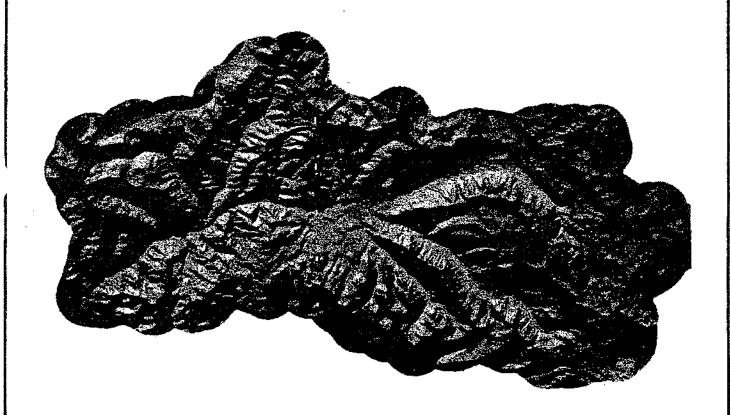
# Breitenbush Watershed Analysis



Willamette NF Detroit RD August 1996

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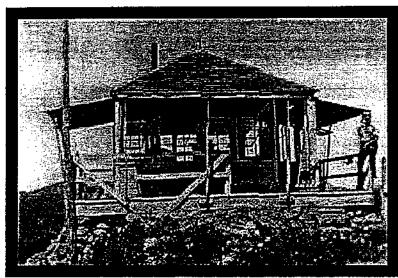
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## I. Introduction

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Gold Butte Lookout - 1938



View from Battle Ax Lookout with Gold Butte in distance (center) - 1933

#### INTRODUCTION

#### A. The Document

The purpose of this watershed analysis is to provide a general understanding of ecological conditions and processes within the Breitenbush drainage. This information will serve as a basis for future project level analysis and decision-making for a wide range of potential management activities there. The analysis helps to ensure that those activities are consistent with ecosystem management objectives as described in the Willamette and Mt. Hood National Forest Land and Resource Management Plans (Forest Plan) as amended by the Record of Decision for Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl.

This document is in a question and answer format. Each subject area is like a mini-story giving an overview; an identification of values and the issues that result from differences in values; a discussion of current and reference conditions as they relate to the issues; a comparison of the differences between current and reference condition and the causes for the change; a discussion of the issues in relation to other factors in the ecosystem; and finally recommendations for dealing with the issues.

The <u>Federal Guide for Ecosystem Analysis at the Watershed Scale</u> (version 2.2) provided guidance for the watershed analysis process. This document summarizes more detailed information that can be found in the appendices. Decisions have not been made about implementing recommendations contained in this document. The recommendations must be further analyzed in the NEPA process.

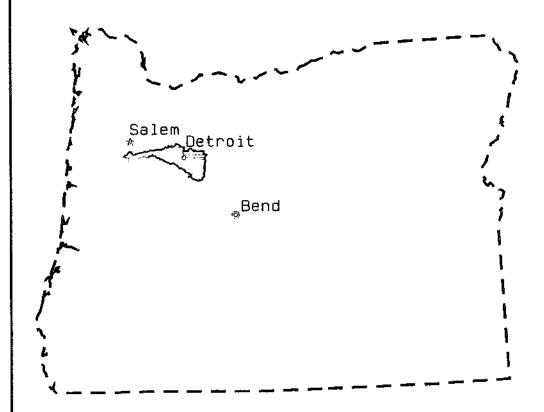
#### B. Location

The Breitenbush watershed lies in the North Santiam river basin on the western slope of the Cascade mountain range, near Mt. Jefferson. It is the northeastern-most watershed on the Detroit Ranger District of the Willamette National Forest and includes a small area of the Mt. Hood National Forest. The entire 69,400+ acre watershed is located in Marion County, Oregon.

Breitenbush river flows in a westerly direction and empties into Detroit Lake, on the North Santiam River near the town of Detroit, Oregon. The dam that contains this lake was constructed in the 1950's to control flooding and produce hydroelectric power. From here, the North Santiam River flows into the Santiam, the Willamette and Columbia rivers before emptying into the Pacific Ocean.

## **Vicinity Map**

Breitenbush Watershed Analysis Detroit Ranger District



#### Legend

Breitenbush Watershed

North Santiam Subbasin

Scale 1500000 05/23/96

Request RHO4



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#### C. Distinguishing Features of the Watershed

#### **Physical**

- Watershed is a combination of High Cascades and Western Cascades physiographic provinces
- Resistant volcanic outcrops result in distinctive geologic features such as Eagle Rock
- Geothermal hot springs are found in watershed
- Portions of the watershed are among the lowest precipitation on the Detroit district
- Highest lightning ignitions/strikes, as well as highest human-caused ignitions, on the Detroit district
- Large number of lakes in the eastern portion of the watershed
- Large concentration and variety of special habitats (meadows, talus, etc.) in the vicinity of Jefferson Park

#### Biological

- Northern end of the range of sugar pine
- The only verified nesting pair of Peregrine falcons on the Detroit district
- Brewer's reedgrass- a sensitive plant has only been found in Oregon at Jefferson Park (Mt. Jefferson Wilderness) and Mt. Hood
- Abundance of Scotch broom (an introduced non-native plant species) especially along the power line corridor
- Breitenbush River currently provides spawning habitat for kokanee and was historically anadromous fish habitat

#### Social

- One of the oldest recreation centers on the Detroit District
- Geothermal hot springs are popular recreation attractions
- A power line corridor extends the length of the watershed
- Road 46 is a National Scenic Byway
- Breitenbush Gorge National Recreation Trail, Pacific Crest National ScenicTrail,
   Proposed Urban Link Trail
- Breitenbush Community
- Summer Home Tracts
- Contains a portion of Olallie Lake Scenic Area which includes several developed recreation facilities
- High concentration of recreation use along the Breitenbush river corridor in both dispersed areas and developed facilities
- A portion of Warm Springs Indian Reservation is within the watershed. Native Americans traditionally fished and gathered huckleberries, etc. within the watershed.
- Domestic water supply
- Gold Butte Lookout and Breitenbush Guard Station which are eligible for inclusion on the National Register of Historic Places

## D. Land allocations and management direction

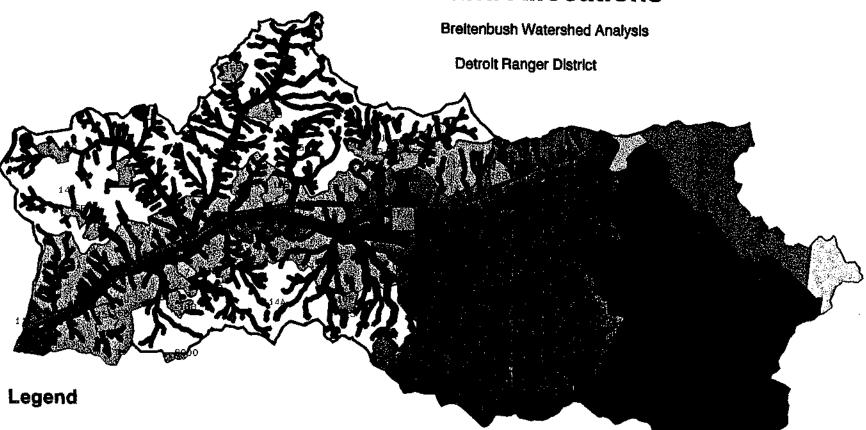
#### 1) Land Allocations (see map on next page)

Land allocations and management direction for the allocations were established by forest plans for both the Willamette and Mt. Hood National Forests. The following is a summary of the allocations within the Breitenbush watershed:

Land Allocation	2 Acres	Percent of Watershed*
Late Successional Reserves	15,719.53	23
Mt. Jefferson Wilderness	14,747.00	21
Matrix	14,205.08	20
Scenic	10,448.69	15
Currently mapped Riparian Reserves (not all streams have been field verified and mapped)	20,333	29
Olallie Lake Scenic Area	3,180.91	5
Special Use Area	661.42	1
Special Interest Area (Hill Creek)	186.23	0.3
Dispersed Recreation	130.04	0.2
Developed Recreation	75.75	0.1
Special Wildlife Habitat	73.49	0.1
Old Growth Groves (Outerson, Cliffs Creek and South Breitenbush)	69.89	0.1
Water	45.46	<0.1
Administrative Site	20.17	<0.1
Developed Recreation (special)	111.7	0.2
Bull of the Woods Wilderness	1.69	<0.1

Some land allocations overlap, so total will not be 100%.



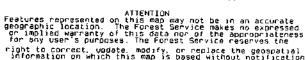


- Wilderness
- Ollalie Lake Scenic Area
- Mt Hood N.F.
- Warm Springs Reservation
- Dispersed Rec. Lakeside No Harv
- Scenic Modification Middleground
- Scenic Parital Retention Middleground 2010 Old Growth Grove
- Scenic Parital Relention Foregound Scenic Retention Foreground
- Developed Recreation
- Special Use

- Long Term Special Use
- Administrative Site
- Riparian Reserve
- Lsr 100 acre
- Special Interest Area
- Private
- Special Wildlife Habitat
- Water
- Matrix

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#### 2) Other Management Considerations

Portions of the Breitenbush river and South Fork of the Breitenbush river are eligible for the following classifications under the Wild and Scenic River Act and are managed as such until final determinations are made:

Recreation 10 miles
Scenic 6 miles
Wild 5 miles

A portion of Mt. Jefferson North Roadless Area that was studied under RARE II, falls within the watershed.

#### 3) Management Plans within the watershed

The management of this watershed is directed by the <u>Willamette National Forest Land and Resource Management Plan</u> (1990) and <u>Mt. Hood National Forest Land and Resource Management Plan</u> (1990) both of which were amended by the <u>Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related species Within the Range of the Northern Spotted Owl</u> (1994).

The land and resource management plan requires site specific direction for management of certain areas. The following existing and proposed plans apply to the Breitenbush:

- Bald Eagle Management Plan
- Peregrine Falcon Management Plan\*
- Power line Corridor Management Plan (outdated)
- Wild and Scenic River Management Plan\* (if rivers are determined eligible)
- Scenic Byway Management Plan\*
- Wilderness Prescribed Natural Fire Plan
- Federal Wildland Fire Management Policy and Program
- Late Successional Reserve Assessment\*
- Access and Travel Management Guide\*
- Winter Sports Management Plan
- Detroit Lake Composite Area Management Guide
- Geothermal Environmental Impact Statement

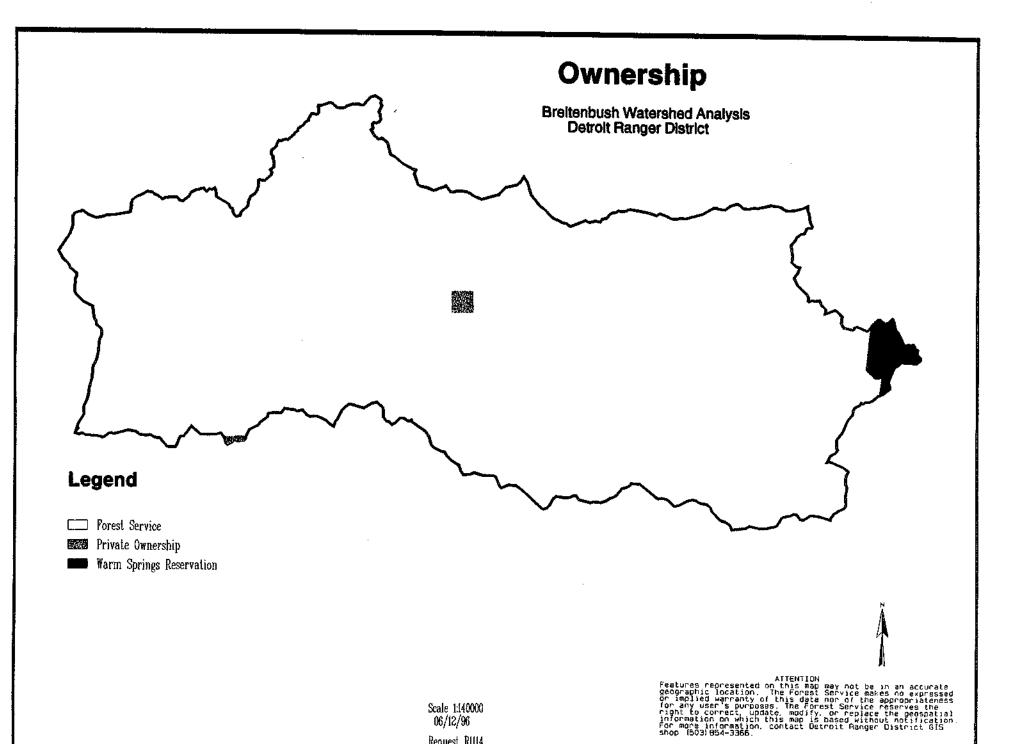
<sup>\* =</sup> Proposed Management Plan

#### E. Ownership (see map next page)

- 98.7 % National Forest system land
- 0.3 % Private land
- 1.0 % Warm Springs Indian Reservation

### F. What makes the watershed important to people?

- Economics timber harvest and other commodity production, tourism, etc.
- Breitenbush Community population center, tourism
- A domestic water source
- Recreation use (Campgrounds, Summer Homes, Wilderness, Olallie Lake Scenic Area, fishing, hunting, firewood gathering, sightseeing, etc.)
- Geothermal hot springs
- Electric power lines



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#### PHYSICAL DOMAIN

#### A. Geology

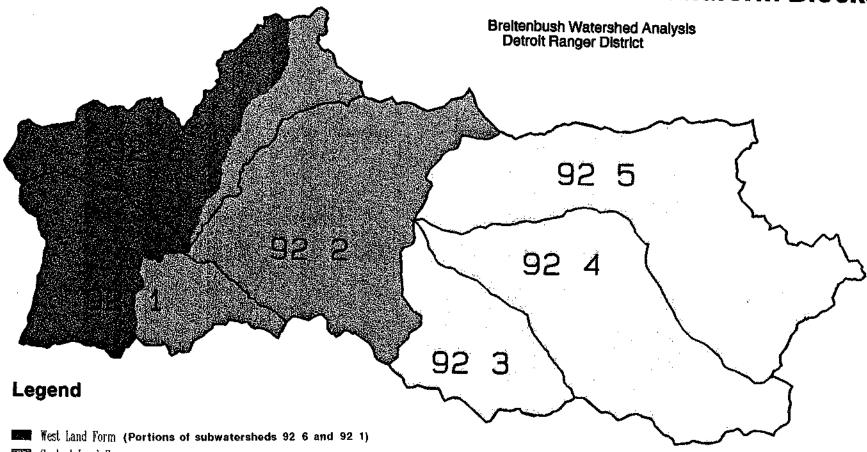
#### 1. Characterization

The Breitenbush drainage is generally oriented east to west. It includes both High Cascades and Western Cascades physiographic provinces with a fairly distinctive transition zone in between. The area has been stratified into three relatively distinct landform blocks (Eastern, Central and Western) that have common geology and geomorphology as described below (see map).

#### a) Landform Blocks

- block are typically U-shaped, glaciated valleys with relatively flat bottoms and steep, rocky walls, that abruptly transition to rolling uplands at the higher elevations. The uplands commonly contain broad expanses of uniform, gently sloping topography with numerous lakes. The steep side walls commonly display over 2000 feet of relief, and are extensively dissected, show numerous rock outcrops and cliffs, and often maintain heavily forested side slopes. The gently sloping terrace deposits of the valley bottom are comprised almost entirely of glacial outwash materials. The upland deposits, predominately within the Wilderness, are outwash and ground moraine, with an occasional covering of recent volcanic ash deposits from volcanic venting farther to the east and south.
- ii) Central Landform Block (transition area) - Western Cascades: Far and away, the most impressive and imposing structure in this subwatershed is the formidable and protruding rock face at Eagle Rock. Dominating the lower Breitenbush canyon, Eagle Rock remains as an erosional remnant of some long extinct volcanic eruption and lava flow. Second in grandeur, but first in height, is the less awe inspiring form of Short, Mansfield and Collawash Mountains that form the northern skyline of this landform block. These forested peaks look down upon a geomorphically diverse and highly complex landscape that ranges from extensively glaciated upland benches and headwalls at the higher elevations, to large-scale stabilized slump/earthflow complexes, to localized areas of actively unstable landflows, to steep, shallow soiled, highly dissected headlands with rock scarps and bluffs, and finally to extensive areas of lower elevation benches, flats and terraces that formed by fluvio-glacial action. Early to mid Pleistocene glaciation probably carved a broad band of moderate to gently sloping terrain into the underlying Western Cascade volcanic stratigraphy. Subsequent large scale slump / earth flows have relocated much material downslope, and left a jumble of dislocated topography. Later Pleistocene glaciation likely reoccupied this valley at a lower level and deposited extensive moraines in the areas of Hill Creek, Cleator Bend and lower Mansfield Creek.





Central Land Form (Subwatershed 92 2 and portions of subwatersheds 92 6 and 92 1)

East Land Form (Subwatersheds 92 3, 92 4, and 92 5)



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iii) Western Landform Block - Western Cascades: The most distinguishing features of this, the smallest of the landform blocks, are the stunning relief of over 3500 feet and the classic V-shaped, erosional valleys. In this light the rough and rocky headlands of Byars Peak plunge headlong down Byars and Canyon Creeks to ease at the terraces along the Breitenbush River. Stream downcutting of the older Western Cascade volcanic materials has been the principal active process for several million years.

#### b) Geothermal

Of some geologic interest, and certainly maintaining considerable social interest, the Breitenbush hot springs is located approximately at the boundary of the Western and High Cascades. It seems likely that geothermal activity which created the hot springs is related to the relatively recent volcanic peaks that form the spine of the Cascade Crest. The locations and characteristics of the Austin, Bagby and Breitenbush Hot Springs within the upper Clackamas and North Santiam River subbasins fall within the north-south trending hot spring zone along the western slope of the Cascade range. These springs contain chiefly sodium chloride waters or largely meteoric origin and are typically of hotwater dominated thermal systems. Structurally, they are likely related to north to northwest trending fault zones (Hammond et. al, 1980)

#### 2. What do humans value that is associated with geology?

- a) Natural geologic processes and their influences on the ecosystem are valued (i.e. the natural influence of erosion on species diversity).
- b) Geologic resources have utilitarian and economic value (i.e. rocks to surface roads and decorative rocks for landscaping).
- c) Landform has aesthetic, spiritual and functional value (i.e. vistas, vision quests, recreation settings, travelways for humans and animals, etc.)
- d) Geologic features such as geothermal hotsprings have both economic and recreational value (i.e. bathing and geothermal power).

## 3. What are the highest priority issues or resource concerns associated with geology?

- a) Whether current erosion processes that are dominant in the Breitenbush watershed are within the natural range of variability or whether they have been influenced to such an extent by human activities that they are now outside that range.
- b) A more specific subset of the above issue is whether management activities such as timber harvest and road construction were major contributors to the landslides that occurred in

the Breitenbush watershed during the 1996 flood event and whether the number and types of landslides were outside the range of natural conditions that might be expected in such a storm event.

- 4. What and where are the management direction/activities, human uses, or natural processes that affect the dominant erosion processes?
  - a) Current Conditions

\*What erosion processes are dominant within the watershed? \*What are the current conditions and trends of the dominant erosion processes prevalent in the watershed? \*Where have they occurred or are they likely to occur?

