP

5. Reconstruct Detroit Flats into a day use site and birding interpretive viewing area including paved parking, trails, fishing and viewing platforms, picnic sites, toilets, shore stabilization, interpretation, osprey viewing gazebo, vegetation management and enhancements for waterfowl and migratory song birds.

Potential Partners: Federal Lakes Committee, City of Detroit, ODFW, COE, Audubon Society, BLM (Steve Dowlan) Potential Funding: COE funding, COE wetland enhancement, ODFW/USFWS grants, challenge cost-share, CIP, Scenic Byway Grants, Corrections and Youth Crews, volunteers

6. Continue law enforcement and education

Continue active FPO program with focus on hotspots within the watershed. Consider a Forest Patrol Program that uses a variety of multi-funding sources.

7. Implement enhancements identified in the West Cascades National Scenic Byway corridor management and interpretive plan

The plan identifies interpretive opportunities, need for developments, signing and enhancements, and establishes priorities. Enhancement sites include: Detroit Flats, Hogg Railroad sites, Independence Prairie, Marion Forks, N. Santiam River access,Detroit Portal, Mt. Jefferson and 3 Fingered Jack viewpoints.. Potential Partners: Byway communities, ODOT. Funding: Federal Highway grant, ODOT mitigation funding.

8. Conduct Forest-wide OHV planning

This process includes road inventory and implementation of a public use map specifying roads open to OHV use and access to dispersed campsites. Potential Partners: Marion County, local OHV and snowmobile groups. Funding: RO directed appropriated multi-funding.

9. Improve vegetation conditions in all campgrounds

Open stand canopies to increase vegetation screening and improve long-term stand health, planting/transplants, barriers around campsites and other traffic controls to reduce recreation impacts, and hazard tree management. Eliminate noxious weeds. Potential Partner: Concessionaire. Funding: KV, timber sale prescriptions, recreation fees, corrections crew, stewardship contract, COE, G-T.

10. Improve and restore Marion Forks Campground

Create a host site and install a holding tank, decommission water system, change lower loop to day use, rehab to improve riparian edge effect and provide interpretation. Potential Partners: ODFW (O&M). Potential Funding: Payco, recreation fees, KV, ODFW, Federal Highway grants, Forest Highway Grant.

11. Improve and restore Big Meadows Campground

Replace toilet with CXT, maintain rail fencing and corrals, expand campground to accommodate use, consider a reservation system on some sites. Potential Partners: Horse group (maintenance of wood structures), Concessionaire. Potential funding: Payco, G-T

12. Hoover Boat Ramp Parking Area Expansion

Increase and improve parking area at boat dock.

13. Restore Marion Forks Guard Station and add to the Recreation Rental Program.

A recreation lodging feasibility study was completed in 2007 and determined Marion Forks Guard Station as a viable site to include in the recreation rental program. Next step is to bring site up to condition to rent to the public and go through the Recreation Enhancement Act process to bring it on line as a rental. Potential funding: Recreation Fees (O&M)

13. Remove hazard trees in developed recreation, dispersed and permit areas within developed recreation, popular dispersed sites (with minimal developments) and permit area. Potential Partners: concessionaire, permittees, saw cert training, Angell Job Corps. Potential Funding: concessionaire, permittees, KV, timber sale

14. Pave roads in Marion Forks, Riverside and Whispering Falls Campgrounds. Potential funding: Payco, KV, Roads CIP

15. Develop a plan for a Highway 22 rest area

Develop a plan with ODOT for a rest area on Highway 22. Possibly establish a new site or improve and maintain snow-park facilities that serve highway travelers. Potential Partners: ODOT. Potential Funding: ODOT.

16. Restore Camp Pioneer

Continue restoration efforts. Partners: Boy Scouts. Funding: KV

17. Install toilet at Duffy Trailhead

Replace porta-potty with a CXT toilet.

18. Improve kayak put-in in access and parking at Bruno Mountain Road and Blowout Road.

Potential Partners: whitewater groups. Potential Funding: volunteers.

19. Maintain trails and improve opportunities

General trail maintenance. Reconstruct Mackey Trail to old lookout site. Enhance with a viewing site and interpretation, and improve trailhead parking. Reconstruct Piety Island trail. Continue to create equestrian trail opportunities outside of wilderness to reduce horse impacts and user conflicts. Expand winter and equestrian trail opportunities within north of Big Meadows Road into the Twin Meadows area. Expand the snowmobile area north of Big Springs

Potential Partners: Pacific Crest Trail Association, Northwest Youth Corps, Backcountry Horseman, Oregon Equestrian Trails, snowmobile and Nordic clubs. Potential Funding: Volunteers, Payco, Recreation Fees, KV

20. Develop a Big Meadows Dispersed Area Implementation Guide as specified by the forest plan

21. Piety Island Channel

Dredge a north/south channel in the area between Piety Island and Detroit for safe boat access during summer periods of low water. Potential Partners: Marine County Sheriff Marine Patrol,

Federal Lakes Committee, Oregon National Guard. Funding: Oregon National Guard labor, COE funding.