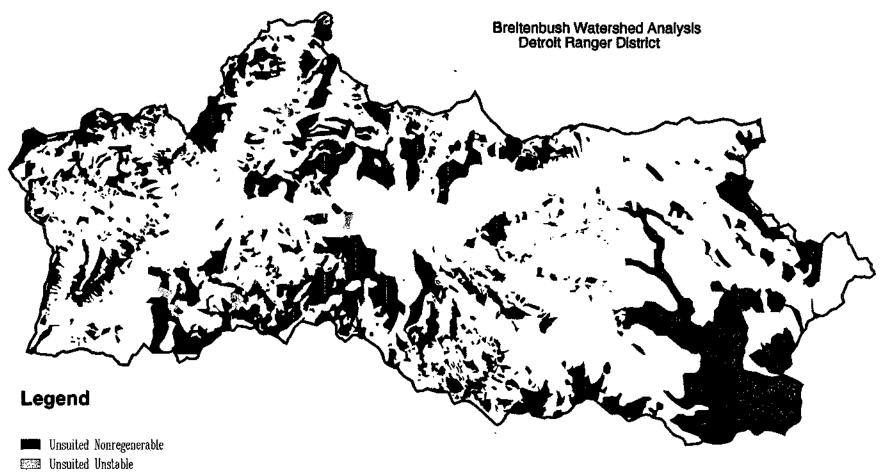
The dominant erosion processes within the Breitenbush watershed vary by landform block as described below:

i) Eastern Landform Block - High Cascades: Since deglaciation, the major forces affecting slope morphology have changed considerably. Ice is no longer the dominant player except at the highest elevations. The more traditional geologic forces of wind, rain, freeze/thaw, gravity, and erosion have come into play.

Sediment delivery systems now in operation are related to the more steady-state geologic processes. On the steep, shallow-soiled scarps, creep and slope ravel are most dominant. While on the relatively gently sloping and deep soils of the valley bottoms or the uplands, wind and stream erosion predominate, primarily during those brief periods after catastrophic fires when all vegetation and duff has been stripped away. This landform block has a complex and active fire history dating back several hundred years.

Instability: Very few actively unstable areas are located in this landform block. However, there are several areas of critical, highly dissected sideslopes with shallow soils and steep-sided draws, which probably support considerable natural, debrischute-type slope instability, especially after episodic events such as intense stand replacement fires and/or catastrophic floods. It seems likely that the fire/flood events of the last century precipitated a flurry of slope failures; however, little evidence remains to substantiate this. The significance of slope failures to sediment budgets in this landform block is difficult to define because of the time frames involved. For the most part, harvest units have been well located to avoid sensitive areas, and roads have generally been confined to the stable benches or ridges. Except for the abandoned road bed in Skunk Creek, road construction and unit harvest have not resulted in a significant number of additional failures to this point. The recent February 1996 storm appears to have resulted in only one road-related failure in upper Devil's Creek. Consequently, it appears that natural rates of slope instability are currently maintained.

## Soils



Potentially Highly Unstable

Stable Land Flows



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Displacement: Little or no evidence can be found to indicate that timber management and slash treatment activities have resulted in detrimental soil displacement or off site soil movement in the uplands. Roads have generally been constructed on stable benches and flats and few sidecast roads were noted. However, there is one example of extensive sidecast on Skunk Creek road (Forest Service road 2231 854). Taking that into account, displacement of soil from timber management and downslope creep from colluvial processes probably are of the same order of magnitude when considered in approximately the same time frames and viewed over the entire study area.

Extensive salvage and cleanout of instream and riparian timber occurred in the North Breitenbush during the 1970's. Millions of board feet of large logs were removed during that period. This large woody material functioned to reduce stream energy and maintain an intact riparian zone in these relatively unconsolidated outwash sediments. With the salvage and subsequent high stream flows, the Breitenbush began to downcut and widen its channel. In the last quarter century, it is estimated that over two million cubic yards of sediment has been eroded away and washed down the Breitenbush River into Detroit Reservoir (modeled by a rectangle that is four miles long, one hundred yards wide and three yards deep). To put this in perspective, this amounts to all the excavated material for almost 200 miles of average road construction or about 80% of the total road mileage in this watershed.

Nutrient loss: Most of these areas were burned, reburned or underburned in stand replacement intensity fires that started approximately two hundred years ago and created a mosaic of stand ages. At some point, these fires consumed much of the existing above ground organic matter, especially on the south aspects. On the other hand, some north aspects had less frequent and lower intensity fire regimes. Consequently a wide range exists in the amount of above ground decomposing organic matter. The older timber harvest plantations display a commensurate removal of above ground nutrient matter similar to intense natural fires. More recent timber harvest has generally been more benign and retained considerably more organic matter than was left by the stand replacement fires and/or underburns.

failures is the dominate sediment delivery method in this basin in the near term time frame. Most of the major tributaries of this landform block - Short Creek, Scorpion Creek, Slide Creek, and the eastern face of Humbug Creek - contain potentially highly unstable or actively unstable terrain. All these areas currently display features which indicate that considerable instability has occurred in the last 300 years or so, and more is to follow. These slide zones will continue to supply these tributaries with sediment for decades, and possibly centuries, to come. The Breitenbush was at one time the toe area and collector for the massive amounts of sediment generated by the large, landflows that once occurred around Hill and Leone Creeks as well as Short Lake. It is likely that much of the terrace deposits that surround Detroit Reservoir, found their origins in these landflows. Now, as the landflow activity has

abated, little direct sediment input from slope instability occurs directly into the Breitenbush River. To be sure, as the landslide sediment supplied to the tributaries, works its way through the system, this subwatershed becomes one of the principal sediment sources for the Breitenbush River, below this point.

Finally, creep and colluvial deposition from slope ravel and slough certainly play a considerable role in the more steady state, sediment delivery at least on the steep sideslopes. Intensive, often large scale, fire activity and the resulting vegetation removal undoubtedly accelerates these rates. At a much slower rate, stream erosion and deposition have shaped the lower portions of these drainages as major stream terraces have developed at various gradient control points along the main channel of the Breitenbush river.

Instability: Numerous areas of large scale, actively unstable or potentially highly unstable slump/earth flows exist in this landform block. This condition has persisted for at least 300 years or more, and may have been the product of regional tectonic activity. In addition, several zones of critical highly dissected sideslopes with shallow, often debris chute prone soils can also be recorded. These slide zones display considerable natural, translational, slope instability that appears to be related to the stand replacement fire and/ or flood events. High rates of sediment input to some streams are a very natural part of the system. "Natural failures," road sidecast failures and in-unit slope failures all supply necessary sediment and structure to stream channels. Of some importance is the observation that most failures provide streams with necessary structure, either in the form of large woody debris and/or boulders, and sediment for flood plain and terrace development. Stream morphology and function have adjusted to the high rates of sediment input because of the stabilizing influence of adequate structure, primarily large woody debris. It is the removal of this large woody material that may have more adverse effects to stream function than the inputs of sediment.

In conclusion, this section of the Breitenbush is currently a relatively sediment rich system with extensive, nearly continuous input from the numerous tributaries. The failure regimes would indicate that this sediment-rich condition is not likely to change for perhaps many decades or even centuries into the future. From a sediment budget standpoint, the numerous areas of active (or potentially highly active) slope instability are the principal agents affecting change in the channels. The affects from fires on ravel and slough, though extensive, are not as important in the sediment generation race. It is likely that the fires played a greater role in relatively recent stream morphology by creating or consuming considerable woody debris or by changing evapotranspiration rates, than by any direct affects to soil fertility or creep. Finally, in this landform block, human caused sediment to this date are approximately subequal with the colluvial processes. Certainly some roads have been sidecast into streams, and some road sidecast has failed, and some in unit failures may have resulted from timber harvest. However, these events are commensurate with natural sediment input from land flows, fires and floods. A more

likely effect of timber management has been the removal of large woody debris from timber harvest and salvage in riparian areas. In future, harvest activities should be located and scheduled so as to provide a continuous high level of large woody debris to the deficient stream channels.

Displacement: The lower elevation, valley bottom zones along the main stem Breitenbush and Humbug Creek were railroad logged in the 1930's. It would seem likely these early entries when few if any standards were in place, produced considerable displacement and erosion of the soil resource. Evidence of this is scant as this area is now heavily covered with advanced regeneration. Timber management activities in the second half of the Twentieth Century have for the most part occurred with the appropriate suspension requirements. Slash treatments have usually maintained some duff retention. Uncontrolled tractor logging and tractor piling occurred on only a few sites, and this practice ceased over a decade ago. Little or no evidence can now be found to indicate that this second generation of timber management activities has resulted in significant detrimental soil displacement or off site soil movement. Finally, most roads have generally been constructed to access stable benches and flats. Some road locations are on steep sideslopes, and some sidecast roads were observed primarily in the area between Hoover Ridge and Eagle Rock. Fortunately, most seriously steep sideslopes have been avoided. Some of the old roads to access parts of the Eagle Rock fire (1967) are a notable exception. Although difficult to equate, displacement of soil from timber management and downslope creep and colluvial processes and slope instability probably are of the same order of magnitude when considered in approximately the same time frames and viewed over the entire study area.

depend entirely on the slope position that is occupied. On the steep shallow - soiled scarps, slope ravel and slough predominate when vegetation cover has been reduced. The more mundane creep commands the day to day reign in the forested environment. Few areas of active slope instability are present. It seems likely that, given the steep dissected nature of the valley walls, debris chutes would occupy a prominent role in the down slope movement of soil and debris. Since little evidence was found to indicate that this is major source of sediment generation in this century, it would seem that this mechanism is highly episodic in nature. This landform block was likely extensively underburned about one hundred to two hundred years ago. These fires were followed by 100 year storm events in 1861 and 1964. The high number of steep bed rock draws would seem to indicate that debris chutes are a likely failure mechanism although few failures were noted in the recent 1996 flood event.

Instability: In stark contrast to the Central landform block, this section, although much steeper and more dissected, is also inherently much more stable. Several areas appear to have the potential for considerable natural debris chute type, slope instability, especially in the high elevation upland meadows and rock cliffs. And, it

seems likely that sustained stretches of substantial slope stability were punctuated by relatively brief periods of intense debris chute activity, usually related to contemporaneous large scale stand replacement conflagrations and/or intensive storm events. Probably the numerous cycles of fires and storms over the millennia have left little material to fail. Harvest units have generally avoided the most sensitive areas, and few in unit slope failures were noted (even in this most recent storm event). However, as was discussed previously, road sidecast failures are likely a principal sediment producer along some stream segments. It is difficult to determine if natural rates of slope instability currently apply, but over the long term it would seem that have been maintained. Certainly, the amount of large woody debris naturally associated with them has not been.

Displacement: Yarding activities in this area have for the most part occurred with the appropriate suspension requirements. Slash treatments have usually maintained adequate duff retention standards. Little or no evidence can be found to indicate that these two timber management activities have resulted in detrimental soil displacement or off site soil movement. Finally, road development is relatively limited and most roads have generally been constructed on stable benches and ridges. For the most part, little sidecast construction was noted, with some roads in Byars and Deadhorse Creeks the notable exceptions. Fortunately, most seriously steep sideslopes have been avoided. Although difficult to equate, displacement of soil from timber management and downslope creep from colluvial processes probably are of the same order of magnitude when considered in approximately the same time frames and viewed over the entire study area.

#### b) Reference Conditions

What are the historical erosion processes within the watershed (e.g. surface erosion processes, mass wasting)? Where have they occurred?

formations that comprise the High Cascade parent materials has been the principal active process in this area for at least a million years or so. This process was accelerated with the various Pleistocene glaciations, but that record is obscured by the more recent upland ground moraine and lowland terrace deposits. It is likely that glacial ice occupied at least the upper valley segments of much of these drainages in the more recent late Pleistocene glaciation. It seems equally likely that the some of the U-shaped valley construction occurred at some point prior to the last glaciation in this area.

- ii) Central Landform Block: Taking a long view of several millions of years, stream downcutting and erosion have been the principal actors to shape the steep sideslopes in earth's evolutionary drama. In the nearer term of several hundreds of thousands of years, Pleistocene glaciation took the main stage as the headline erosion protagonist. As primary evidence, the similar glacial deposits that occur both on the north and south sides of the main stem Breitenbush. Once these surfaces were joined to form the broad base for an extensive valley glacier. This glacier, in its heyday, probably extended well to the west of this particular analysis area, and may have completed its journey near Detroit Dam, much farther down valley. It also seems likely that in the nearer term, late Pleistocene glacial ice actually extended out into this landform block from the valleys of the Eastern Block during the last and most recent Ice Age. Late Pleistocene glaciation may have also developed localized ice fields on the northern aspects of the tallest peaks and ridges, such as at Gale Hill. Finally, in the near term of centuries to millennia, slope instability from landslides, landflows and debris chutes has most acted upon the sideslopes and streams of this subwatershed to create the landscape we now see. Most of this massive slope instability, which resulted in part from the glaciation and part from the downcutting of the Breitenbush River into the weaker Western Cascades volcanic material, has now stabilized (over 25% of the area). However, some localized movement still remains, and active slope instability can be found in Slide Creek (aptly named), Cliffs Creek, and Scorpion Creek as well as others. In fact, the most potentially highly unstable and/or actively unstable terrain in the entire watershed exists within this landform block.
- western Landform Block: Stream downcutting of the volcanic formations that comprise the older Western Cascade parent materials has been the principal active process in this area for several million years. This alluvial erosion process was extensively accelerated with the various Pleistocene glaciations. Ice movement scoured out large quantities of sand and gravel. This sediment, when transported downstream by glacial meltwater, acted like a rasp, to wear down and grind away the underlying volcanic stata. Also, early Pleistocene glaciers likely moved down valley through this landform block. Consequently, glacial ice played a major role in carving and creating the current valley topography. In the most recent Pleistocene glaciations, smaller ice fields occupied only the higher elevation valleys and north aspects, such as in the headwaters of Byars and Humbug Creeks.

#### c) Comparison of Current and Reference Conditions

i) What are the natural and human causes of changes between historical and current erosion processes in the watershed?

Displacement: Little or no evidence can be found to indicate that timber harvest and slash treatment activities have resulted in detrimental soil displacement or off site soil movement of any significant degree for most harvested units in the analysis area. Forest monitoring concluded, and this analysis has reinforced, that off-site sediment

movement from harvest units where appropriate suspension and duff retention standards have been implemented, has been very low, especially in relation to nature disturbance events such as wildfire.

Of approximately 240 miles of road in the watershed, many miles have been constructed on stable benches and flats, but sidecast road segments are also present. Road construction standards have varied over time as well. With that to consider, within the Central Landform Block, displacement of soil and rock from road construction is not significant when compared to the mass of material displaced by active and semiactive slope instability (landflows and debris chutes) when considered in approximately the same time frames and viewed over the entire study area. When looking at the Western Landform Block, because natural slope instability has been relatively minor, road construction and road sidecast failures appear to be the dominant sediment relocation process for the decades from the late 1950's to the 1980's. This level of industriousness has slowed considerably as this century comes to a close, but many sites still continue to provide sediment to individual stream reaches at rates considerably above more natural mechanisms. In the Eastern Landform Block, roads have generally been well located to avoid most steep sideslopes. With the notable exception of the upper Skunk Creek system, roads in this landform block have not contributed significantly to sediment budgets. This is especially true when one considers the amount of erosion that has occurred along the flood plain of the North Breitenbush in the last two decades.

One conclusion that can be drawn for this watershed, is that sediment from timber management activity is not a significant issue in this basin, with a few notable exceptions, generally associated with sidecast road construction. Some problem sites are present, and require restoration. However, stream channels and riparian areas do not display those features which might indicate problems with excessive off site sediment generation.

The critical factors in this basin are the presence or absence of large structure and the timing of sediment input (see hydrology section), not the amount. The removal of large woody debris and essential stream structure through harvest and stream cleanout appears to have more affected stream channel morphology than sediment inputs from other management activities.

Compaction: Existing compaction, which resulted from unrestricted tractor yarding and tractor piling, is not considered cumulatively significant within the basin, partially because much of the basin is too steep for tractor usage. Some of the flatter areas were likely tractor yarded and piled with minimal control on skid road density. Detrimental compaction, exceeding the 20% Regional Standard level, is probable in some of these units. It is likely that this compaction is starting to ameliorate as root growth and frost action begin to operate to reduce soil density.

Nutrient Loss: Nutrient loss from harvest and slash treatment is not considered

significant in this watershed when compared to historic conditions. Parts of the Breitenbush were burned, reburned, or underburned in large scale, stand replacement type fires than began approximately five hundred years ago. In many areas, these fires consumed most of the above ground organic matter, and extensive acreage now exists that displays very little down woody debris after almost one to two centuries of time. On the other hand, numerous sites, especially on the north aspects and in the deeper draws and sheltered benches avoided the conflagrations, and show little if any effects from the fires that raged around them. Snags and extensive down woody debris can commonly be observed. Consequently, a wide range in the above ground tonnage of decomposing organic matter exists across the subwatersheds. Timber harvest over time has tended to mimic this wide diversity of tonnages. The oldest timber harvest plantations with low utilization standards, resulted in extensive amount of large woody debris and slash retained on the ground. The harvest units of the 1970's and early 1980's, with high utilization standards and fall slash burns, display a commensurate removal of above ground nutrient matter similar to that of severe natural fires. The most recent timber harvest with down woody debris and duff retention standards has generally been more benign and retained about as much organic matter as is displayed in the less intensive fire regimes.

Instability: When the entire basin is taken into account, it appears that natural rates of slope instability are currently maintained. The slope failure record for the Breitenbush is a complex one, and the previous conclusion does require clarification. The Central Landform Block displays features that indicate considerable instability has occurred there in the last 300 years or so to present, and more is to follow (in most areas). Several areas of actively unstable slump/earthflows, massive landslides, and debris chute prone soils can be found in this landform block. Many events are related to the stand replacement fires and/or extensive flooding. Some slope movement may be correlated to regional tectonic activity. Whatever the cause, the cumulative effect of this slope instability is to produce a naturally sediment rich system for the hydrologic regime. Field inventories indicate that road sidecast failures are not significant when compared to the rates of sediment input to streams from the natural system. In unit slope failures replicate conditions similar to natural fire related instability. Consequently, harvest activities are but a distant second in this sediment generation race. It is worth repeating that the removal of large woody debris and essential stream structure through harvest and stream cleanout appears to have more affected stream channel morphology than sediment inputs from management activities.

It would be nice if this was the complete story, but it is not. For the Western and Eastern landform blocks, numerous localized areas of steep dissected sideslopes with potentially unstable draws can be found. Slope instability in these areas may be related to the stand replacement fire and/or flood (or other catastrophic) events over the last 300 to 600 years. Slope instability that is closely linked with longer term episodic catastrophic events will eventually develop somewhat predictable failure rates that are related by frequency, intensity and magnitude of the disturbance.

Unfortunately in the short term, road sidecast, road related drainage, and washout failures have been principal mechanisms for the downslope movement of soil in the last several decades, especially within specific subdrainages in the Eastern and Western landform blocks, as previously discussed. In the near term, forest management related events have outpaced their natural counterparts by a considerable degree, at least in Skunk Creek and Byars Creek (respectively). Consequently, it is difficult to determine if "natural rates" of instability are currently maintained on the landform blocks as a whole, as one has to defind the yardstick for measurement. Whatever the case, increase sediment from these failures is not the principal factor affecting stream integrity at this time. Many affected reaches show limited sediment storage, and appear "sediment deficient." What has changed is the stream's sediment storage capability, often provided by the stabilizing influence of large woody debris.

In conclusion, there seems little doubt that sidecast road construction, poor road maintenance practices, and harvest of highly failure prone soils can increase the incidence of slope failures. On the other hand, natural failures provide sediment to streams, often far in excess of human caused events, and maintain relatively high population levels of aquatic organisms. The concern then is not so much with the amount of sediment as with when and how it reacts in the system. Perhaps the major controlling factor is available stream structure, primarily in the form of large woody debris and boulders. The removal of large organic material in critical locations through harvest, road construction, or stream cleanout can increase the severity of failure impacts by: (1) overloading natural systems with sediment to the point existing features fail, or (2) allowing sediment to be rapidly flushed through the system and thereby robbing the stream of necessary bank building material. The major difference between apparent "natural failures" and road and unit related events is not their point of origin. Either can be detrimental or beneficial. The key factor in evaluating the effects is the amount of large woody debris present down slope of an active failure. Remember, for many subwatersheds in this analysis area, failures provide the stream systems with almost all of the components necessary for proper funtion. However, just because slides can be beneficial to streams, does not mean that we should just let them slip slide away.

## IIB. Hydrology



Devil's Creek - Februrary 1996

#### PHYSICAL DOMAIN

#### B. Hydrology

#### 1. Characterization

a) \*What are the dominant hydrologic characteristics (e.g. total peakflows, discharge, minimum flows)? \*Other notable hydrologic features and processes in the watershed (e.g. cold water seeps, ground water recharge areas).

The Breitenbush's hydrology is similar to other documented watersheds within the Western Cascades. Peak flows occur during rain-on-snow events in the transient snow zone which is estimated to occur between 2,400 and 4,800 feet elevation (Christner and Harr, 1982). Approximately 75 percent of the watershed is within this transient snow zone. For the remainder of the watershed, nine percent is below 2400 foot elevation and 16 percent is higher than 4,800 feet elevation.

Water storage in this watershed is provided by deeper upland soils, terraces, flood plains and numerous headwater lakes. Glacial soils, terraces, and flood plains act like sponges, retaining water and releasing it slowly during periods of low precipitation. Annual precipitation for the area averages 77 inches with intensities as much as 3.7 inches per 24 hours, which can be expected on the average once every two years (Slack; et al U.S.G.S. 93-4076). Intense precipitation is episodic in nature, and it often generates peakflows which are a major disturbance mechanism for stream channels and associated riparian areas.

Average annual discharge for the watershed is 578 cubic feet per second. Between 1932 to 1987, discharge exceeded: 5,000 cubic feet per second 27 times; 7,000 cubic feet per second 15 times; 10,000 cubic feet per second two times; and 16,900 cubic feet per second once. During the same period, flow in the Breitenbush River was below 100 cubic feet per second 14 times and below 90 cubic feet per second seven times. The lowest recorded flow was 87 cubic feet per second. This wide range of variability in stream discharge reflects the maritime climate and the corresponding flow regime that changes dramatically with the seasons.

Geothermal areas provide a unique hydrology to a few locations in the valley bottoms along the Breitenbush River. Hot, highly mineralized water surfaces as seeps or springs in these areas.

- 2. What values are associated with hydrology?
  - a) Water storage and regulation systems; the amount and timing of water flow; and sediment budgets have ecological value.
- 3. What are the highest priority issues or resource concerns associated with hydrology?
  - a) The highest priority issue is flow of water, especially peak flows and low flows.
- 4. What are the management direction/activities, human uses, or natural processes that affect hydrology?
  - a) Current Conditions
    - i) \*What are the current conditions and trends of the dominant hydrologic characteristics prevalent in the watershed?

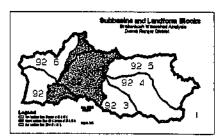
Eastern Landform Block: Sixth field subwatersheds in the landform block are Devil's Creek (subwatershed #923), South Fork Breitenbush River (subwatershed #924), and North Fork Breitenbush River (subwatershed #925). Due to the orientation of the landform block in relation to weather patterns, only



portions of the subwatersheds are susceptible to rain-on-snow events that result in peak flows. The orientation and elevation of the headwaters portion of the North and South Forks of the Breitenbush are such that they are not subject to rain-on-snow events.

This landform block has a high water table because of glacially-dominated headwaters, as evidenced by numerous lakes (23 named and over 100 unnamed lakes), ponds or potholes, and wetland areas (Source; USGS Map). This glacial material provides a water storage potential that allows many streams to have considerable flow into the latter part of the summer months. A large meadow/lake complex illustrates this groundwater storage, in the headwaters of the North Fork Breitenbush. Below these storage areas, steeper valley walls, contain more shallow soils and numerous forested wetlands.

Central Landform Block: This landform block contains the following sixth field subwatersheds: Middle Breitenbush (subwatershed # 92 2), a portion of Humbug Creek (subwatershed # 92 6) and part of the Lower

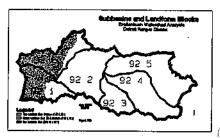


Breitenbush (subwatershed #92 1). These subwatersheds are very susceptible to rain-or snow events, so peak flows are a common occurrence in this landform block.

The landscape is dominated by stabilized earth flow complexes. Lakes and wetlands in this area are associated with unstable areas. There are two named lakes in this landform block, Short and Leone, both of which have their origins as sag ponds created from depressions related to slump block topography.

The water table (groundwater hydrology) here is complex because of the earthflow processes. Geologic benches from slump blocks, create local water storage areas and sag ponds. Adjacent streams respond to these storage areas by flowing for a longer duration in the drier portion of the year. Other water storage areas include terraces that occur upstream of earthflows where stream blockages result in upstream deposition and wider valley bottoms. These wider valleys often support forested wetlands associated with meandering stream channels.

Western Landform Block: This landform block contains most of the Lower Breitenbush (subwatershed #92 1) and Humbug Creek (subwatershed #92 6) sixth field subwatersheds. These subwatersheds are very susceptible to rain on snow events and subsequent peak flows. The dominant parent material for this



area is volcanic in origin, so soils are skeletal and shallow. Water storage in the soils is less than in the central and eastern landform blocks. Dunlap lake and nine potholes/ponds, all of glacial origin, are shown on the USGS map for this area.

The shallow soils, which saturate easily, combine with rain-on-snow events, to quickly produce peak flow conditions early in the wet portion of the year. Stream flows recede much earlier in the year in this landform block than most of the rest of the Breitenbush. Small water storage areas exist as forested wetlands, commonly associated with older debris torrent deposits.

Finally, a reminant glacial terrace exists in the northwestern portion of this landform block. This reminant has the character of the Eastern landform block headwaters area. The size of the area is small, so it has little effect on groundwater storage.

#### b) Reference Conditions

i) \*What are the historical hydrologic characteristics (e.g., total discharge, peak flows, minimum flows) and features (e.g., cold water seeps, ground water recharge areas) in the watershed?

Peak flows occurred much as they do now, during rain-on-snow events in the transient snow zone.

In the past, large scale fires burned vast areas of the watershed, stripping them of their vegetation. The removal of this vegetation, in combination with rain-on-snow events, resulted in increased volumes of water coming off the hillsides and entering stream systems. Because of the increased water volumes, streams occupied a greater portion of their floodplains during these events, resulting in high water tables and numerous wet areas in depressions. In addition, water storage was provided by lakes, potholes/ponds, sag ponds and depressions associated with earthflows, in the glacial headwaters of the watershed.

Specific data on stream discharge for the reference time period is not available. Presumably, the average flows were higher than they are now, since peak flows were higher because of fires and rain-on-snow events, and low flows were likely higher because of increased water storage capacity.

#### c) Comparison of Current and Reference Conditions

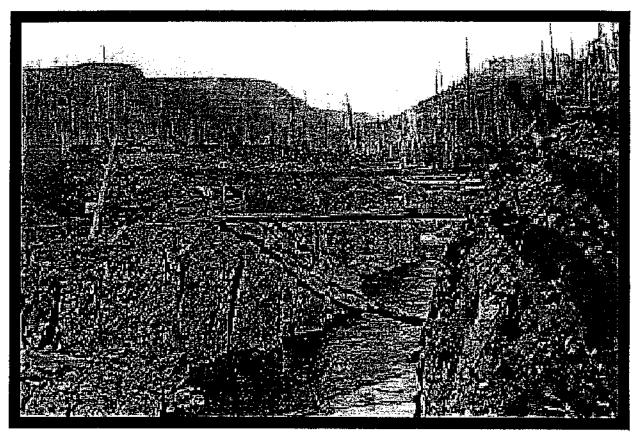
i) \*What are the natural and human causes of change between historical and current hydrologic conditions?

It appears that peak flows have decreased over historic conditions, probably as a result of fire suppression allowing vegetation to persist on the landscape. Vegetation changes the rate at which water reaches stream channels and the amount of water available during minimal flow periods. Timber harvest has countered the effects of fire suppression to some extent by removing vegetation, but not to the same degree that fire once did.

Second, flood plain water storage areas have been reduced within the broad valley areas. Historically large wood allowed these area to be connected to their flood plains. Management resulted in active removal of wood following the 1964 storm event allowing streams to erode their floodplains. This affected both water storage capacity and the number of wetlands, thus drying the floodplains.

Finally, because of higher peak flows and more water storage areas, minimum flows may have been higher in the past than they are now, but no data is available to prove this.

## **IIC. Stream Channels**



Lower Breitenbush - Date unknown, probably post 1919 fire.

#### IL PHYSICAL DOMAIN

#### C. Stream Channels

#### 1. Characterization

a) \*What are the basic morphological characteristics of stream valleys or segments and the general sediment transport and depositional processes in the watershed (e.g., stratification using accepted classification systems)?

The Breitenbush Watershed is a good example of the geologic diversity found in the Western Cascades. This diversity is exemplified by various types of stream channels found in the watershed as described below.

Eastern Landform Block: Deeply incised parallel streams are found within the glacial soils of the eastern landform block, as evidenced by first to third order stream channels. This pattern of parallel streams is the result of high gradient channels draining glacially formed slopes that have been



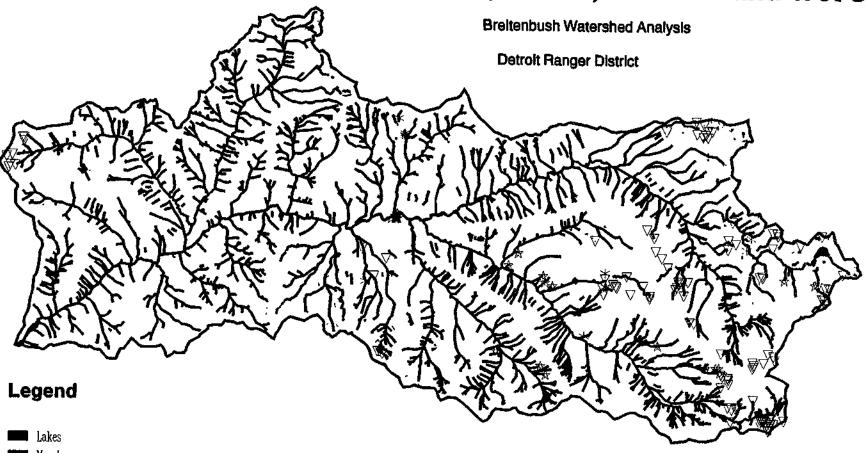
altered by erosion. The high gradient stream channels are associated with valley walls greater than 65 percent slope and contain channel bottom materials which are dominated by bedrock and boulders. These high energy stream channels exhibit very little sinuosity.

Further down the landform block, a dendritic drainage pattern emerges in the 4th and 5th order streams. Rosgen channel types for this landform block range from Aa+ (steep gradients, narrow channels with little sinuosity) to C (fairly flat gradients with wider, sinuous channels).

Headwater channels have moderate sediment storage capacity in pools and backwater areas because of channel structure such as logs and boulders. Sediment storage capacity decreases as streams transition into the valley wall regions where high energy streams transport sediment through to the 4th and 5th order channels below. In the broader 4th and 5th order valley bottoms, stream energy dissipates and boulder to cobble size material is deposited. Smaller particle size material is stored behind large woody material in these reaches, but these sediments are easily mobilized when flows increase.

The western portion of this landform block and the North Fork of the Breitenbush River exhibit the broad valley bottoms and depositional characteristics of a low gradient, glaciated stream. Here wide flood plains and large woody material retained within the system, create a wide, shallow channel during low flows. The South Fork of the Breitenbush doesn't exhibit these characteristic broad valley bottoms and depositional

## Streams, Lakes, Ponds, Marshes and Wet Soils



Marshes

Wet Soils

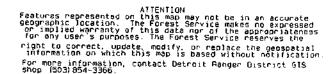
 $\nabla$  Ponds

★ Springs

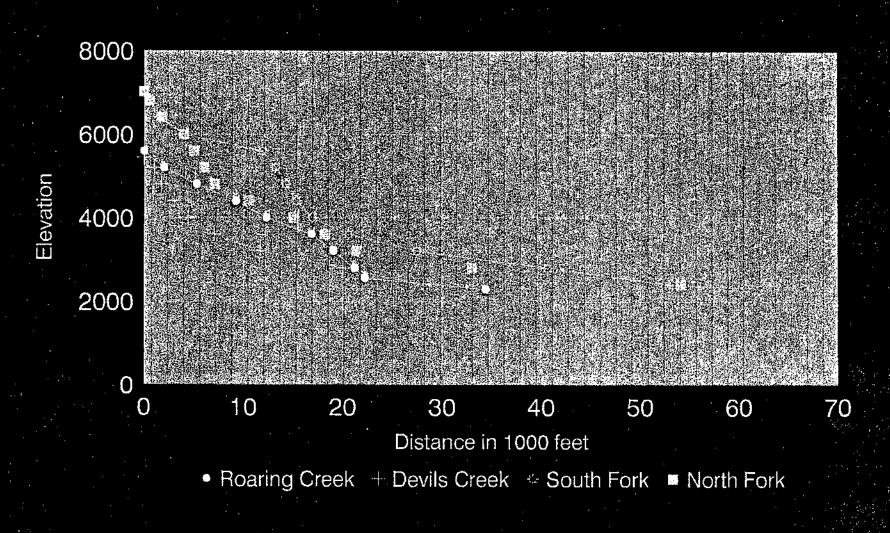
\* Marshes

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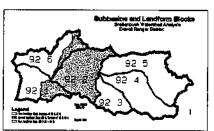
## Breitenbush Watershed Analysis Longitudinal Profile



areas because of a valley constriction before its confluence with the North Fork of the Breitenbush.

As described in the Geology section, debris torrents have at times played an important role in the development of the first and second order stream channels in this landform block. Failed material from debris torrents builds terraces in 3rd and 4th order stream channels which are shaped and reshaped by peak flow events.

Central Landform Block: Channel morphology within this landform block is a combination of dynamic slope forming processes and climate. Glaciated upland benches have eroded to form moderate gradient stream channels and slump/earthflow complexes have shaped and shifted



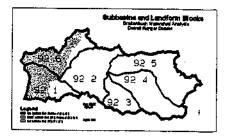
channel locations. Stream channels are incised into unconsolidated material along the margins of the slump topography, glacial material in the headwaters, and old volcanics in the lower valley reaches. Overall, a dendritic drainage pattern is found on this landform block.

High energy first and second order streams have little sediment storage capacity and tend to have bedrock-boulder channel bottoms. A long history of fires denuded the landscape of much of its vegetation, leaving streams without an adequate supply of large woody material to provide structure and store sediments. The fire-denuded areas resulted in increased peak flows and a landscape more susceptible to debris torrents. This fire-peak flow- debris torrent scenario greatly influenced channel development in this area, in part by its lack of large wood to hold sediments. These channels tend to act like pipes and pump sediments through to higher order stream channels.

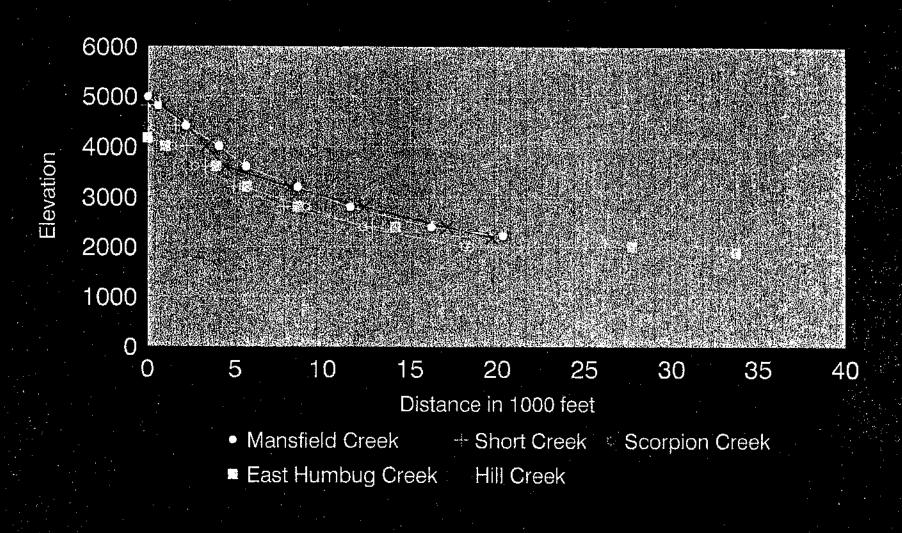
Third and 4th order streams in this landform block are more typical of those of other western Cascades watersheds. Here stream channels transport sediment down narrow valley bottoms that are interrupted or confined by earthflows. Some of the sediment collects behind the large woody material in the channel. At the toes of the earthflows, channel roughness and gradient increase forming a stepped channel as illustrated by longitudinal profiles in figure II-3.

Rosgen channel types for this landform block are Aa+ (steep gradients, narrow channels with little sinuosity) to B (moderate gradients, channel widths and sinuosity), while portions of the mainstem of the Breitenbush are type C (fairly flat gradients with wider, sinuous channels).

Western Landform Block: Channel morphology in this landform block reflects old volcanic geology. The parallel drainage network, over convex slopes, creates high gradient, high energy streams. These streams are typical Aa+( steep gradients, narrow



# Breitenbush Watershed Analysis Longitudinal Profile



channels with little sinuosity) and A channels in Rosgen channel typing methodology.

Type B channels are present in higher order channels such as Humbug and Byars Creeks. These channels historically contained a high percentage of exposed bedrock and large boulders. In addition, debris torrent activity kept Byars Creek loaded with structure. Most of the fine sediments were, and still are, transported out of the system. Small discontinuous terraces are present in channel backwater areas, and confluences as illustrated by longitudinal profiles in figure II-4.