22. Southshore Campground improvements: change to pilings system for transient dock, expand boat launch parking area, campsite shoreline stabilization, install rail fencing to improve safety and for campsite management to improve vegetation conditions. Potential Partners: Concessionaires Potential Funding: COE, Payco, KV, corrections crew, G-T

23. Conduct a visitor use study and update the Detroit Lake Composite Area Management Guide.

Monitor and evaluate the effectiveness of recent recreational developments, and look at changes in trends and demand to update the guide. Reevaluate carrying capacity of the reservoir to help determine developments and management strategies, and deal with issues such as user conflicts.

Other recommendations (these recommendations are from a value-added survey proposal):

A visitor survey was conducted as part of the 1992 DLCAMG. There is a need to revisit and implement another study to determine visitor use, demand, preferences, perceptions, capacity and satisfaction, and evaluate any changes that may have occurred since the original guide was developed. There is a need to conduct visitor surveys to determine if recommendations in the guide are still valid, or if trends, demands, or preferences have shifted, in which other management scenarios would need to be developed. Managers, recreation planners, specialists and law enforcement officials see a need to amend the plan so that managers can make sound decisions based on strong rationale. Other recreation providers, Federal Lakes Committee, and local communities see a need to improve recreation around the lake to benefit local economies. A visitor assessment would assist the District to amend the DLCAMG and prioritize recreation development and management strategies. Desired outcomes of a survey are to:

1. Understand visitor use, demographics, demand, preferences, perceptions, satisfaction, and any changes that may have occurred since the 1992 Guide.

The 1991 survey used for the preparation of the DLCAMG gathered information specific to Detroit Lake about visitor demographics, trip characteristics, activities and participation, satisfaction of facilities, services, and lake conditions, and importance of specific improvements. It would be desirable to repeat similar questions to help understand any changes since this 'baseline survey' was completed. Other survey questionnaire attributes may need to be modified to assess other known issues, changes, etc.

Understand characteristics of visit or trip to better align quantity and types of sites and facilities to meet user needs and demand (eg. proportion of day use vs campgrounds, group sites vs. individual units, RV/cabin/yurt camping, etc).

Understand if displacement is occurring, and why and where it is taking place. This may be occurring in areas upstream from the lake.

Determine if displacement would occur if certain management actions were implemented and where it would occur (in the area or other 'substitute' lakes).

Understand dispersed camping and preferences to help determine future management actions (focused management of dispersed camping vs. no dispersed camping).

Understand perceptions about: crowding, social conflicts, safety/security, resource damage, setting, adequacy of types and number of existing facilities, improvements needed, development scale, dispersed camping, fees, reservation system, etc.

Ascertain route location preferences for the 'Canyon Journeys' Trail around the lake (particularly along the highway/roadway vs. upland forest/lakeside).

Assess if and what opportunities or improvements could be provided to expand the season of use at the lake.

2. Conduct social assessment to help determine capacity of Detroit Lake and Water Recreation Opportunity Spectrum.

The DLCAMG used an old capacity methodology (1977 UDSI Bureau of Outdoor Recreation) that looked only at lake surface area and acreage necessary to accommodate motor and fishing boats. According to the DLCAMG, if all suitable land was developed (limiting factor is amount of parking and campsites) that lake capacity could not be attained. However, boating use is not spatially distributed equally across the lake surface due to lake conditions (afternoon prevailing winds). Boating activity is concentrated on the eastern third of the lake where the majority of boat launch and camping facilities are located, and in four popular narrow arms of major tributaries entering the lake which are most protected from wind. Capacity needs to be reevaluated as recreation managers including the State (2001 State Park Master Plan) are not comfortable making decisions on increasing boat launch parking.

3. Understand perceptions, values and desires of scenic viewshed condition and land management activities.

Detroit Lake is in a sensitive scenic viewshed. With the new scenery management system and Forest Plan revision, it is likely that areas may require a higher classification for scenic integrity, and subsequent standards for land management activities. Over the last few years, the District has managed the timber across the landscape to protect or enhance the visual quality.

Potential Partners: West Virginia State, Oregon State University, Federal Lakes Committee, Concessionaire, City of Detroit, Marine Board, COE. Funding Sources: COE

Roads

1. Reconstruct the Horse Camp Road

Fill over two culvert crossing is eroding and may contribute to culvert and asphalt failure. Project work could involve culvert replacement and fill reinforcement. Potential funding: CIP, Payco, and timber sale generated reconstruction funding.

2. Pamelia Creek Road Reconstruction

Asphalt failing in various areas. Asphalt skin or deep patch repairs would be performed with this project. Potential Funding: CIP, PAYCO, and timber sale generated reconstruction funding.

3. Presley Road Reconstruction/Maintenance

Roads need to be updated to a standard suitable for timber haul within the Presley's Twin Planning Area. Needed reconstruction and maintenance work includes drainage structure replacements and additions as well as cleaning, brushing, blading, clearing, rock subgrade reinforcement, and crushed aggregate surface replacement.

4. Stray Dog North Road Reconstruction/Maintenance

Roads need to be updated to a standard suitable for timber haul for the Stray Dog Timber Sale area. Needed reconstruction and maintenance work includes clearing, fill failure repair, blading, and drain dip placement. Potential Funding: Timber Sale generated reconstruction and appropriated maintenance funding.

5. Stray Dog South Road Reconstruction/Maintenance

Roads need to be updated to a standard suitable for timber haul for the Stray Dog Timber Sale area. Needed reconstruction and maintenance work includes clearing, blading, drainage structure placements, and road widening. Potential Funding: Timber sale generated reconstruction/maintenance and appropriated maintenance funding.

6. Log Creek Storm-proofing

Roads are rutted with cutback slides and slough, ongoing erosion problems. Storm-proofing activities may include waterbarring, slide and slough removal, and partial fill removals over culverts. Potential Funding: PAYCO, KV Potential Cooperators: North Santiam Watershed Council

7. North Santiam River Storm-proofing

Roads are rutted with cutback slides and slough, ongoing erosion problems. Storm-proofing activities may include waterbarring, slide and slough removal, and partial fill removals over culverts. Potential Funding: PAYCO, KV. Potential Cooperators: North Santiam Watershed Council

8. Mary's /North Fork Buck Creeks Storm-proofing

Roads are rutted with cutback slides and slough, ongoing erosion problems. Storm-proofing activities may include water barring, slide and slough removal, and partial fill removals over culverts. Potential Funding: PAYCO, KV Potential Cooperators: North Santiam Watershed Council

9. Reconstruction of Whitewater Road 2243

Road is rough due to lack of blading maintenance and/ or drainage improvements. Road maintenance activities are needed to provide a safe facility for public and administrative use, as well as to maintain road stability and to minimize erosion and mass movement potential. Maintenance activities may involve brushing, blading, drainage structure cleaning, and culvert installations or replacements. Potential Funding: Force account, appropriated maintenance funding.

10. Reconstruction of Marion Creek Road 2255

Road is rough due to lack of blading maintenance and/ or drainage improvements. Road maintenance activities are needed to provide a safe facility for public and administrative use, as well as to maintain road stability and to minimize erosion and mass movement potential. Possibly pave sections to prevent further washboard degradation. Maintenance activities may involve brushing, blading, drainage structure cleaning, and culvert installations or replacements. Potential Funding: Force account, appropriated maintenance funding, possibly timber sales.

11. Remove hazards such as slides, down trees, snags.

12. Update Access and Travel Management plans.

13. Maintain roads to established standards with higher level roads such as those that access recreation sites maintained for safe passenger vehicle travel.

14. Maintain good sight distance on forest roads.

15. Maintain and enforce road closures so the public has a clear understanding of them with adequate closure device, signing and CFR's.

Scenery

1. Improve the scenic quality of Highway 22 with vegetation treatments to enhance scenic big trees, seasonal color, and vegetation diversity. Create small openings, thin or remove individual trees to reveal significant landscape features e.g. Mt. Jefferson, Three Fingered Jack, etc. Integrate scenery objectives with resource objectives including stand health, fuel treatments and highway safety improvements projects (i.e. improve site distance at intersections, improve visibility of forest road entrances; manipulate vegetation to increase sunlight on icy sections, ODOT projects such chain-up areas and highway widening, etc.) Potential Funding: Payco, KV, timber sale activities, stewardship contract, corrections crew, Scenic Byway grants.

2. Maintain and improve scenic overlooks of the river and reservoir along the highway and major Forest travelways. Implement West Cascades National Scenic Byway Management Plan enhancements e.g. viewpoints.