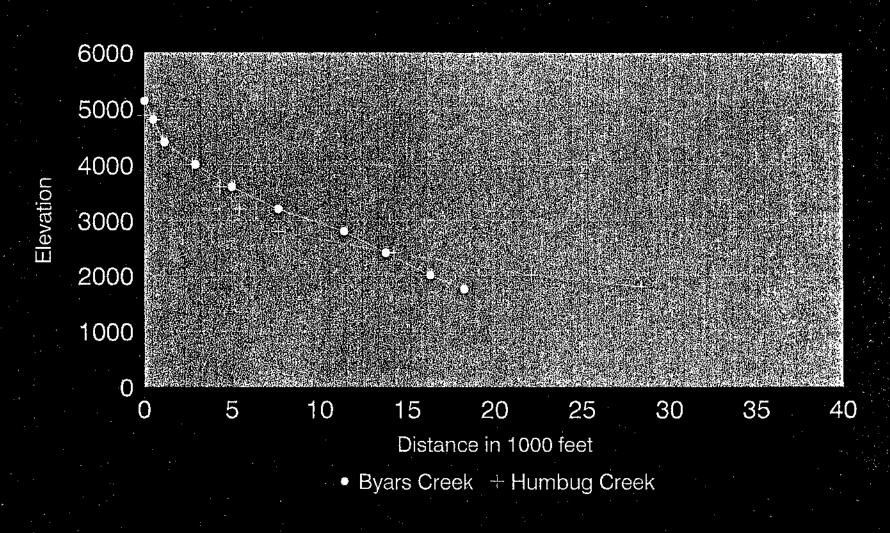
In this landform block, the mainstem of the Breitenbush is confined between steep valley walls resulting in a high energy, stream reach where sediment is transported through and into Detroit Reservoir. Here, in this Rosgen type B channel, bedrock substrate is predominate.

- 2. What values are associated with stream channels?
  - a) Stream channels and their associated floodplains are a valuable part of the ecosystem.
- 3. What are the highest priority issues or resource concerns associated with stream channels?
  - a) Channelbank stability is the highest priority issue.
- 4. What are the management direction/activities, human uses, or natural processes that affect hydrology?
  - a) Current Conditions
    - i) \*What are the current conditions and trends of stream channel types and sediment and depositional processes prevalent in the watershed?

First to third order streams, or about 92 percent of stream channels in the Breitenbush, are Rosgen type Aa+ channels (steep, narrow channels with little sinuosity). Most 4th and 5th order stream channels are Rosgen type B channels (moderate gradients, channel width and sinuosity), while a few are A channels (somewhat less steep, narrow and straight than Aa+ channels) and C channels (lower gradient, wider channels and more sinuosity). Figure II-5 shows the breakdown of the Rosgen stream classification system.

The types of sediment and depositional processes prevalent in the watershed are closely associated with channel types. In the *eastern landform block*, glacial sediments are transported through the Rosgen type Aa+, A, and B channels. Rosgen type C channels, with their lower gradients, and wider, more sinuous channels,

# Breitenbush Watershed Analysis Longitudinal Profile



# Rosgen Channel Types

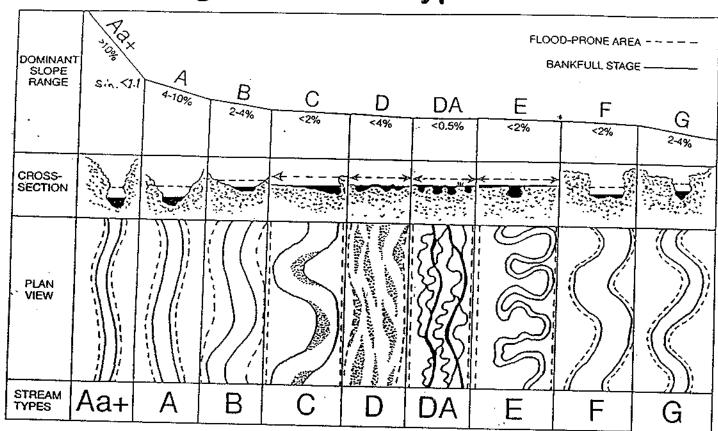


Figure — Stream types: gradient, cross-section, plan view (adapted from Rosgen 1994). Original drawings by Lee Silvey. Courtesy of Catena Verlag.

Dominant	¹ A							
Bed Material	<u> </u>	<u>B</u>	C	D	DA	L E	l ⋅F	T G
1 BEDROCK							Same	
2 BOULDER		8 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	127 - 1				81888	
3 0088LE		020,000,000	W. Asia	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		- Gero		0.000 000 0.000 000
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ENTRH.	<1.4	1.4-2.2	>2.2	N/A	>2.2	>2.2		
SIN.	<1.2	>1.2	>1.4	<1.1	1.1-1.6	·	<1,4	<1.4
W/D	<12	>12 .	>12	>40	<40	>1.5	>1,4	>1.2
SLOPE	.04099	.02039	<.02	<.04	<.005	<.02	<.02	.02039

Figure — Cross-section view of stream types (adapted from Rosgen 1994). Original drawings by Lee Silvey. Courlesy of Catena Verlag.

become transition reaches. Here sediments are temporarily deposited and later mobilized during storm events.

The central landform block is a conglomerate of colluvial, earthflow and glacial material which becomes sediment that is transported through the Rosgen type Aa+, A and B channels. Fourth to sixth order streams tend toward Rosgen type C channels, but more are fairly short in distance. These type C channels respond similarly to those described in the eastern landform block in they was they transition sediment during a storm event.

The main sediment sources in the western landform block are related to fire and the resulting surface erosion. At times, debris chutes and soil ravel may occur in steep topography. Nearly all channels types in this landform block are transport reaches.

In all landform blocks and all channel types, large woody material plays an important role in the metering of sediment through stream channels. In the absence of wood, sediment is transported uninterrupted through the system. When large wood is present, sediment is pulsed from wood accumulation to wood accumulation, thus increasing the time sediment remains in the stream channel.

One of the greatest impacts on stream sediment and depositional processes, is a century of fire suppression activities that have reduced debris torrent frequencies as well as the amount of surface erosion. This in turn, reduced the amount of sediment introduced into the stream channels.

Management activities have mimicked the effect of fires on sedimentation in the Breitenbush, but on somewhat smaller scale. This management-induced sedimentation is a result of harvest units where no riparian vegetation was left; roads that were sidecast; recreational activity in proximity to stream channels; fuel management activities; and removal of large wood. Many of these activities are no longer practiced, but the effects are still evident.

#### b) Reference Conditions

i) \*What were the historical morphological characteristics of stream valleys and general sediment transport and deposition processes in the watershed?

The historic morphological characteristics of stream valleys in the Breitenbush are similar to existing conditions. The basic stream patterns and channel gradients are largely influenced by geology, so have not changed a great deal since the reference time frames, 100 years ago.

Historically, sediment transport and depositional processes were a result of peakflows and erosion. After fire burned an area, erosion-generated sediments

loaded stream channels. These sediment-loaded channels were later flushed out during peak flows. Though episodic in nature the effects of peakflows on stream channels were long lasting.

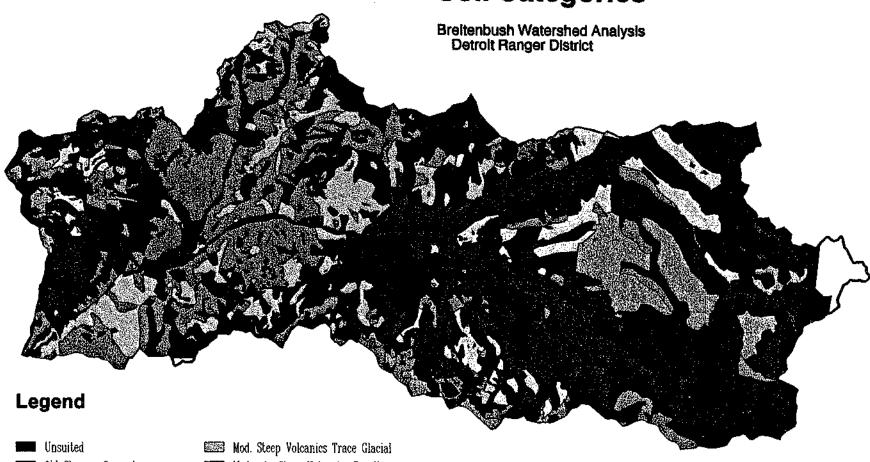
The amount of large woody material, that acted as sediment traps, in stream channels fluctuated with fire intensities. High intensity fires consumed large woody material, while low intensity fires recruited woody material into stream channels. The amount of wood also varied with the topography. Steeper, V-shaped valleys such as those in the Western landform block, retained less wood than the wider U-shaped valleys in the Eastern landform block. These V-shaped valleys acted as chimneys drawing fire through them and consuming the woody material in the stream channels.

Channels formed under peakflows became very resistant to change as high energy streams scoured out fine sediments and left large boulder and bedrock dominated channel bottoms. These substrate allow for sediments to move through the system rather than be deposited.

Depositional areas are mainly associated with larger order streams and the amount of large woody material in the stream channels. The streams in depositional areas, generally had wide valley bottoms and lots of downed wood to trap sediments. These areas also had high water tables, so were fairly resistant to burning. Depositional processes associated with glacial soils tend to be alluvial in nature, and those associated with volcanic soils tend to be colluvial in nature.

Soils are a good indicator of historic channel conditions and morphology. Figure II-6 shows various soil groupings for the Breitenbush watershed. Areas with alluvial soils tend to have lots of woody material in stream channels while slump earth flows and upper glacial soil groupings tend to have only moderate amount of woody material in stream channels. In areas of volcanic soils, very little woody material is available in stream channels.

## **Soil Categories**



- Old Slumpy Ground
- Mostly Unsuited Unstable
- Stream Terrace
- Young Glacial Bench
- Glacial Moderate Steep
- Upland Glacial Bench and Mt. Hemlock
- Upland Glacial Bench
- Steep Volcanic Basalt
- Tuff Brecca Steep Volcanics
- Volcanic Steep Side Slopes Mt. Hemlock

Moderate Steep Volcanics Basalts

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These soil groupings also relate to historic erosion. The following table shows dominant erosion processes by soil groupings:

Erosion Process	Soil Grouping
Surface Erosion	All volcanic soils
Stream Erosion	Stream terrace All glacial soils
Debris Torrents	Moist unsuited/unstable All volcanics
Earthflows	Unsuited Old slump ground Moist unsuited/unstable

### c) Comparison of Current and Reference Conditions

## i) What are the natural and human causes of change between historical and current channel conditions?

The most change between historic and current conditions is evident in forth order and larger stream channels. Smaller order channels have exhibited only minimal changes, for the most past.

One change that is evident, stems largely from fire suppression. In many areas, there is an increase in the buildup of down woody material as well as an increase in channel vegetation, since peak flows occur less frequently than they did when catastrophic fires occurred regularly in the watershed.

Another change is the reduction in surface erosion up slope of stream channels as a result of fire suppression activities. This reduces the sediment available to stream channels to rebuild floodplains. Both sediment and wood have to be available to the channel for proper channel/floodplain interactions.

Fourth order and greater streams, historically experienced peak flows that altered their channels. Sediment delivered to these channels would build flood plains in response to the natural wood concentrations in the channel. Currently, that sediment loading has been reduced and the wood component removed by management activities such as stream clean out, etc., especially along the Breitenbush River. This has resulted in the erosion of flood plains, causing them to become disassociated with their stream channels. The net effect is very unstable stream channels. This, coupled with episodic events that pulse through the system,

has caused the stream channels and their flood plains to become very dysfunctional.

Historically, stream channels in this watershed had high energies and they remain that way today. The reintroduction of large wood into these systems can help the stream channels to reduce energies somewhat, retain more sediment, and function as they once did.

## **IID.** Water Quality



Mansfield Creek at Road 46 - February 1996

## IL PHYSICAL DOMAIN

## D. Water Quality

#### 1. Characterization

#### a) \*What aquatic-dependent beneficial uses occur in the watershed?

Beneficial uses, dependent on aquatic resources, in this watershed are: domestic water use; resident and anadromous fisheries; aquatic non-fish species; riparian dependent species; water-related recreation; hydroelectric power generation; and water-related fire suppression and road maintenance needs.

- Domestic water is obtained from the Breitenbush River, Devils Creek and associated tributaries for summer homes, the Breitenbush Community, and several campgrounds. In addition, the City of Detroit uses the lower Breitenbush River as a supplemental intake system for their domestic water supply. Water from the Breitenbush flows into the North Santiam River which serves as a domestic water supply for several downstream municipalities, including Gates, Mill City, Lyons, Mehema, Stayton and Salem, which are all located below Detroit and Big Cliff dams.
- Fisheries are found in the main stem of the Breitenbush River, other major tributaries, and large lakes in the watershed. This fisheries resource is not extensive because of steep channel gradients. Kokanee, which are a landlocked anadromous fishery, are present in the watershed. Historically, the Breitenbush provided anadromous habitat for winter steelhead and spring Chinook prior to the construction of Detroit and Big Cliff dams further downstream.
- Aquatic non-fish species can be found in all waters within the basin. A large wetland complex at the headwaters of the North Fork of the Breitenbush River provides highly diverse habitats.
- Riparian-dependent species occur along the edges of water bodies in the watershed.
- Historically, water-related recreation use has been extensive, especially at the geothermal hot springs. All recreation facilities in the Breitenbush are in riparian zones and approximately 80% of dispersed sites are within riparian reserves.
- The Breitenbush River is potentially eligible for Wild and Scenic River status.
   Outstandingly remarkable values for the river include scenery, geology, and recreation.

- The Breitenbush Community uses the Breitenbush River to generate hydroelectric power for their community. Water from this watershed also contributes to the hydroelectric operation of Detroit Reservoir.
- Water use for fire suppression and road maintenance are periodic in nature. Use depends upon the amount of activity in the area. Historically, due to the fire frequency and the fire suppression efforts, water sources were developed to aid in the control of fire. These sources would then be utilized during road maintenance.

#### b) \*Which water quality parameters are critical to these uses?

Water quality parameters critical to beneficial users are temperature and type and timing of sediment input. Another potential critical parameter is biological contaminants.

**Temperature**: As is typical in the western Cascades, water temperature controls the type and distribution of aquatic species in the watershed. The primary influence on water temperatures in the Breitenbush is solar radiation. Broad, unvegetated floodplains in some areas, act as solar conductors transferring latent heat to the water.

The Breitenbush is atypical of most western Cascade streams, in that it has a geothermal influence on water temperatures. Although the geothermal interaction is not well understood, there appears to be a localized influence on aquatic species composition. As for its contribution to stream temperatures, locally it has a dramatic effect, but further downstream there is insufficient information to determine the magnitude of its effects at this time.

**Sediment:** The next critical parameter is sediment. Sediment movement through the watershed is critical for various aquatic, domestic, recreation and hydroelectric resources. The timing, type and amount of sediment have varied effects on beneficial users, including the following:

- regeneration success of certain aquatic species is reduced when fine sediment inputs occur during egg incubation
- transportation systems can be damaged by coarse bedload deposition that plugs culverts
- impellers on hydroelectric facilities can be eroded by fine grained material
- water treatment costs increase as a result of turbidity from suspended colloidal material
- spawning habitat for various aquatic species is created by stream deposition

- beaches for recreation are created from fine grain deposition
- riparian habitat for riparian-dependent species can be created as a result of depositional areas creating flood plains that later become vegetated

As illustrated above, sediment can have both the positive and negative impacts on various other resources. Thus supporting the critical nature of sediment movement, and its properties; (turbidity; bedload, mode of movement, suspended, rolled, skipped) as a water quality parameter.

Biological contaminants: The third, potentially, critical parameter for water quality is biological contaminants. Contaminants, such as water borne diseases, can impact both domestic and aquatic users. In the Breitenbush, there is potential contamination from human waste because of the amount of recreation use the area receives, and from stocking non-native fish species such as hatchery rainbow trout. At this time, the degree to which this is a concern is unknown.

#### c) What influence does geothermal have on water quality?

In the central landform block, there is at least one tributary to the main stem Breitenbush river that is influenced by geothermal activity. Outflow from the geothermal source has, at least, localized effects on water temperature and mineralization. Downstream affects are less understood.

### 2. What values are associated with water quality?

 Water and water quality have life-sustaining, economic, aesthetic, recreational and spiritual value (i.e. domestic and industrial water supplies, swimming, geothermal hot springs, etc.)

# 3. What are the highest priority issues or resource concerns associated with water quality?

a) The highest priority issues are temperature, type and timing of turbidity, and other potential contamination.

# 4. What are the management direction/activities, human uses, or natural processes that affect water quality?

#### a) Current Conditions

\* What are the current conditions and trends of beneficial uses and associated water quality parameters?

Stream temperatures exceed State standards of 58 degrees during portions of the summer. It appears as though this condition will remain constant until instream structure is effective in reducing erosion on the flood plains, so shade-providing vegetation can be reestablished along stream channels.

Currently, the mainstem of the Breitenbush erodes it's flood plain yearly, removing vegetation that provides shading and a moderating influence on stream temperatures. A possible hindrance to the ultimate goal of reestablishing shade-producing vegetation along stream channels, is fire suppression, which reduces sediment input into stream channels. By reducing the amount of sediment, streams will not build up their channels and reconnect them to their historic flood plains, so stream energies can be reduced and shade-producing vegetation can become established to moderate temperatures.

Water quality for domestic water use is generally high in the Breitenbush. Episodic storms temporarily reduce water quality, as sediment increases along with rising waters. This sediment is flushed out of the watershed and water quality returns to previous conditions, under normal flows. Domestic water users downstream of Detroit and Big Cliff dams, have not historically been affected by these pulses of sediment because of the metering of these sediments by the dams.

During the 1996 water year this condition changed. Tighter requirements adopted by the State of Oregon reduced the acceptable level for turbidity in water available for domestic use. This change in standards, coupled with the February storm event, which flushed a lot of sediment into Detroit reservoir and stirred up existing sediment within the reservoir, piqued the interest of several downstream communities when turbid waters flowed past their water intake systems and they had to rely on alternate water sources for domestic use. Their main concern was determining where sediment sources originated which ended up in the Detroit and Big Cliff reservoirs. The character of sediment they were most concerned with was ultra fine clays or colloidal materials. In the Breitenbush, sources of these clays are failure zones of earthflows, weathering and subsequent leaching of old glacial deposits, and weak volcanic ash deposits. These types of soils are found in all landform blocks, but are probably most common in the Central landform block.

Recreational uses will be described within the social portion of this report. Generally

speaking, recreational uses are high in the watershed and are expected to increase in the future. The major impact of the increases will be on riparian and associated resources.

ii) What and where are the "303d" water quality limited water bodies within the watershed?

Overall, water quality for recreation and aquatic dependent species is within acceptable State levels, except for occasional readings of high temperature during the summer. As a result of these occasional high temperatures, the Breitenbush was previously included on the States' 303d list of water quality limited bodies for late summer fish production.. In 1996, after further analysis, it was taken off the list. Water temperatures in this area are still of interest and require monitoring.

As was discussed above, the unstable nature of the floodplains in the Breitenbush, reduce stream shade and contribute to high temperatures.

Additionally, in the vicinity of natural hot springs, the waters have a high mineral content, as well as high temperatures. Outflow from these areas has been measured as high as 180 degrees F. This has a marked affect, at least locally, on downstream water temperatures, until a point where mixing with cooler water offsets the temperature increases.

iii) Does the 303 water quality standard for temperature fit for the Breitenbush Rive system, given its geothermal influences?

Water temperature monitoring is being established above and below geothermal influences to stream temperatures on the Breitenbush river. At this time, we know there are local effects, but insufficient information is available to determine how much impact geothermal influences have on overall temperature in the Breitenbush system. As data is collected and reviewed, it will be incorporated into future amendments to this analysis.

#### b) Reference Conditions

#### i) \*What were the historical water quality characteristics of the watershed?

Historic water quality characteristics are difficult to determine quantitatively due to lack of data. Even with the data available, characterizing the watershed can only be done on how the system is operating today. Temperature records for the Breitenbush only go back to 1950. Upon reviewing the records one needs to remember weather changes that have occurred since this period of record, as well. From these records, the mainstem of the Breitenbush exceeded today's temperature standard of 58 degrees during the month of July.

Historically sediment characteristics can only be classed in relation to historic disturbance. The historic fire map, figure\_, shows the extent of this disturbance. Sediment pulses more than likely came through the system during episodic events that created short term impacts. This sediment was transported into the North Santiam River and through to the Willamette River. Sediment particle size depended upon the source and location. First through fourth order streams contained boulder to clay size particles that were mobilized and fifth and greater order streams would move cobble to clay size particles. The difference between the two, related to the amount of woody material present to increase channel roughness and reduce energy.

Biological contaminants were likely lower in historic times than now, because less people used the area and there was no fish stocking program.

#### c) Comparison of Current and Reference Conditions

## i) What are the natural and human causes of change between historical and current water quality characteristics of the watershed?

Historic records are not conclusive that high temperature during mid/late summer are characteristic of the Breitenbush River. The causes of change from historic to current conditions, relates more to the areas of solar radiation rather than if solar radiation was/is a problem. Historically due to the fire regime first to fourth order streams were burned. This burning reduced the vegetation next to the streams and allowed solar radiation to reach the water. This water would then continue down slope and be cooled by the stored reservoir of water contained in the flood plain.

Currently first to fourth order streams are vegetated, for the most part, and solar radiation does not have an opportunity to increase water temperature (some effect will occur due to changes in microclimate but in looking at the watershed as a whole this becomes minor). This cool water then reaches the floodplains of the fifth and greater order channels where lack of vegetation increases solar radiation

and the alluvial material on the flood plain acts like a heat sink to increase water temperatures.

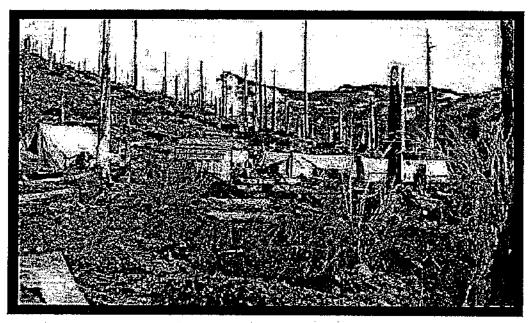
It is assumed that geothermal influences on water temperature have not changed between current and reference conditions. Until information to the contrary becomes available, these influences will be assumed to be constant.

Historic sediment production characteristics have been impacted primarily by fire suppression/prevention activities and large scale wood removal during stream clean out. A reduction in sediment available to the system, as a result of fire management and a lack of wood to hold sediments, led to a change in sediment type. Failures following fires used to load channels with fine and coarse sediments, that would be retained by the large wood and would be slowly metered through the system.

Currently, sediment production is mainly due to in-channel recruiting and episodic pulses, during large storm events, which cause road failures and natural debris torrents. During storm events, these pulses of sediment pass through the system (due to the dysfunctional nature of channel and flood plain). Stream energies are so high, at this time, that sediment of all sizes, is moved.

It seems likely that biological contaminants are greater now than in the past, because of increased human use over time, as well as, the introduction of hatchery fish to the system.

## IIIA. Vegetation



1921 tree planting camp and tree shelter on the Firecamp Lakes burn (1914)



Original tree shelter in 1995.

## III; BIOLOGICAL DOMAIN

## A. Vegetation

#### 1. Characterization

a) \*What is the array and landscape pattern of plant associations and structural stages in the watershed (riparian and nonriparian)? What processes caused these patterns (e.g., fire, wind, mass wasting)?

Plant Association Series: There are four major plant association series in the watershed. Roughly half of the watershed is in the Pacific silver fir series, about a third is in the western hemlock series, and the remainder is mountain hemlock and Douglas-fir series. These series reflect differences in local environmental conditions as shown in figure III-1. The tree species which define each series indicate the potential climax species and not necessarily the species currently occupying the site at this time.

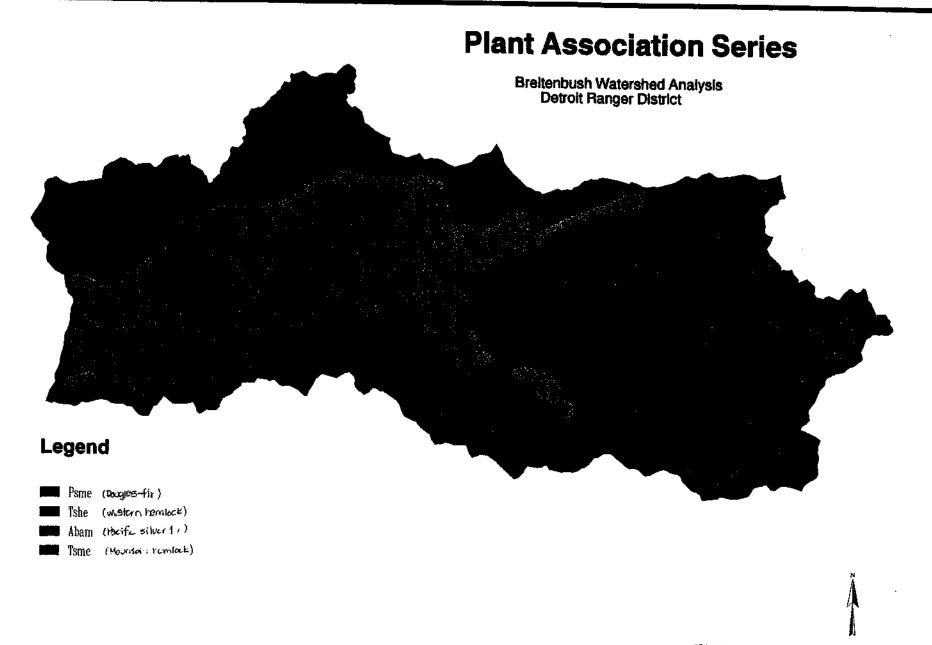
Figure III-1: Plant Association Series

Plant Association Series	Percent of forested partion of watershed	Site Temperature	Elevation	Tree Growth
Douglas-fir	2	warm	low	high
western hemlock	35	1		1
Pacific silver fir	51	v	v	v
mountain hemlock	12	cold	high	low

The distribution of the plant associations series across the landscape is depicted in *figure III-2* for the entire watershed and in *figure III-3* for riparian reserves.

The plant association series for the eastern landform block is about half mountain hemlock and half Pacific silver fir, although some western hemlock and Douglas-fir series can be found in the valley bottoms. The lower elevation valley bottoms of the western and central landform blocks are western hemlock series, while the upper elevations are Pacific silver fir series.

Overall, vegetation in the Breitenbush is very diverse because of variability in elevation, topography, soils, precipitation, disturbance, and past management. Within the four plant association series, District data bases show 79 individual plant associations that have been mapped within the watershed, ranging in size from ½ acre to many thousands of acres.

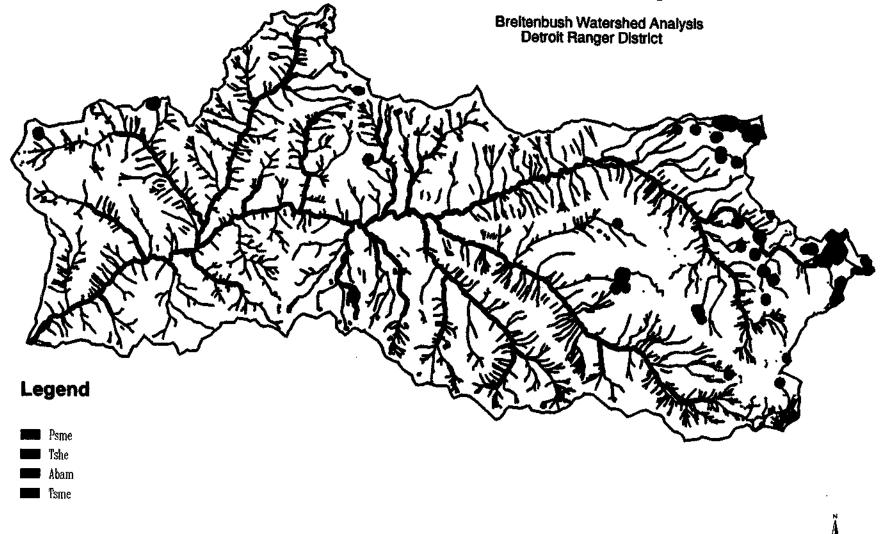


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# **Plant Association Series in Riparian Reserves**



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Differences in plant associations between riparian and non-riparian areas may vary in degree locally, depending on stream class, topographic features, water availability, air drainage, soils, and other factors. Differences in vegetation from riparian areas and upslope sites may be significant enough to classify adjacent sites in entirely different plant association series or there may be no difference at all. In general, riparian plant associations tend to be wetter and cooler than adjacent upslope sites, but these differences decrease or may disappear completely with intermittent streams. For clarification, Riparian Reserves widths may or may not represent the actual zone of influence that streams have on vegetation. In general, differences in vegetation from the upslope disappear in a shorter distance than that defined by Riparian Reserve widths.

<u>Structural Stages</u>: The structural stages represented in the Breitenbush today are generally the result of either timber harvest or past fires. There are four structural stages represented in this watershed: stand initiation, stem exclusion, understory reinitiation, and old growth. The following is a brief description of each structural stage:

• Stand Intiation Stage - In this stage, stand ages range from 1 to 20 years old depending on site conditions and degree to which the stand has been managed. In the Breitenbush, most stands in this stage were the result of timber harvest and almost all were planted. Harvest units were planted at a density of about 400 to 600 trees per acre with one or more tree species, generally Douglas-fir, noble fir, and western white pine, depending on site conditions. Commonly, additional tree species seeded into these plantations naturally. At the lower elevations, shade-tolerant species such as western hemlock, western redcedar and Pacific silver fir seeded in, while at the higher elevations mountain hemlock and Pacific silver fir seeded in.

About 1/3 of these plantations have been precommercially thinned, leaving the largest, most damage free trees, as well as seedlings under one foot tall, free to grow in the plantations.

Non-tree vegetation is also present in this structural stage, although species and numbers are highly variable. On most sites, species such as rhododendron and vine maple resprout after timber harvest and broadcast burning. At higher elevation, beargrass also survives timber harvest and burning and may cause severe competition for planted trees. Invasion of harvested sites by non-sprouting plants is highest at lower elevations, < 3000 feet, and on southerly and westerly aspects. Snowbrush invasion occurs on some sites, especially those with frequent fire return intervals. The degree of plant species diversity declines with increasing elevation and coldness of site. Many of the sites in the mountain hemlock series undergo very little change in the composition of plant species following fire or logging.

Until about 1990 most of these plantations had very few snags, green trees, or significant levels of course woody debris. Almost all were broadcast burned. After 1990 most units that are in this structural stage have met the Willamette National Forest standards and guidelines for snags and down woody material.

• Stem Exclusion Stage - This structural stage includes a very large range of stand conditions and includes trees that range in age from about 20 to 150 years, with diameters from 5" to 20.9", depending on site conditions and degree of management. These stands have dense crowns which block out light to the forest floor, and limit additional tree regeneration in the understory. Typically, shade tolerant understory trees that are present persist but grow very slowly. Intermediate or suppressed trees that do not tolerate shade well, suffer from competition and have a high mortality rate. Shade intolerant shrubs and forbs frequently disappear during this stage.

In natural stands, this stage is typically dominated by one or two tree species. Precommercial thinnings, which normally preceed this stage, may reduce competition and mortality by favoring the best growers. Commercial thinnings further reduce competition and increase average stand diameter. Shade tolerant understory trees and other plants may benefit from increased light and respond with vigorous growth.

• Understory Reinitiation Stage - This stage is characterized by stands as young as 80 years to stands as old as 250 years, depending on site conditions. The vast majority of these stands have not been managed. In this stage, the dominant tree layer begins to break up due to mortality and a second canopy layer, generally pole sized, develops underneath. Although this may simply happen naturally, given enough time. In the Breitenbush, past underburning has created these stands in many areas, by killing sufficient overstory trees to stimulate regeneration underneath. This underburning was more prevalent in the past than has been generally recognized, partially because it was not of intense interest until recently and also because it is difficult to distinguish through querying of databases.

In this watershed, management-induced understory reinitiation has resulted from old salvage logging and more recently, commercial thinnings. These practices have resulted in release of tolerant understory trees that are developing a second canopy layer at a much earlier age than would have developed under natural conditions, especially with fire suppression and a lack of natural underburning.

• Old Growth - These stands are generally the largest and oldest found in the watershed. They may range from over 200 to over 600 years old in this watershed. While a complete record of stand ages is not available, it is believed that over 90% of the stands, in this stage, date back to the 1600's. Most of these stands still have a high component of Douglas-fir or other fire regenerated species in the upper canopy layers. Second and third canopy layers are usually well developed with shade tolerant species. Other vegetation, primarily shrubs, may reach high levels because of more open canopies. Diseases such as dwarf mistletoe in hemlocks or true firs, and heart rots and root rots contribute to mortality and bole defects. In the oldest stands, especially those in the upper elevations, mortality and rots may occur at high levels. Heavy competition from rhododendron, other shrubs or beargrass may reduce replacement of mortality, leaving stands more open.

The following chart depicts the percentage of area occupied by each structural stage in the various plant association series for the entire watershed and for riparian reserves.

Currel	nt Structu	ral Stages	by Plant As	Sociation S	Series		
Structural	Plant Association Series						
Stage	Douglas- fir	Western Hemlock	Pacific Silver Fir	Mountain Hemlock	Total		
	% of watershed	% of watershed	% of watershed	% of watershed	% of watershed		
100		Entire W	/atershed				
Stand Initiation	0.1	9.5	10.6	0.4	20.1		
Stem Exclusion	0.9	12.5	12.5	8.4	34.4		
Understory Reinitiation	<0.1	2.9	9.4	1.6	13.8		
Old Growth	0.8	6.0	11.5	<0.1	18.3		
Non-Forest	0.1	1.3	3.5	8.0	12.9		
Totals	2.0	32	47.4	18.4			
Riparian Reserves							
Stand Initiation	0.3	6.9	8.8	0.2	16.1		
Stem Exclusion	0.7	12.2	11.0	8.0	31.9		
Understory Reinitiation	<0.1	2.5	10.9	2.1	15.4		
Old Growth	0.9	7.4	14.2	<0.1	22.6		
Non Forest	<0.1	1.6	4.0	8.3	13.9		
Totals	1.9	30.7	48.8	18.5			

From the chart above, it appears that structural stages in the riparian reserves are similar to the rest of the watershed, except there is slightly less stand initiation and slightly morold growth.

Figure III-4 shows the landscape distribution of stand structural stages across the watershed. Figure III-5 depicts stand structural stages within riparian reserves.

Structural stage differences between riparian and non-riparian sites may vary and are influenced both by management activities and by similar factors that influence plant association distribution. Major disturbances such as fire and logging have had a differing level of influence on structural stage development which varies greatly by stream class. Except for early railroad logging in the lower Breitenbush, larger streams were excluded from regeneration harvests. Salvage logging was practiced in these streams but this would not usually be significant enough to alter stand structural stage. Intermittent streams were generally not buffered from logging until the 1970's and many not at all.

Past fires tended to burn in intermittent stream valleys as they did in upslope areas and may have burned with even greater intensity where heavy fuel accumulations were present. On larger streams, there was more of a tendency for fires to burn less intensely or to go out entirely. These fires were more likely to leave remnant trees or unburned islands of vegetation. Reinvasion of burned areas may have varied greatly or very little from upslope areas due to factors previously discussed.

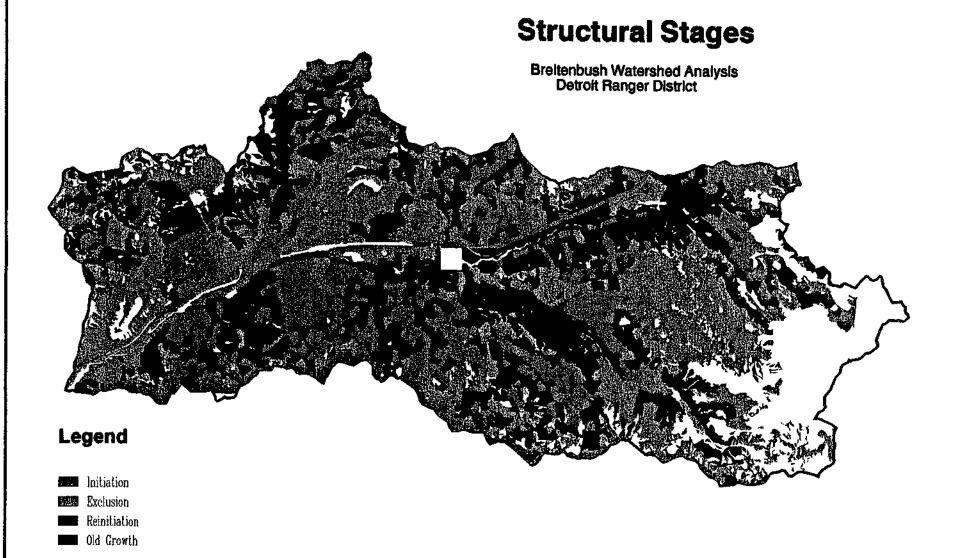
Floods and debris torrents may have created significantly different vegetation in localize riparian areas, but overall these differences are probably not significant in the watershed.

#### ii) What is unique about the vegetation in the Breitenbush?

There are some interesting and unique plant populations in the Breitenbush. For instance, the watershed supports the largest population of sugar pine on the Detroit District and the northern most significant population in the range of the species. Unfortunately, these sugar pine have experienced high mortality due to blister rust, bark beetles and drought. High mortality, combined with inherently low reproduction rates and stand conditions that are not conducive to sugar pine survival, have threatened the unique population.

Furthermore, there are three known sensitive plant species within the watershed Gorman's Aster, Brewer's reedgrass and Thompson's mistmaiden. Of these, Brewer's reedgrass (Calamagrostis breweri), has only been found in Oregon at Jefferson Park (Mt. Jefferson Wilderness) and Mt. Hood.