3. During Forest Plan revision, change existing management allocations in areas to appropriate scenic allocation based on the new Scenery Management System. Develop scenic standards and guidelines for COE lands managed by the Forest Service.

Soils

The Soils and Geology Report for the Upper North Santiam Watershed Analysis, completed in 1995 discussed the background geology of the Cascades, evaluated the effects of previous management activities on the landscape, and considered likely outcomes from various natural or human events. The flooding and fires of the last decade have tested the conclusions in this report. In general, the report has fairly accurately evaluated past activities and reflected future events. The recent development of the Presley's Twin Timber Sale will help implement suggested actions in the document.

The soils and geology resources are generally meeting the desired future condition and operating as they should be. Displacement, compaction, nutrient loss, and instability are well managed on a project by project basis. With subsoiling, legacy compaction is being reduced. Accumulations of biomass from decades of fire suppression is also slowly being reduced, but much work remains in this arena.

One concern that needs mentioned and not discussed in the original report, is rock resource management. The concern is not with the actual use of the rock resource as aggregate, nor with the inappropriate development of our rock sources, but with the planning and expansion of existing and future rock sources and the associated NEPA documentation that is required. For a variety of reasons, we have not kept up to date either the existing pit plans or the needed environmental assessments. And, not surprisingly, no time or energy at all has been expended to consider our future needs for rock. In the coming decade, we will need to address this issue as

most of our rock sources have reached the development limits as defined by the clearing currently at hand. Most of our major rock sources still have considerable volumes of rock available, but the development plans and the associated NEPA documents do not exist.

Vegetation Management

Objectives and potential vegetation treatments were identified in the 1995 UNS watershed analysis by three management allocations: Late Successional Reserves (LSRs), Riparian Reserves, and Matrix allocation.

Late Successional Reserves

Two primary objectives for LSRs identified in 1995 were accelerating old growth characteristics and preventing large scale disturbances from fire. Since 1995, the mountain pine beetle outbreak has caused mortality within and along the eastern edge of the LSR RO214 (see figure 12). This mortality, combined with the mortality from the 1987-1993 western spruce budworm outbreak, has greatly increased the risk of a large scale fire disturbance occurring in the LSR. The 1995 watershed analysis recommended considering prescribed fuel breaks and treating existing slash within the LSR but this recommendation should be expanded to the high risk area east of the management allocation boundary.

Riparian Reserves and Matrix Allocation

The primary objective for Riparian Reserves was identified in 1995 as developing desired stand structure with emphasis on growing large trees and other late successional characteristics. The primary objectives for Matrix included maintaining and enhancing the growth and health of managed stands and increasing ecological diversity by creating big game forage and restoring the role of underburning. The mountain pine beetle and western spruce budworm outbreaks discussed above have caused not only an increase in tree mortality but have caused varying levels of reduced tree growth across the landscape east of highway 22. Trees weakened by budworm defoliation are often predisposed to attacks by bark beetles and infections by root diseases. Stand susceptibility to mountain pine beetle is strongly correlated with high stocking levels. To maintain healthy and vigorous growing trees, opportunities to reduce density in stands adjacent to the outbreak areas should be examined. Opportunities to regenerate stands, experiencing heavy mortality and growth loss from insects and disease, and planting a healthy mixture of tree species should also be examined.