Whitebark pine is another unique species that inhabits the Mt. Jefferson Wilderness portion of the watershed. Currently, very little is known about the extent and distribution of whitebark pine populations because no surveys have been done. Regeneration success for this fire-dependent species may have been hampered by many years of fire suppression and individual trees have succumbed to blister rust, but there is no data showing whether

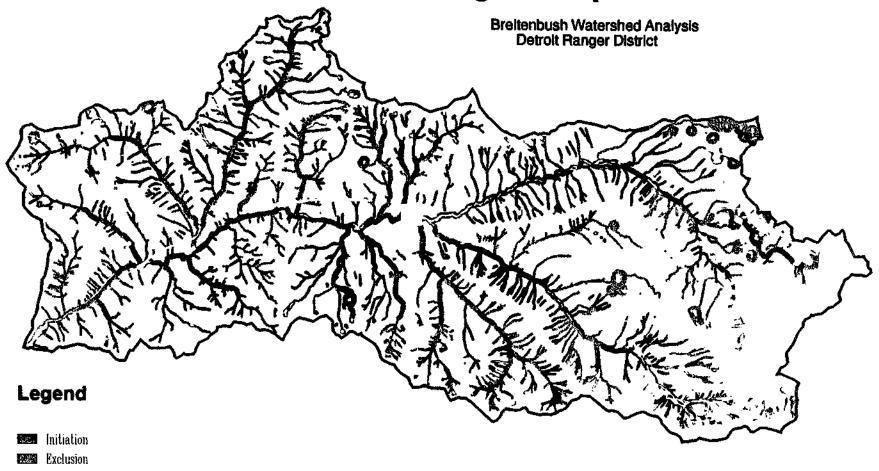


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## **Structural Stages in Riparian Reserves**



Reinitiation

Old Growth



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populations on the whole are increasing, decreasing or static in comparison to reference conditions.

Noxious Weeds: A large portion of the district's noxious weed populations occur in the Breitenbush drainage. St. John's-wort and Scotch broom present the largest problem, followed by Canadian thistle, tansy ragwort, and bull thistle. Control efforts will focus on Scotch broom, which has moved into the flats around Breitenbush Hot Springs and dispersed from there along interior forest roads. Scotch broom has the tendency to dominate disturbed and semi-disturbed areas due to its size, large seed bank, and its ability to modify the surrounding environment.

## 2. What values are associated with vegetation?

- a) Vegetation has economic, life-sustaining, aesthetic and spiritual value (i.e. trees and other vegetation provide commodities, many plants provide food/shelter to humans, fish and animals, old growth provides aesthetic and spiritual value, huckleberries and cedar trees are important to Native American cultures for tribal ceremonies and basket making, etc.)
- b) Natural species richness and diversity has ecological value. Plants are the oxygen providers and the base of the food chain that allows all other forms of life to exist. A variety of plant species supports a variety of other life forms. Plant/animal interactions can range from a simple indirect association as in the case of carnivores, to very complex interdependencies where neither the plant species nor the animal species can exist without each other (coevolution). Animals can use vegetation for food, shelter, camophlogue, poisons, and tools.

Without variety, living systems become simpler, and are more prone to reduction or extinction during stochastic events such as environmental disturbance or disease outbreaks.

# 3. What are the highest priority issues or resource concerns associated with vegetation?

- a) For a variety of reasons, old growth is a highly valued component of the ecosystem. Since most of the old growth in the watershed, takes many human lifetimes to develop to the stage it is at now, many people do not want to see any more of it harvested. Therefore, management activities that involve harvest of old growth timber, and for that matter, timber harvest of any kind have become very controversial.
- b) Fire suppression has been a management goal for many decades, now the issue is whether fire suppression has significantly altered plant community and seral stage distribution and timber stand conditions within the watershed.
- c) Land allocations and management goals are often based on compromise rather than

science, so they are not always compatible with historic ecosystem conditions or dynamic natural systems. Management goals for land allocations such as late successional reserver riparian reserves, scenic areas, summer home tracts, etc. require that vegetation be managed in ways that may be in conflict with historic ecosystem conditions within the watershed.

- d) Recent wind storms and floods have resulted in a lot of downed timber throughout the watershed. This often results in increased bark beetle populations that eventually kill adjacent live trees. In addition, there have been some recent concentrations of spruce budworm infestation resulting in pockets of dead trees scattered about the watershed. Furthermore, accumulations of downed and dead trees increase risk of catastrophic wildfire. The issue is whether management should actively respond to these events or let them run their natural course.
- e) Noxious weeds, such as scotch broom, and invasive non-native plants are a threat to native plant diversity in the watershed. 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, burned areas, 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.
- f) There is a concern about maintaining natural biodiversity within the watershed. 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 eighty five 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 five percent of the land base.

- 4. What are the management direction/activities, human uses, or natural processes that affect vegetation?
  - a) Current Condition
    - i) What were the disturbance factors that led to the current vegetative conditions in the watershed described in the characterization?

#### Fire

The 1890's has been the period of the most extensive fire activity in the watershed since the 1600's. In 1901, mapping of the Central Cascades Forest Reserve indicated that about 33 thousand acres (48%) of the watershed were recently burned at that time. Although it is difficult to reconstruct the method of mapping used in 1901, comparison with current size class mapping indicates a good correlation between both map locations and the scope of disturbance. Panoramic fire lookout photos taken during the 1930's clearly show evidence of extensive burning that would correspond to the 1890's period. Additionally, public land survey notes from the late 1800's refer to the more recent fires and give an estimate of acres burned per township.

Using current size class mapping and known stand ages, it appears that about 35% of the watershed was in a recently burned or younger age class, < 50 years old, by 1895. Difficulty in obtaining a greater degree of accuracy is limited by the completeness of stand information and by underburned stands which may be classified as either young or old depending on the severity of burning and the amount of older trees left as remnants. In general, it is felt that the amount of underburning is underestimated since it may be difficult to identify during aerial photo stand mapping.

In 1995 an intensive study (Garza) was completed of the fire history in the East Humbug, Fox, and Scorpion Creek drainages, 8850 acres (these areas are mostly within the central landform block). This area of the Breitenbush probably has the most active fire history in the entire watershed.

Reburning of the same area accounts for a substantial percentage of these acres. This study also classified the area by Fire Regime Type:

Fire Regime Type	Acres	% Area
3-4	2194	25
4	1696	19
5	173	2
5-6	4687	54

- 3 = infrequent, light surface fires (>25 years)
- 4 = short return interval crown fires (25>100 years)
- 5 = long return interval crown fires (100>300 years)
- 6 = very long return interval crown fires (>300 years)

There have been numerous large fires in the Breitenbush since 1900 including the following:

Fire Name	Year	Acres
Firecamp Lakes	1914	2000
Dunlap Lake	1920	1500
Byars Ridge	1920	480
Canyon	1958	1025
Eagle Rock	1967	1288
Devil's Ridge	1967	423
Total		6716

Fire suppression activities have been very successful in reducing the number of fires since 1900. Public policy to minimize resource loss and threats to public safety led to increasing abilities to keep fires small. Increasing technology, personnel, road access, timber harvest and subsequent fuel treatment, have combined to reduce acres burned.

Lightening has been the primary cause for most of the historic large fires in the watershed. Although human-caused fires have been a factor since humans first occupied the area, there is no established evidenced that either deliberately or accidentally set fires have been of the scope that appears to be the case with lightening caused fires. Lightening is the probable cause for the large number of fires dating to the 1890's. Numerous stands across the Detroit Ranger District date

back to this period and are so widespread that no other cause is likely.

The most active area of the watershed in terms of past fires has been the area north of the main Breitenbush River and east end of the watershed roughly defined by the wilderness boundary. The area to the north of the main Breitenbush River is predominantly south facing slopes and is also characterized by lower precipitation averaging between 60 and 70 inches per year. The east end of the watershed is the most susceptible to fall east winds and is primarily in the mountain hemlock plant association series. Approximately 87% of the mountain hemlock zone is currently in earlier seral stages due to fires over the past 150 years. Western spruce budworm, and other insect and disease mortality have likely contributed to high fire occupance in the mountain hemlock zone.

#### Timber Management

Logging: The first significant timber harvest began in the 1930's with railroad logging in the lower Breitenbush from Detroit up to about the confluence of Humbug Creek. Railroads were also built up Canyon Creek and Humbug Creek for logging. Regeneration cutting, primarily clear cutting, was by far the most common method used and was viewed as both a disturbance comparable to stand replacement fires and as being the most economical. It was practiced as a successful method to regenerate Douglas-fir, the premier commercial species.

Decade timber harvest in the watershed was as follows:

Years	Clearcut	Shelterwood	Commercial	Tot
	Acres	Acres	Thinning Acres	Acres
1920 - 1929	61			61
1930-1939	1031			1031
1940-1949	•			-
1950 - 1959	842			842
1960 - 1969	3786	6		3792
1970 - 1979	2411		232	2643
1980 - 1989	3816	1963	638	6417
1990-1995	361	132	325	818
Totals	12,308	2,101	1,195	15,604

In general, logging practices from the 1920's into the 60's consisted of logging the lower elevation, easier ground first. This permitted use of ground skidding with tractors and hi-lead cable yarding. The 1960's brought the use of skyline logging and road access into the higher elevation areas. The 1970's saw continued improvement in logging systems and increased use of partial cutting for both visual and reforestation reasons. The 1980's saw the end of machine piling and the beginning of restricting tractors to designated skid roads. It also began the practice of over-the-snow logging on overstory removal units, and the beginning of commercial thinning in second growth stands. The 90's brought regeneration modified to meet wildlife and long-term productivity objectives, increased stream protection and helicopter logging.

**Reforestation:** The first reforestation documented on the Detroit District and some of the earliest in the Pacific Northwest was done following the Firecamp Lakes Burn in 1914. The next major reforestation effort appears to be planting in the late 1930's and early 1940's of the railroad logged areas previously mentioned.

Following World War II timber harvest became more consistent and as a result reforestation became a more sustained program. Both planting, and natural and artificial seeding were options used from the 1940's into the 60's. Douglas-fir was the preferred species at lower elevations but was not always successful at higher elevations, especially in frost prone areas. Noble fir was a preferred planting species above 3000 feet elevation. Engelmann spruce and ponderosa pine were used on some severe frost pockets where Douglas-fir planting was not successful.

In the 1970's planting became the sole reforestation method due to its reliability and requirements in the National Forest Management Act to assure reforestation within five years after harvest. The shelterwood regeneration method was also used on sites with high frost potential and on warm droughty sites. The 1980's saw the addition of most of the indigenous conifer species to the list of species planted. The most notable species was the addition of rust-resistant Western white pine which had been significantly reduced in the watershed due to blister rust. Western redcedar, Western hemlock, grand fir, Pacific silver fir, sugar pine, mountain hemlock and lodgepole pine were also planted depending on local site conditions. The use of shade cards was introduced in the 1980's for seedling protection on warm droughty sites. The Forest Cultivator/subsoiler began operating during this period to help break up old compaction from prior logging and to help reduce vegetative competition. Also The 1990's have added increased hardwood planting on some local areas, especially in root rot pockets. Increased use of containerized versus bareroot seedlings has resulted in significantly increased survival for certain tree species.

Site Preparation and Fuel Treatment: Throughout the period that timber management has taken place in the watershed, site preparation for planting and fuel treatment have been closely linked. Prior to the 1960's, the record of what fuel treatment was used is not particularly clear but it is generally recognized that the use of broadcast burning was much less than in recent decades and this coincided with less tree planting and therefore less need to prepare sites. Snags were felled for fire hazard reductions from the earliest harvest dates. Utilization standards for timber were relatively low during this period, so a great deal of large material was left following logging and if unburned additional material was left. On gentler slopes, tractor piling was also used with variable effects on soil productivity.

As tree planting became more or less standard practice, along with concern for minimizing fire hazard, broadcast burning became more prominent. During the 60's most of this burning was done in the Fall and frequently was associated with dry conditions which resulted in hot burns and excessive duff consumption. The 1970's saw the introduction of yarding of unmerchantable (YUM) material off of units and for a few years using this as a substitute for burning. This was discontinued as a substitute for burning because it did not treat the small diameter slash, was less than adequate as site preparation, and didn't set back vegetative competition. YUM yarding was continued to help reduce broadcast burn intensities and increasing timber utilization further increased reductions in wood from the sites. The broadcast burning season was extended late Spring to Fall and night burning instituted to take advantage of higher fuel moisture conditions to reduce burning impacts. In the early 1980's tractor piling of slash was ended due to unacceptable impacts on soil productivity. Broadcast burning was the preferred treatment on most sites. From the late 1980's to the present brought the need to leave green trees, snags, Pacific yew, and logs on harvest units. This coupled with increasing restrictions aimed at meeting air quality standards, created conditions which necessitated a

reduction in the number of acres burned. Grapple piling was also used increasingly on gentler slopes since it provided more flexibility in the timing of burning will minimizing soil damage.

Timber Stand Improvement: Timber stand improvement began in the early 1950's, with pruning and precommercial thinning. Both activities remained at fairly low levels through the 50's and 60's and pruning was discontinued by the mid-60's. Precommercial thinning accelerated during the 1970's and has continued at high levels into the 1990's at a rate of about 500 acres per year for the entire District (precise figures for the watershed alone were not analyzed). Fertilization began in the late 1970's and has averaged about 500 acres per year to the present. Some stands have had multiple treatments. Pruning was reintroduced in 1989 and has averaged 300 to 400 acres per year on the District. Brush release has been a very minor treatment on the District, with snowbrush, Ceanothus velutinus, pulling being the most common method.

Early precommercial thinning tended to leave stocking levels higher than are currently regarded as optimum for acceptable growth. Starting in the early 1970's, fewer trees, generally about 300 per acre were left and this level has continued until the present. Prior to the 1980's Douglas-fir was, in most cases, the preferred crop tree at lower elevations and with noble fir also favored at higher elevations. Other species were left if they were the largest and most healthy trees. In most cases the other species had not been planted and as a result were smaller and therefore not left as crop trees. Beginning in the 1980's provisions were taken to leave representation of all species present which in some cases also resulted in additional trees being left. With the planting of a much wider selection of species, minor species also were in a better position to compete.

#### **Insects and Diseases**

Historic levels of diseases and insects are difficult to reconstruct, however, certain stand conditions are known to favor some of these agents. An understanding of past stand conditions may give an indication of what insects or pathogens were most prominent.

One disease, white pine blister rust, was introduced into the region in the early 1900's and has seriously affected both Western white pine and sugar pine. Whitebark pine is also susceptible and although no inventories have been conducted to assess the extent of infection, it is probable based on reports from other localities, that it is also reducing populations here. Of the three susceptible tree species found here, white pine was the most widespread, being found at all elevations. In conjunction with mountain pine beetle attacks, upwards of 90 per cent of the original white pine population may have been killed by this disease. In the early 1980's rust resistant white pine planting stock became available and has been a substantial component of planting since that time. Infection can also be reduced by thinning and

pruning which makes micro climatic conditions less favorable for the rust.

Sugar pine, which is found primarily from Humbug Creek to Scorpion Creek, is in serious decline due to blister rust and other factors. In the previously cited study (Garza, 1995), reduced disturbance by fire, competition from more shade tolerant tree species, and bark beetles are also contributing to high mortality rates in sugar pine. Lack of disturbance is also creating few opportunities for regeneration of the species. Unlike white pine, rust resistant sugar pine have not been confirmed from trees sampled on the District. Limited planting of stock without confirmed resistance has been done to help maintain population levels.

The two primary bark beetles acting in the watershed are the Douglas-fir beetle and the mountain pine beetle. The Douglas-fir beetle is generally found at low levels except when other disturbances such as wind or fire create habitat conditions favorable to its buildup. This was the case following a major windstorm in 1990 and has likely been so when conditions were right in the past. Populations built up in downed trees and spread to standing trees which were additionally weakened by several years of drought. Mortality in the Breitenbush was the highest on the District following the 1990 storm and reached its peak in 1992. Tree kill was probably equal to or greater than the number of trees blown down. Concentrations are highest from about Scorpion Creek east to about the Wilderness boundary and also in the South Breitenbush and Devil's Creek. Additional down trees have been reported as a result of flooding, wind and heavy snow during February 1996. Increased Douglas-fir beetle activity can be expected within the next few years. In stands that have had previous mortality, cumulative impacts may become significant in changing stand structure.

Mountain pine beetle primarily attacks white pine, sugar pine, and lodgepole pine. It appears to be most active in older white pine and sugar pine, especially those that are experiencing high levels of competition or have received some mechanical damage.

Root rots, primarily Phellinus weirii and Armillaria mellea, are endemic to the watershed today and would also have been in historic periods. There is evidence from research that suggests short rotation, single species forest management may increase rates of infection. Certain tree species are less susceptible or resistant to root rots than others and multi-species stands have a greater ability to break root contact between infected and non-infected trees. Root rot infection centers tend to be more difficult to spot in older stands due to other mortality factors so that it may not appear to be as prevalent as in more uniform second growth stands. It is not clear whether the overall impact of infection is significantly greater than historic levels.

Western spruce budworm has been a significant defoliating insect affecting most of mountain hemlock plant association series adjacent to the crest of the Cascades. It is

associated with stands composed of the most susceptible species, Pacific silver fir, mountain hemlock, Douglas-fir, and Engelmann spruce. Severe outbreaks may als affect generally less susceptible species such as lodgepole or white pine. Historic evidence of defoliation in the watershed only was available as far back as 1947. A budworm control spray project was conducted in the early 1950's with aerial spraying of DDT. Previous outbreaks were probably common given the favorable habitat and weather conditions. The most recent outbreak began in 1987 and continued through 1993. Infestation in the Breitenbush was fairly limited in scope and severity but may have had significant effects in some localized areas. It was primarily limited to mountain hemlock plant associations.

#### Other Disturbances

Other disturbances such as wind, floods, or landslides, are generally localized in their effects and not generally major factors in shaping vegetation patterns over broader areas. Recent wind storms such as the 1962 Columbus Day Storm and the 1990 windstorm severely impacted specific areas. The 1990 storm had its greatest affect adjacent to recently created openings, in partial cuts, along roads, power lines etc. Historically this effect may have been seen along edges of burned areas or other natural openings. During the 1990 storm it appeared than other considerations being equal, younger stands received less blowdown than older, larger stands. The level of blowdown in the past was probably also regulated by the pattern of natural fires. local stand conditions, and timing and location of wind events. As previously mentioned, subsequent Douglas-fir bark beetle kill may add to the direct blowdow mortality and be locally significant. Flooding impacts tend to be localized to a fairly restricted area except in such events as the 1964 flood in which case water levels may undercut trees and scour out other vegetation outside the seasonal floodplain. Large conifers may be replaced by smaller shorter lived red alder. Salvage of logs from the riparian area has widened flood plains and lengthened the recovery period for large confers.

Heavy snow, during January 1996, has resulted in a lot of tree breakage in some stands; adding to fuel loadings and subsequent bark beetle kill.

#### ii) What are the current condition of late successional habitat?

Late Successional: The oldest stands of trees, for which there is documented information in this watershed, are approximately 550 years old. There may be older stands than this, but they have not been intensively inventoried. Individual trees older than 550 are more likely to be present than are stands of that age, but their infrequency makes them less likely to be sampled during an inventory. The vast majority of the older stands, found in the watershed, date from the early 1600's when fires burned over most of the watershed. This is consistent with stand ages found throughout the rest of the Ranger District.

The harvest of late successional timber has slowed, in recent years, as public controversy over this practice has increased. To ensure protection of this unique resource, land management allocations have been established to protect it. The following chart shows approximately 40 percent of the forested portion of the Breitenbush watershed is in late successional habitat. Of that, about 31 percent is protected from timber harvest, while 9 percent in available for timber harvest.