Specific Vegetation Management Projects

Sauer's Creek/Dry Creek Thin

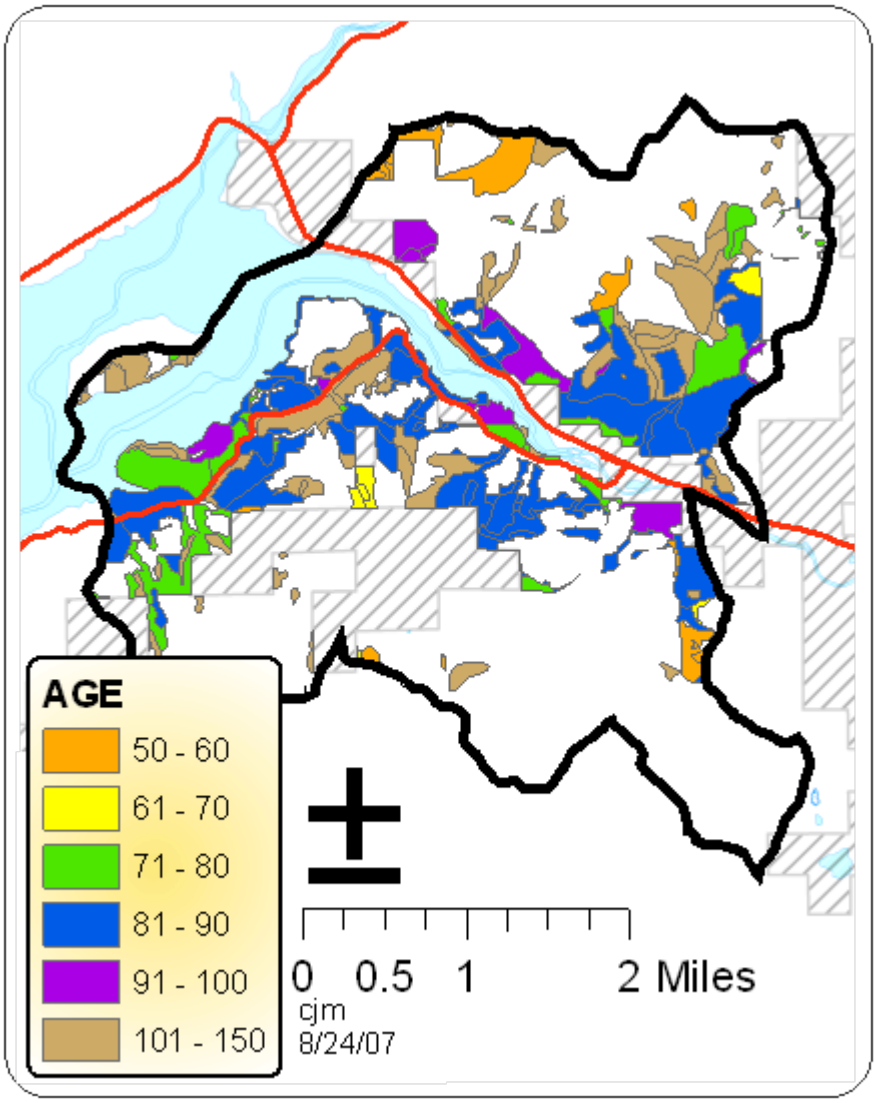
This project area consists of 2450 acres of proposed timber harvest. These stands fall in the Sauer's Creek/Dry Creek 6th field HUC. Stands are between 50 and 150 years old, based on the year of origin. Most of these overstory removal harvests occurred between 1900 and 1940. About 1,000 acres had previous commercial thinning treatments some of which included: Flyin' Fish (1997), Sour Fly (1994), Lo Dry Thin (1988).

Average Stand age is 90. A large portion of the stands are between 80 and 90 years of age. Many of these stands are remnants that are interspersed between Shore Nuff (2004) timber sale units. 200 acres or 10% of the area was PCT harvested between 1972 and 1980.

Most stands in this area are in Land Management Allocations 11D Scenic Partial Retention Foreground, 11A Scenic Modification Middle Ground, and 14A General Forest. The area also includes portions of private land and 9B Wildlife Habitat – Pileated Woodpecker.

Stands were excluded from consideration for the following reasons: private land, harvested between 1999 and 2007, younger than 50 years (in 2007), older than 150 years or fell within inventoried roadless areas.