Late Super	essional = (old growth and	l reinitiation stag <del>es</del> )
Land Allocation Category	Acres of late successional stands	% of Forested Portion of the Watershed
Matrix lands that are forested but unsuited for harvest	2468	4%
Matrix lands that are suited and available for timber harvest	5615	9%
Non-Matrix (other allocations such as riparian reserves, Late Successional Reserves, etc.)	15,933	26%
Total	24,016	39%

Total watershed acres = 69,400; non-forested acres = 8,957; so total forested acres = 60,443

## iii) What is the status of non-native species in the watershed? Where are non-native plant populations located? What factors have contributed to their spread?

The following table lists some of the invasive non-native plants found in the Breitenbush watershed. The occurrence column indicates which species are most predominant.

Common Name	Scientifie Name	Biological Control	Occurrence
ox-eye daisy	Chrysanthemum leucanthemum	No	Widespread
chicory	Cichorium intybus	No	Isolated
foxglove	Digitalis purpurea	No	Patchy
spotted cat's ear	Hypochaeris radicata	No	Widespread
wall lettuce	Lactuca muralis	No	Widespread
reed canarygrass	Phalaris arundinacea	No	Patchy
self-heal	<u>Prunella yulgaris</u>	No	Patchy
red sorrel	Rumex acetocella	No	Widespread
curly dock	Rumex crispus	No	Patchy
common mullein	<u>Verbascum blattaria</u>	No	Patchy

The table below shows five established noxious species occur in the Breitenbush watershed.

Commun Name	Scientific Name	Biological Control	Occurrence
Canada thistle	Cirsium arvense	Yes	Widespread
bull thistle	Circium vulgare	Yes	Widespread
Scotch broom	Cytisus scoparius	Yes	Widespread
St. John's-wort	Hypericum perforatum	Yes	Widespread
tansy ragwort	Senecio jacobaea	Yes	Widespread

iv) What is our current knowledge of Table C-3 (ROD) and Appendix J2 (FEIS) species occurrence in the watershed, and what is the current status of survey protocols for survey and manage species (C-3)? What other species of concern are found in the watershed?

A large number of late successional forest plant, animal, and fungal species were identified as needing protection or monitoring in the ROD and S&G for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994). Habitat for these species has declined in the watershed due to recent harvest of old-growth and associated road building.

The Regional Ecosystem Office (REO) is collecting location information and developing survey protocols (due out in June 1995 and in 1996 respectively). Survey strategies include the following:

Survey strategy 1: manage known sites;

Survey strategy 2: survey prior to activities and manage sites;

Survey strategy 3: conduct extensive surveys and manage sites;

Survey strategy 4: conduct general regional surveys.

Activities implemented in 1995 and later must include provisions for known sites if the species is under survey strategy 1. For species under survey strategy 2, activities implemented in 1999 or later must have completed surveys. Survey strategies 3 and 4 are more general and must be underway in 1996. Surveys have not been initiated for the vast majority of these species. Mitigation measures for these species can be found in Appendix J-2 of the FEIS (Holthausen et al. 1994). Table -- lists species documented on the Detroit District. Those species located in the Mt. Jefferson Wilderness have a high probability of occurring within the Breitenbush watershed.

Survey and manage species documented on the Detroit Ranger District.

Category	Species	Location	Survey Strategy
False truffle	Rhizopogon albietis	Breitenbush	3
Rare false truffle	Alvopa alexsmithii	Mt. Jefferson Wilderness	1, 3
Rare undescribed false truffle	Hydnotrya sp. nov. #Trappe 787.792	Mt. Jefferson Wilderness (Jefferson Park)	1, 3
	Martellia sp. Nov. Trappe 5903	Mt. Jefferson Wilderness	1,3
Nitrogen-	Lobaria oregana	Forestwide	4
fixing lichens	Lobaria pulmonaria	Forestwide	4
Vascular plants	Allotropa virgata	Forestwide (Roaring Creek)	1, 2

The species 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. Otherwise, no systematic surveys have been conducted by the Forest Service for any of these species. Vascular plants that are on both the C-3 list and the Region 6 Sensitive Plant List suspected or documented to occur on the Willamette National Forest (Botrychium minganense and Botrychium montanum) have been subject to survey during the normal course of field work. To this date, habitat descriptions of most C-3 plant and fungal species are not specific enough to determine probable locations with existing data.

In addition to the incidental sighting of a Roaring Creek population of <u>Allotropa</u> <u>virgata</u> (candystick), ecoplot data reveals an additional Breitenbush population to the immediate east of the Breitenbush Community.

## v) What TES species occur in the watershed, and what is the current condition of these populations?

Three plant species found on the Region 6 Sensitive Plant List have been documented in the Breitenbush watershed. These species occur in non-forested habitats, such as meadows and rock gardens. Discussion of sensitive species documented in the watershed can be found in the Botany report. Approximately 10-15% of the Forest Service land in the watershed has been surveyed for sensitive plants, mostly in conjunction with proposed timber sales and other projects. No

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.

Sensitive plants located in the Breitenbush watershed.

Common Name	Scientific Name	Numbe r of Pops.	Geographical Area	ONHP status
Gorman's Aster	Aster gormanii	5	Byars, S. Breitenbush, Outerson Mtn.	1
Brewer's reedgrass	<u>Calamagrostis</u> <u>breweri</u>	1	Jefferson Park	2
Thompson'smist maiden	Romanzofiia thompsonii	1	Roaring Creek	1

The Gregon Nameal Heritage Program (ONHP) maintains four lists of rere plants based on ravity: List 1 contains species which are endangered or threatened throughout their range. List 2 contains species that are threatened or endangered in Oregon but are more common or stable chewhere. List 3 and 4 are explained below.

Gorman's aster (<u>Aster gormanii</u>): Gorman's aster populations in the Breitenbush watershed are located in the vicinities of Outerson Mountain, Byars Peak, and adjacent to the South Breitenbush River trail in the Mt. Jefferson wilderness. All populations appear to be stable.

Thompson's mistmaiden (*Romanzoffia thompsoni*i): The documented occurrence of Thompson's mistmaiden in this watershed is located near Roaring Creek. Recent visits have not indicated any significant change in this population.

Brewer's reedgrass (Calamagrostis breweri): Threats to this plant mostly involve recreational use of Jefferson Park, including trampling and camping outside of designated areas.

Other Plant Species of Concern: In addition to those species that are sensitive, there are five plant species on Watch or Review Lists documented in the watershed. Definitions of these lists can be found below the table.

Plant species of review and watch lists that occur in the Breitenbush watershed.

Common Name	Scientific Name	Number of pops.	Geographical Area	Status
Larsen's collomia	collomia larsenii	1	Park Butte	Watch
	Douglasia laevigata	1	Park Butte	Review
hairy elmera	Elmera racemosa	1	Park Butte	Watch
cascade daisy	Erigeron cascadensis	1	Boulder Peak	Watch
Suksdorg's silene	Silene suksdorfii	1	Park Butte	Watch

The Review List (List 3) contains species for which more information is needed before status on a be determined, but which may be threatened or endangered in Oregon or throughout their range. The Watch List (List 4) contains species of concern that are not currently threatened or endangered. In addition, the Willamette National Forest maintains a Concern List for locally rare species that are not included in the above lists.

#### b) Reference Conditions

i) \*What is the historical array and landscape pattern of plant communities and structural stages in the watershed? \*What processes causes these patterns (e.g., fire, wind, mass wasting)?

The reference date is assumed to be approximately 100 years ago because there was not much human influence at that time and because of an active fire period that followed that time period. Some of the discussion regarding reference conditions is interspersed in the current conditions section of this document.

The following graph, shows the structural stages by plant association for the 1895 period. Figures were derived from mapping current size classes for unmanaged stands and "growing" them backwards to 1895. Managed stands were assumed to be the same size class as surrounding unmanaged stands for purposes of reconstructing pre-management conditions. In the mountain hemlock plant association series it was somewhat difficult to use this technique to separate out how much area was in stand initiation versus stem exclusion since there were large fires in both the early and late 1800's. Currently both of these fire episodes are predominantly in the stem exclusion stage, but in 1895 there would have been more differentiation.

ii) What was the status of non-native invasive plants 100 years ago?

Oregon was settled by Europeans more than 100 years ago. Chances are that some non-native stock grasses had established by 1895. Because human caused disturbance was limited at that time, these populations were probably insignificant.

iii) What was the historical relative abundance and distribution of species of concern (ROD, TES, others) and the condition and distribution of their habitats and other special habitats in the watershed?

Although there is no data regarding the status of these species 100 years ago, inferences can be made based on habitat. Species associated with habitat that was converted to serve other purposes have probably experienced population decline in size and distribution. Habitat that was not intentionally converted may have incurred some incidental losses. Habitat that was protected may have associated species that realized population increases, if not just population stabilization. Of course, protected areas tend to be high elevation habitat, where harsh environment usually influences species success.

Formation and development of SHABs is mostly a function of changing geomorphology, in which changes are measured in millennia. The more important comparison to make to a 100 year reference point is changes in SHAB structure, function, and species composition.

#### c) Comparison of Current and Reference Conditions

i) \*What are the natural and human causes of change between historical and current vegetative conditions? How and where are current vegetation types and distribution different from historic conditions?

### Differences and Similarities Between Past and Current Vegetation - 1895 & 1995

- Smaller openings now than in the past
- Disturbances episodic in the past with fires, rather than continuous currently with timber harvest and sustained yields
- Tree reestablishment after disturbance slower in the past versus current reforestation
- Underburned conditions common in the past, no comparable condition now, other than shelterwoods
- Understory Reinitiation time line speeded up now by thinning versus natural time frame.
- Increased abundance of shade tolerant tree species due to lack of fire.
- Multi-species planting results in more species at earlier age than usually found in natural fire regenerated stands

- Meadow and other special forest habitats currently being encroached by conifers with current fire suppression
- Fewer snags and logs on harvested units in areas that have a long fire return interval, less difference where fires were frequent
- Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval
- Higher spruce budworm mortality due to stand conditions resulting from fire suppression
- Increased tree growth in managed versus natural stands at a comparable age.

# ii) What are the natural and human causes of change between historical and current species distribution and habitat quality for species of concern in the watershed?

Based on the assumptions made under "reference conditions", species dependent on older forested habitats (the C-3 species) probably have seen decline in populations due to both permanent habitat conversion and habitat conversion to an early seral stage. Species that occur in low to mid-elevation non-forested habitats, such as Aster gormanii, Romanzoffia thompsonii, and Erigeron cascadensis, have probably incurred some population loss based on incidental disturbance (road building) or habitat conversion for more limited uses (rock quarrying). High elevation species including Calamagrostis breweri, Collomia larsenii, Douglasia laevigata, Elmera racemosa, and Silene suksdorfii occupy generally protected habitat, but are subject to harsher environmental conditions, more limited habitat, and the relatively new threat from recreation.

## iii) What are the natural and human causes of change between historical and current special habitat quality and distribution in the watershed?

Management disturbance threats to field verified special habitats appear to be harvest units and adjacent roads (8 and 10 percent respectively). Although current numbers of these habitats effected by disturbance are relatively low, 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 non-native 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 micro environment which in turn can alter species composition and distribution (Chen 1994). The FW-211 standard and guideline now requires us to buffer habitats that may be adversely effected by disturbance. In addition to moderating micro climatic changes, buffering can provide a barrier to some human and animal disturbance, as well as invasive nonnative seed dispersal. 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. Drier special habitats are presumably less effected by created openings since they generally occur on exposed sites. However, hydrology changes and invasion of dry adapted weeds still needs to be monitored.

Excepting moist meadow, rocky, and shrubby habitats, the scarcity of the other habitat types outside the wilderness in the Breitenbush makes it imperative that these areas be protected from further disturbance.

#### iv) What are the effects of nonnative plant and animal species on diversity?

Compared to the reference condition 100 years ago, invasive weeds are much more common today. Most of these species originated in Europe, some in Asia, and were either intentionally introduced by humans, or accidentally introduced by humans via ship ballast dumping, stock feed, etc. This invasion of Europeans and the non-native plants they brought with them, resulted in disturbance and establishment of the non-natives, displacing both the native vegetation that existed in the disturbed areas, and competing with native plants of a weedy nature. The increasing disturbance brought about by management and other human activities combined with natural disturbances in these same areas has caused a shrinking of areas dominated by native vegetation. The decline of native vegetation in turn, limits the distribution of associated animals.

# III. Wildlife - Aquatic Species



Salmon above Breitenbush fish racks- 1920's

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### III. BIOLOGICAL DOMAIN

### B. Animal Species and Habitats- Aquatic

#### 1. Characterization

a) \*What is the relative abundance and distribution of species of concern that are important in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

There are over 75 miles of known fish bearing streams and over 150 acres of fish bearing lakes in the watershed. The lakes range in size from unnamed ponds less than 5 acres to Breitenbush Lake that is over 50 acres.

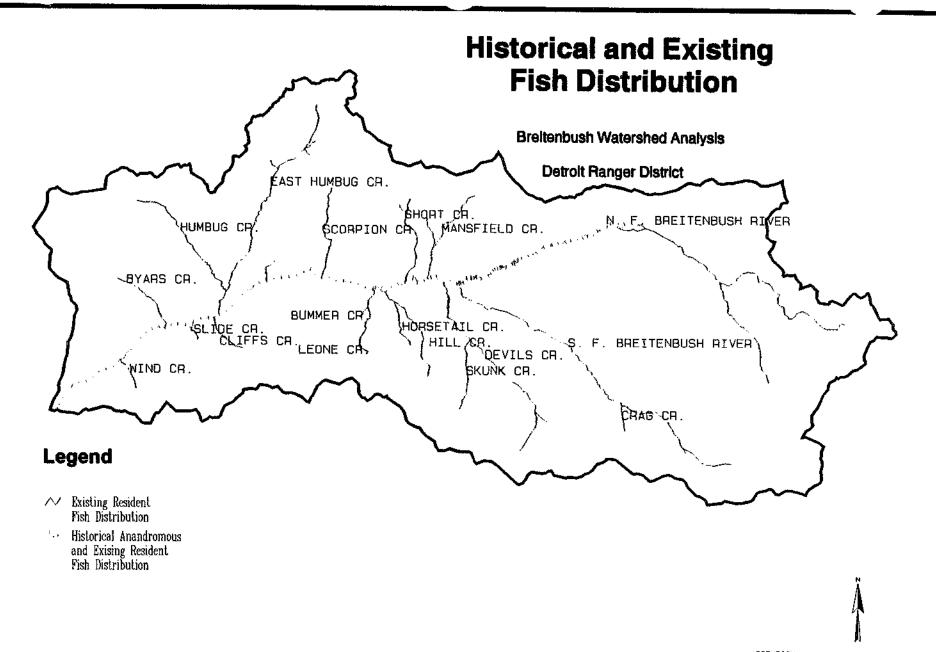
Game fish presently found in the Breitenbush Watershed include rainbow, cutthroat, and brook trout; whitefish; and kokanee salmon. Rainbow and cutthroat trout are considered to be stocks of concern by the Oregon Department of Fish and Wildlife due to a lack of information on populations. Historically, populations of spring chinook salmon, winter steelhead trout and bull trout were found in the watershed. See *figure III-6* for existing and historic fish distribution in the watershed.

### 2. What values are associated with species and habitats?

- a) Species and habitats have aesthetic, economic, recreational, and spiritual value.
- b) Habitat components necessary to sustain the variety of species indigenous to the area has ecological significance.
- c) Native wild gene pool has ecological value.
- d) Native fish and wildlife have value to the functioning of the ecosystem.

## 3. What are the highest priority issues or resource concerns associated with species and habitats?

- a) Maintaining or restoring habitat components necessary to sustain native fish populations.
- b) Resource concerns about reintroduction of native fish species such as bull trout, spring chinook salmon and winter steelhead to the Breitenbush River.



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- c) Resource concerns about introduction of non-native fish species into the Breitenbush watershed and introduction of fish into fishless lakes.
- 4) What are the management direction/activities, human uses, or natural processes that affect aquatic species and habitats?
  - a) Current Conditions
    - I) \*What are the current habitat conditions and trends for species of concern identified above?

A survey of over 30 miles of streams in 1995 indicated fish habitat was in good condition, on the whole. The 1995 survey showed that Leone, Hill, Horsetail, and Mansfield Creeks, along with the North Fork of the Breitenbush River all had pretty good fish habitat. These streams averaged over 76 pieces of large wood per mile, had significant amounts of pool habitat, and had stream temperatures 55° F or lower. Fish habitat was not as good in Humbug and East Humbug Creeks, as well as some other smaller streams such as Wind, Bummer, Cliffs and Short Creeks because of a shortage of large wood. These streams had fewer than 30 pieces of large wood per mile. Tables 1 and 2 (below) describe habitat conditions at the time of the 1995 survey.

The condition of fish habitat in 1996 is highly variable. Some of the streams surveyed in 1995 have changed as a result of a flood event in February 1996. A resurvey was done in August of 1996 and has not been fully analyzed at this time. Preliminary information indicates that Mansfield Creek, upper Short Creek and lower Leone Creek were heavily impacted by debris flows. The debris flow in Mansfield Creek started in the upper part of the drainage and passed through an area classed as excellent fish habitat in 1995. It scoured the channel leaving a cobble/boulder lined channel that is relatively poor habitat today.

The 1996 flood had a wide variety of affects on fish habitat. It ranged from those mentioned above in Mansfield Creek to creation of new habitat. On one hand, events such as this flood can tear things down, on the other hand, they provide the streams with the building blocks for new habitat. They supply new large wood to the channel from debris flows and from undercutting of trees along the channel. They also bring in new substrate, from channel changes and debris flows, to recharge and form new spawning areas. The short term impacts can be pretty drastic but the long term effect are generally good.

Table 1. Comparison of habitat characteristics from the Level II survey done in 1995.

Stream	Miles	Flow CFS	Wetted Width	Gradient %	Substrate Dom/Sub	Max Tem	Pools/ Mile	Pools	Fish Species	Large Wood/
		6	Feet		2	p F		Area	9	Mile &
ımmer Creek	0.3	0.2	9	25	GR/CO	48°	71	29	1	18
Cliffs Creek	1.0	0.3	8	9	CO/GR	52°	68	38	1	28
Leone Creek	2.1	1.2	10	13	LB/CO	52	41	19	1,4	93
Hill Creek	3.2	1.8	11	9	CO/LB	54°	46	17	1,2,3	100
Horsetail Creek	1.4	1.0	10	13	CO/LB	52°	51	19	1	110
Humbug Creek	3.9	8.1	26	5	CO/GR	52	25	25	2,3	3
E. Humbug Ck.	5.2	2.5	19	4	LB/CO	55°	27	31	1,2,3	21
Mansfield Ck.	2.5	.6	12	9	CO/GR	55°	48	26	2,3	96
NF Breitenbush	8.3	39.6	25	2	CO/GR	52°	18	19	2,3	76
Short Creek	2.5	0.5	9	7	CO/LB	54°	58	26	1,2,3,5	28
Wind Creek	0.7	0.4	8	15	CO/GR	52	59	19	1,2	19

Table 2. Riparian vegetation characteristics within 100 feet of selected streams in the Breitenbush Watershed.