Figure 13. Sauer's Creek/Dry Creek Thin



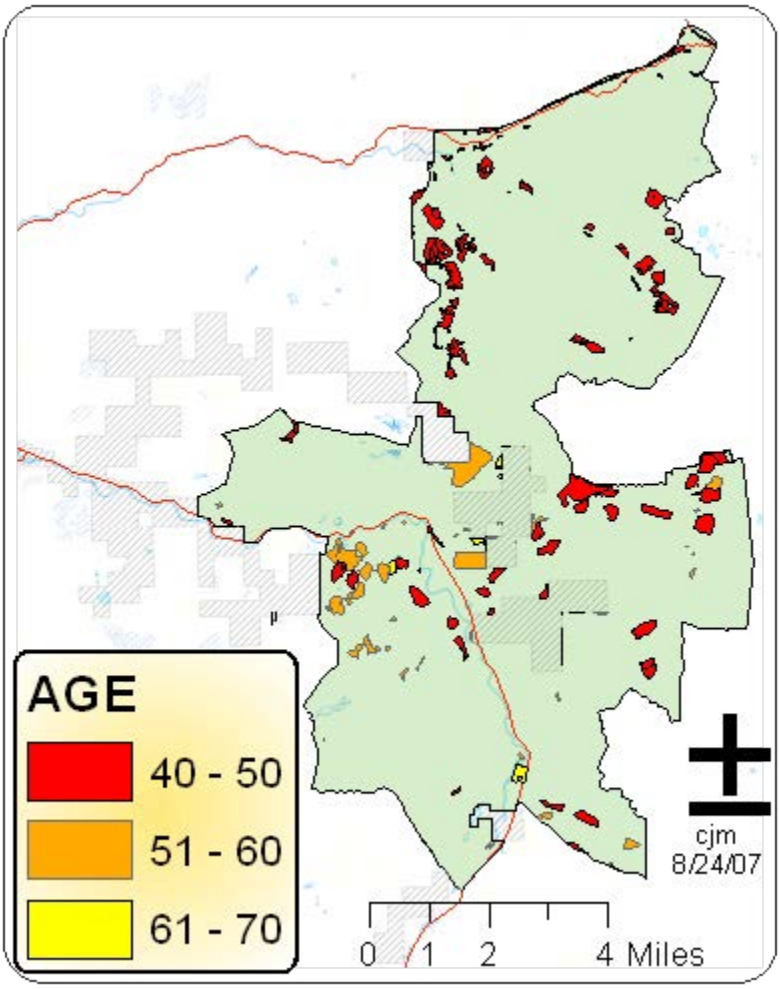
LSR Thin

Stands in the LSR that were between the ages of 50 and 80 were analyzed for a potential restoration project that would be driven by the purpose to advance late successional characteristics. Stands in the inventoried roadless area and stands of private land were excluded from analysis. There were only 743 acres that fell into this category in 2007.

Due to the lack of acres ready to be thinned at this time it is recommended that treatment of the LSR be delayed for at least another 10 years until 2017. At this time, there will be about 2430 acres between the ages of 50 and 80; enough to carry a viable sale. The stands that would be available for harvest (between the ages of 50 and 80) in the year 2017 are shown in Figure 2. One note for this information is that even in 2017, over half of these proposed units (1461 acres) will be between the ages of 50-60 years and could provide only marginal per acre timber volumes. Such a sale should be approached with caution even in 10 years.

Stands were excluded from consideration for the following reasons: private land, harvested between 1999 and 2007, younger than 50 years (in 2007), older than 150 years or fell within inventoried roadless areas.

Figure 14. Jefferson LSR Thin

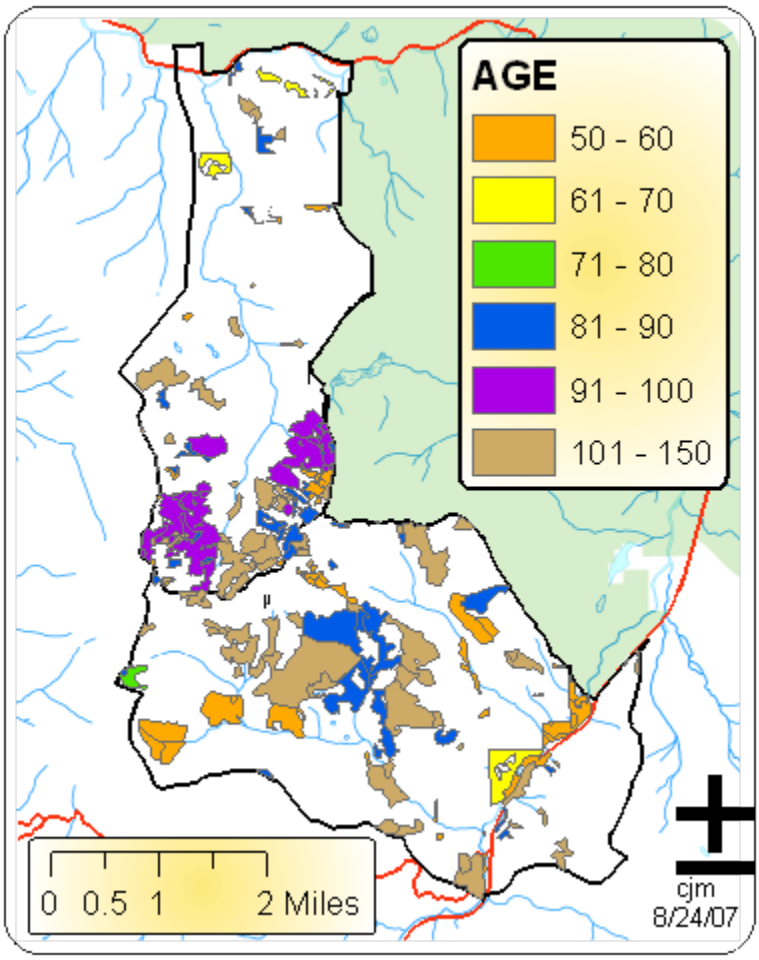


Bold Mary Thin

There are 2560 acres of proposed timber harvest in the Bold Mary project area. This proposed project area occupies the eastern portion of the Bugaboo/Minto Creek subwatershed and the southern portion of the Boulder/Mary's Creek subwatershed. These subwatersheds also correspond to the 6th field HUCs. There are 2560 acres shown in figure 3. Stands are between

50 and 150 years old based on the year of origin. Most of the 400 acres of overstory removal harvest occurred in the 1940's and 1950's. There was almost no commercial thinning in the area save for a couple units from the Coffin Timber sale (1984). Only about 50 acres of the area have been pre-commercially thinned.

Figure 15. Bold/Mary Thin



The average stand age is 74. About 80% of the stands are between 80 and 150 years of age. One previous concern with proposed harvest in this area is the poor access and high percentage of white wood species such as noble and silver fir may yield a lower value for the timber. Despite these concerns, the area is potentially ready for a thinning entry and should be considered as a potential stewardship project.

The majority of stands fall within management allocations 14A General Forest and 10B Dispersed Recreation—Semi-primitive Motorized. There are also a small number of acres that fall within 11A Scenic – Modification Middle Ground and 11FScenic – Retention Foreground.

Stands were excluded from consideration for the following reasons: private land, harvested between 1999 and 2007, younger than 50 years (in 2007), older than 150 years or fell within inventoried roadless areas.

Special Management Areas – LSR

1. Develop an evacuation plan for the Pamelia Lake area

Special Management Areas – Wilderness

1. Implement Chief's 10 year wilderness stewardship challenge which includes components of the following:

2. Develop an wilderness education plan to including the definition of key messages, the identification of target audiences and messages, monitoring & evaluation, and a schedule/action plan (may include ad campaign, one-on-one contacts/ signboards) and budget for implementation, which includes a prioritization of activities.

3. Promote use of weed-free hay/palletize feed

4. Educate users to manage livestock

5. Develop Wildland Fire Use Plan

6. Update and implement Wilderness Management Strategy and Wilderness Implementation Schedule to reduce social and resource impacts within key impact areas to include but not limited to limited entry, designate campsites or day use areas, fire bans, and restoration of campsites and user trails to meet forest plan standards.

7. Reestablish burned/lost wilderness boundary for adjoining projects and to protect wilderness resources

Wilderness Potential Partners/Funding: National Forest Foundation, University of Oregon Service Learning Center, SCA, Wilderness Stewardship Volunteer Program, OET, Backcountry Horsemen, PCTA

Wildlife

1. Restore Detroit Flats by erosion control, wetland development, noxious weed removal, recreation development, grassland restoration, maintenance of shallow water areas used by catfish which currently provide food for ospreys and bald eagles, migratory bird inventory

2. Manage the falling of snags in LSR for firewood with signs, enforcement and education

3. Thin fire regenerated stands

4. Commercial thin young stands

5. Manage firewood cutting and control road access in the Pileated Woodpecker management area

6. Maintain roads, rehabilitate lakeside areas and provide big game forage and hiding areas in section 33 south of Big Meadows

7. Survey for species of concern and consider Toad Creek for special interest area designation in wet, meadow and flat areas

8. Manage tree encroachment, restore meadow and develop a management plan for the Twin Meadows (10F) special interest area

9. Restore the dry meadow, survey for species of concern and develop a management plan for Minto Meadows (9D) special interest area (SIA)

10. Restore the wet meadow and beaver habitat, survey for species of concern and develop a management plan for Bruno Meadows (9D) SIA

11. Survey for species of concern and develop a management plan for the wet meadow at Pigeon Prairie (9D) SIA

12. Develop management plan and conduct lakeside restoration for Marion Flats (10F) SIA

13. Develop management plan and conduct lakeside restoration for JoJo Lake (10F) SIA

14. Develop management plan and conduct lakeside restoration for Bruno Lakes (10F)SIA

15. Develop management plan to include surveys for species of concern in the wetland southwest of the lake, completion of lakeside restoration and management of sewage at Tule Lake (10F) SIA

16. Develop a management plan and conduct lakeside restoration Presley Lake (10F) SIA

17. Survey for species of concern and develop a management strategy for the old growth grove at Outerson Mountain (7) SIA

18. Remap the fire damaged core Bald Eagle Management area for Marion lake

19. Survey habitat used by wetland species of concern at Horse Pasture Marsh

20. Survey habitat used by wetland species of concern at Big Meadows

21. Survey habitat used by wetland species of concern at Pamelia Lake south

22. Survey habitat used by wetland species of concern at Wild Cheat Meadow

23. Survey habitat used by wetland species of concern at North Pyramid meadow

24. Survey for species of concern and migratory birds in Santiam lake wetland habitat

25. Survey for species of concern and evaluate recreation impacts on those species in Lake Ann wetland habitat

26. Install gates to increase big game habitat effectiveness values in areas with approved access and travel management plans.

27. Revise the Bald Eagle conservation strategy at Marion Lake based on habitat changes and delisting related management direction changes.

28. Survey for species of concern and develop a management strategy for the old growth grove at Whitewater Creek (7) SIA

29. Develop a partnership with Oregon Department of Fish and Wildlife to determine population management strategies and habitat improvement needs for Big game in the watershed.

V. List of Specialists Involved with Project Prioritization/Watershed Revision

Paul Bennett, Engineering

Robert Bertolina, Fire and Fuels

KC Briggs, Fisheries

Darren Cross, Fisheries Biologist

Nanci Curtis, Fire and Fuels Specialist

Leslie Elliot, Silviculturist

Dave Halemeier, Hydrologist

Rich Hatfield, Watershed Revision Lead, Economics

Cara Kelly, Archaeologist

Dave Leach, Silviculturist

Christy McDevitt, Project Prioritization Lead, Fire and Fuels Update

Dani Pavoni, Recreation Planner

Abe Quihuis, Wilderness

Mike Roantree, Botanist

Doug Shank, Geologist

Chris Wagner, Botanist

Daryl Whitmore, Wildlife Biologist

VI. Citations

Anderson, Hal E.; 1982. *Aids to Determining Fuels Models for Estimating Fire Behavior*. Gen. Tech. Rep. INT-122. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 22p.

Economic Impact Study for Detroit Lake and the Upper North Santiam Canyon. Oregon State University Extension Service. Special Report 1071, May 2006

Grenbemmer, Greg ODFW Hatchery Manager. Marion Forks, OR.

Halemeier, David. Hydrologist, Willamette N. F., Santiam River Zone. 2007. Hydrology/Watershed Input.

Madden, J. and G. White. 2003. *B&B Complex Booth and Bear Butte Fires*. Deschutes & Ochoco National Forests. Fire and Aviation Section. B&B Complex Fires. Crooked River National Grassland. The Central Oregon Arson Task Force. http://www.fs.fed.us/r6/centraloregon/fires/2003/b-b/index.shtml. Accessed on 8/24/2003.

National Oceanic and Atmospheric Administration national Marine Fisheries Service. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale.

Northwest Forest Plan. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl: Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA Forest Service, USDI Bureau of Land Management.

United States Fish and Wildlife Service. 1998. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale.

Willamette National Forest, 1995 North Santiam River Watershed Assessment. Detroit RD

Willamette National Forest, Upper North Santiam Watershed Restoration Prioritization, 2005. Detroit RD

Willamette National Forest, Land and Resource Management Plan. 1990. USDA Forest Service, Pacific Northwest Region.

Willamette National Forest Stream Survey Database, NRIS.

Appendix A – List of Surveyed Culverts in the Watershed

Road Number	Mile Post	Stream Name
1000	3.7	Sauers Creek
1000	2.5	Sportsman Club Creek
1000065	0.8	Beard Creek
1000	9.85	Beard Creek
2233	0.3	McCoy Creek
2234100	2.3	Bear Lake Creek
2234	0.55	Rainbow Creek
2242806	0.4	Misery Creek
2234207	0.17	Rainbow Creek
2234205	1.3	trib to Rainbow Creek
2234	2.25	Rainbow Creek
2234100	3.15	Bear Lake Creek
2234205	1.9	trib to Rainbow Creek
2246753	3.5	Red Creek
2243	3.2	Cheat Creek
2243	5.3	Sentinel Creek
2233515	5.7	Boulder Creek
2233515	6.6	Middle fork of Boulder Creek
2233515	7.1	Boulder Creek
2233	6	upper Boulder Creek
2253	2.3	Minto Creek
2253128	0.5	trib to N.S.R. at Riverside CG
2266	0.15	North Santiam River
1164	2.3	Straight Creek
2261	0.3	Meadow Creek
2261	2.3	Meadow Creek
2257	1.9	North Santiam River
2257	1.9	North Santiam River
2261405	4.6	Tail Creek
2257405	1.2	Tail Creek
2257	0.5	Horn Creek
2200050	0.2	Horn Creek
2200050	0.2	Horn Creek
2255	2.9	Moon Creek
2255	2.9	Moon Creek
2200050	0.01	Horn Creek

Road Number	Mile Post	Stream Name
2200050	0.01	Horn Creek
2257	1.2	Horn Creek
2246	0.4	Woodpecker Creek
2246	2.2	Red Creek