Stream	Innur Rip (*) Yeg Width (Fact)	Size 2 Class	Dom Veg TypesA	Outer Rip@ Veg Widti (Fret)	Size Class	Dom Veg Types@
Bummer Creek	24	SP	HV/CH	76	LT	CD/CC
Cliffs Creek	15	ST	HV/HB	85	LT	LT/CD
Leone Creek	39	SP	HW/CH	61	ST	CD/CH
Hill Creek	45	SP	HV/HA	55	ST	CD/CC
Horsetail Creek	38	SP	*****	62	ST	CD/CH
Humbug Creek	22	ST	HA/HV	68	LT	CD/CH
E. Humbug Ck.	27	SP	HA/HV	63	ST	CD/CC
Mansfield Ck.	32	SP	на/ну	68	LT	CD/CC
NF Breitenbush	46	SP	HA/HV	54	ST	CD/CC
Short Creek	12	SP	HV/HA	88	ST	CD/CH
Wind Creek	20	SP	HA/SS	80	SP	CH/CC

① CPS = Cubic Feet Per Second
② CR = Gravel, CO = Cobble, LB = Large Boulder
② Fish Species: 1 = Cutihreat trout, 2 = Rainbow Trout, 3 = Sculpin, 4 = Eastern Brook Trout, and 5 = Dace.
③ Large wood is defined as at least twice the bank full width or 50 feet and at least 24 inches in diameter at that length.

<sup>(1)</sup> Hardwood dominated riparian zone.

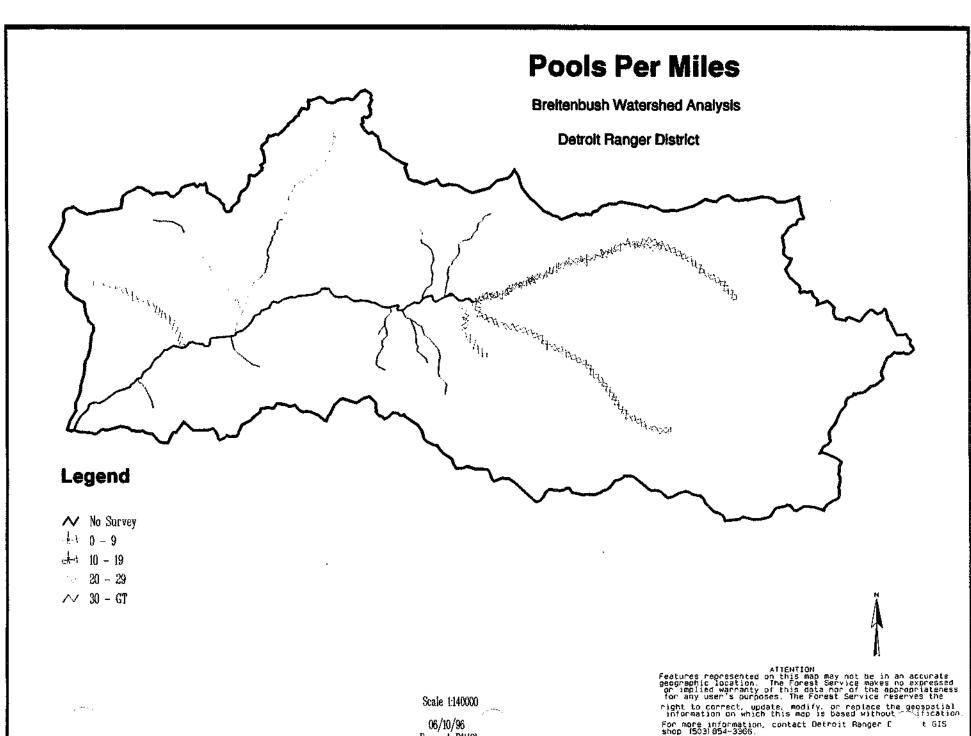
(2) Size classes (d.b.h.): SS = Shrub/Scodling, SP = Sapling /pole(<2°), ST = Small Tree(8°-20.9°),

LT = Large Tree(21°-32°)

(2) Dominate Vegetation types: HV = Vine Maple, HA = Alder, HW = Willow, HR = Bigles f Maple,

(3) Conifer dominated riparian zone.

(3) Dominate Vegetation types: CD = Douglas Fir, CH = Hemlock, CC = Cedar



Request R1112b

Streams in the watershed range in size from Cliff Creek, only a few feet across to the main stem of the Breitenbush River which is more than a 100 feet across in places. Detroit Reservoir, at full pool, covers about one mile of the lower Breitenbush River within the watershed analysis area and about one mile outside. Stream gradient ranges from 2% or less in the North Fork of the Breitenbush River, to 25% in Bummer Creek. Structure in the form of large wood varied greatly in 1995. The largest amount (110 pieces/mi) was found in Horsetail Creek and the lowest (3 pieces/mi) in Humbug Creek. In general the larger streams have lesser amounts of large wood than some of the smaller streams. The one exception is the North Fork of the Breitenbush River, where large wood averaged 76 pieces per mile. The lower reaches of the North Fork are broader depositional areas that wood from upstream areas tends to settle out on. This probably accounts for the higher amounts of large wood.

Fish were found in all of the streams surveyed in 1995. Salmonids were the most common and were found in all of the surveyed streams.

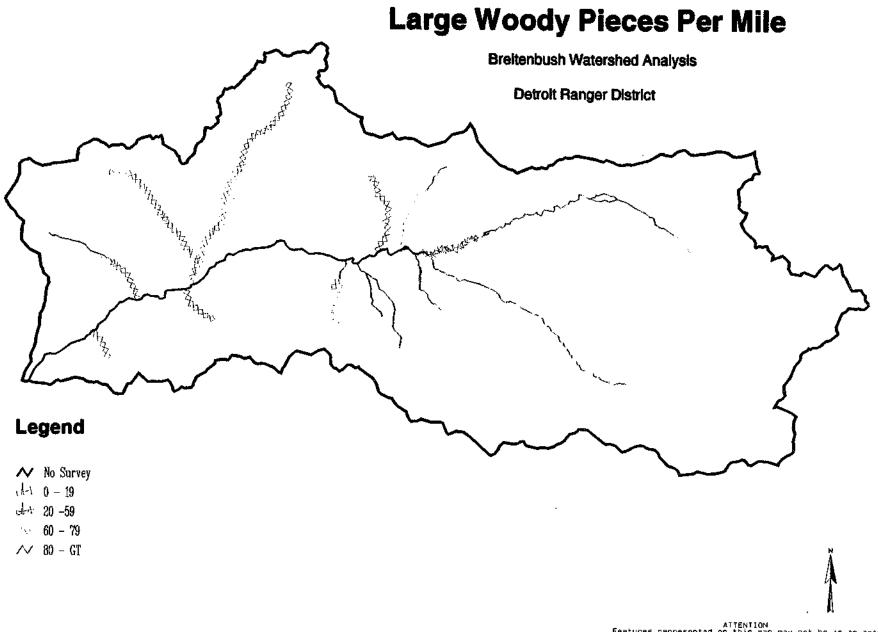
Cutthroat trout were generally found in the smaller streams and higher reaches of larger streams. There is no good information detailing their population trends, but is it estimated that cutthroat population levels are relatively stable. Flood impacts may have heavily impacted populations in some streams such as Leone Creek and Mansfield Creek, however.

Rainbow trout were found in the larger streams and in the lower reaches of the smaller streams. Population trends for wild rainbow trout in the mainstem of the Breitenbush River may be masked by the stocking of 20,000 hatchery raised rainbow trout each year. The condition of wild rainbow trout is unknown at this time.

Sculpin species were found scattered around the watershed. They were probably more abundant than the surveys indicated as they can be difficult to shock and to see while snorkeling. One dace was found in Short Creek and a lone Eastern Brook trout was found in Leone Creek, below Leone Lake. Leone Lake is stocked with Brook trout.

Kokanee salmon were introduced into Detroit Reservoir and run a short distance up the Breitenbush River in the fall to spawn just below a small falls near the mouth of Wind Creek. The success of this spawning is not fully known. At this time the Oregon Department of Fish and Wildlife regularly stocks kokanee in Detroit Reservoir to maintain the population at fishable levels. Spring chinook salmon and winter steelhead used to pass easily above the falls but kokanee are poor jumpers so are restricted to below the falls.

Besides the stocking of 20,000 rainbow trout each year, in the mainstem Breitenbush, the lakes in the watershed are stocked with fingerling size rainbow, cutthroat and brook trout on two to three year rotations. The primary stocking



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method is helicopter for the lakes and truck for the streams.

ii) Where are the year-round cold water sources areas for the streams in the Breitenbush, and where can their contribution be identified as important to the maintenance of cool stream temperatures?

A review of temperature data gathered in 1995 for 11 streams in the watershed indicates that no one stream seems to dominate temperature for the drainage. There are a number of other streams that haven't been monitored for temperature that may contribute to maintenance of cold stream conditions. It may be there are no significant cold water streams due to the geology of this system. Temperature moderation may be a function of stream morphology and stream side vegetative cover.

iii) What and where are existing fish habitat improvements in the watershed?

Fish habitat improvements in the Breitenbush watershed are found primarily in Devils Creek. A section of stream approximately one mile long, near the Devils Creek summer homes, was improved in the early 90's through the introduction of large woody material and boulders. This increased habitat complexity, increased the number of pools, and helped to stabilize eroding banks. These structures generally held up well during the 1996 flood event.

Logs and boulders were also placed below a culvert in Humbug Creek to improve fish passage. These structures were moved around during the flood and will need maintenance to regain full effectiveness.

iv) How does the current condition of the aquatic habitat relate to future reintroductions of winter steelhead and spring chinook salmon?

While conditions are not optimal for fish production, the habitat should be able to support populations of spring chinook and winter steelhead.

#### b) Reference Conditions

I) \*What was the historical relative abundance and distribution of species of concern and the condition and distribution of their habitats in the watershed?

Spring chinook, winter steelhead, bull trout, cutthroat trout, and whitefish historically moved up the North Santiam River system on their annual spawning runs. Literally thousands of salmon and steelhead then came up the Breitenbush River to spawn. The steelhead spawned in the spring and then drifted back down the river towards the ocean. A small percentage probably survived to spawn again. Spring chinook and bull trout spawned in the late summer and early fall. The spring chinook all died after spawning but most bull trout survived to spawn again. The cutthroat trout and resident rainbow trout spawned in late winter and spring, while

the whitefish spawned in late fail and winter. The migratory populations of these fish probably moved up from the lower river to spawn in tributaries in the Breitenbush watershed.

The Racks: Fish racks, installed at Detroit in the early 1900's, blocked most salmon and steelhead from completing their migration to their spawning grounds. The racks may very well have affected bull trout populations as bull trout were considered unwanted predators at the time and may have been killed when found at the racks. The racks probably had little affect on the other species of fish present.

The Dams: With the construction of Detroit and Big Cliffs Dams in the mid-1900's, fish migration was again disrupted, as there were no fish ladders incorporated into the design of these dams. Spring chinook and winter steelhead, could no longer reach historic spawning and rearing areas in the upper North Santiam River and the Breitenbush River. Marion Forks Fish Hatchery was constructed as mitigation for the resultant loss of fish production.

Not so obvious at the time, was the potential impacts to bull trout that was also migratory. The large adult fish may have spawned in the upper Breitenbush River as well as the larger tributaries to the river. After spawning the large fish would have moved back downstream to the larger rivers where they spent the majority of their time. The dams would have shut off this migratory pattern and may have been the final action that contributed to the loss of bull trout in the Breitenbush watershed. In some systems a lake or reservoir is used by adults instead of a large river system. There doesn't seem to be any indication this has happened here as no bull trout have been seen in the North Santiam or Breitenbush Rivers for over 30 years.

Cutthroat trout in the Willamette Basin are also known to be migratory, in that populations in larger systems tend to run up into tributaries to spawn. It is not really known how much interaction these migratory populations historically interacted with resident populations. This interaction may be important in maintaining healthy gene pools in both the resident and migratory populations. The building of the dams has severed this connection. There is no information on what the long term effects may be, if there are any.

Stocking Fish in Lakes: There are over 100 lakes and ponds found in the Breitenbush watershed. They range in size from unnamed ponds less than 5 acres to Breitenbush Lake that is over 50 acres. Historically these lakes and ponds were probably devoid of fish life. There primary inhabitants were aquatic insects and amphibians along with transient visitors such as waterfowl and mammals. As European man moved into the area fish were introduced into the more accessible lakes. Starting in the 1920's, the old Oregon Fish Commission, with help from the U. S. Forest Service, began a major push to introduce fish to as many lakes as possible.

Little thought was spent on how this activity might be affecting these natural

ecosystems. The only questions that came up during this process were primarily in relation to what fish was best adapted to survive in the lakes and provided anglers a good catch. Numerous native and non-native fish species were tried, including rainbow trout, cutthroat trout, brown trout, and Eastern Brook trout. The brook trout, a non-native species, did the best in many of the lakes and became an legacy of these early days of fish management. It is very competitive with other fish in streams and lakes it is adapted too. To date, brook trout have not established themselves outside of the lakes in the Breitenbush watershed. The 1995 survey only found one brook trout in Leone Creek below Leone Lake. The only known, well established brook trout population in the North Santiam River system is in the upper North Santiam in the Big Meadows area.

#### c) Comparison of Current and Reference Conditions

\*What are the natural and human causes of change between historical and current species distribution and habitat quality for species of concern in the watershed?

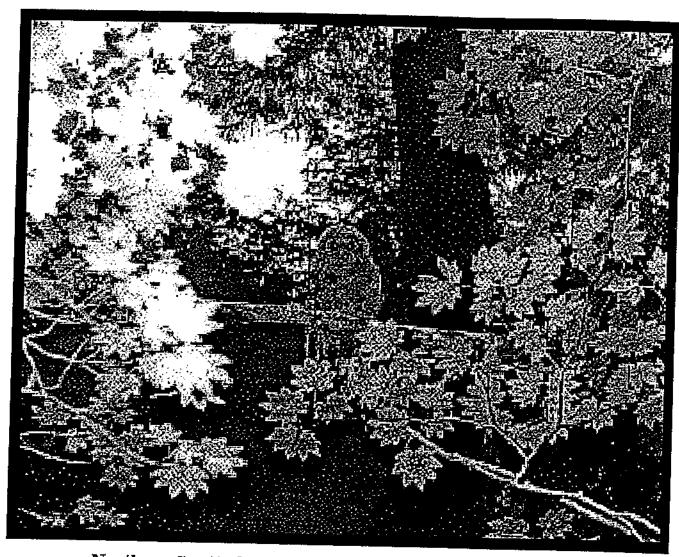
Natural causes of change include fire, wind and major flood events. Over hundreds and thousands of years these actions have modified fish habitat, both positively and negatively. Populations of rainbow and cutthroat trout in the Breitenbush watershed have reacted accordingly.

Human causes of aquatic habitat change include timber harvest, timber salvage, road building and other development near streams and rivers. These activities have affected fish habitat through direct disturbance of streams, input of fine sediment, removal of stream side cover, increased temperature, removal of large woody material, removal of future large woody material, and by straightening and simplifying stream channels.

Major human causes of changes in fish species distribution include the construction of Detroit and Big Cliff dams and the placement of the racks on the river in the early 1900's.

Fish stocking, especially in previously fishless ecosystems, could totally change the ecosystems dynamics. For instance, you could see major downward changes in zooplankton populations, in populations of larger aquatic insects and in amphibians. There could be changes in phytoplankton and other aquatic plants, etc.

## IIIB. Wildlife - Terestrial Species



Northern Spotted Owl in the Breitenbush

### BIOLOGICAL DOMAIN

### C. Species and Habitats - Terrestrial Wildlife

#### 1. Characterization

a) What is the relative abundance and distribution of species of concern that are important in the watershed (e.g. threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

This analysis will primarily focus on the following species: peregrine falcon, bald eagle, northern spotted owl, red tree vole and big game. Habitats of interest that will be discussed include snags and down wood habitats and a special wildlife area designated in the Forest Plan. There will also be a general overview of other species of concern and their potential habitats within the watershed.

#### Endangered species

Peregrine Falcon (<u>Falco peregrinus anatum</u>)

There is one known peregrine falcon eyrie within the Breitenbush watershed. Disclosure of the location of the site is prohibited without approval, as this is sensitive information. This site was located in 1992 and has successfully fledged young every year except this year (1996).

Currently there is a mosaic of habitats within a three mile radius of the nest site, providing a good mix of talus, rock cliffs, early successional and late successional habitat. The Urban Link Trail, which could potentially impact the peregine, is proposed in the vicinity of the nest site.

The management goal for the Peregrine Falcon Management Unit, which includes the Breitenbush watershed, is two stable pairs. The Willamette National Forest, which is also within the same unit, has 11 established pairs, well over the established management goal for this area.

#### Threatened species

#### Bald Eagle (<u>Haliaeetus</u> <u>leucocephalus</u>)

Bald Eagle habitat within the Breitenbush watershed exists primarily along the North Fork Breitenbush River and around high elevation lakes. This habitat is in fair to good condition.

The Bald Eagle Management Zone (Zone 12), which includes the Detroit Ranger District and Breitenbush watershed, has a recovery population goal of 25 breeding pairs and a habitat management goal of 42 pairs. The Willamette National Forest, which is in this zone and includes Detroit Ranger District, has 9 occupied sites, 8 of which were active in 1995.

Two of the Forest's 9 bald eagle sites exist on the Detroit Ranger District, but neither are in the Breitenbush watershed; however, approximately 300 acres of the Kinney Creek Bald Eagle Management Area lie within the watershed.

#### Northern Spotted Owl (<u>Strix occidentalis caurina</u>)

There are 20 northern spotted owls with home range centers inside the Breitenbush watershed. Eight of these owls are in Late Successional Reserve (LSR) R0214.

Late Successional Reserve R0214 makes up approximately 23% of the Breitenbush watershed. It comprises approximately 14,559 acres and is located in the east side of the watershed bordered by the Mt. Jefferson Wilderness.

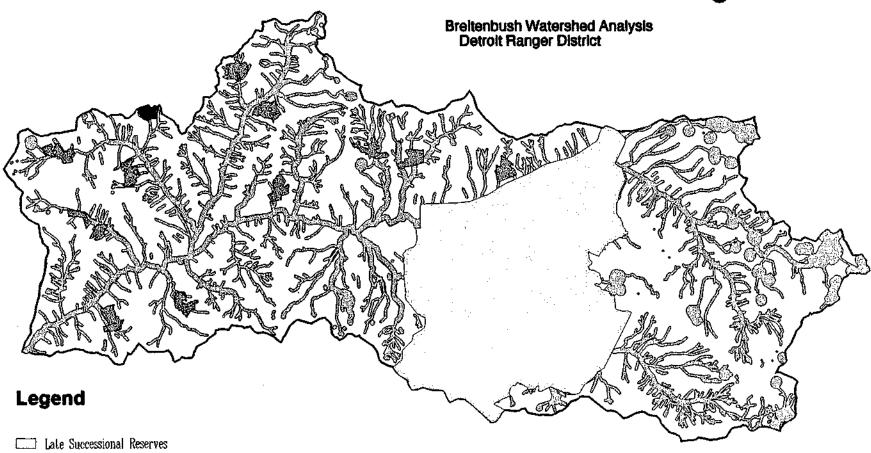
LSR R0214 has the following habitat available for spotted owls within the Breitenbush watershed:

Type of Habitat	Percentage of LSR
Nesting	14%
Foraging	32%
Dispersal	24%
Atypical nesting or foraging*	1%

"Not typical habitat but spotted owls were either present or used the areas.

The nesting habitat within the LSR is scattered throughout the area in small

### **Wildlife Habitat Designations**



Late Successional Reserves
Spotted Owls

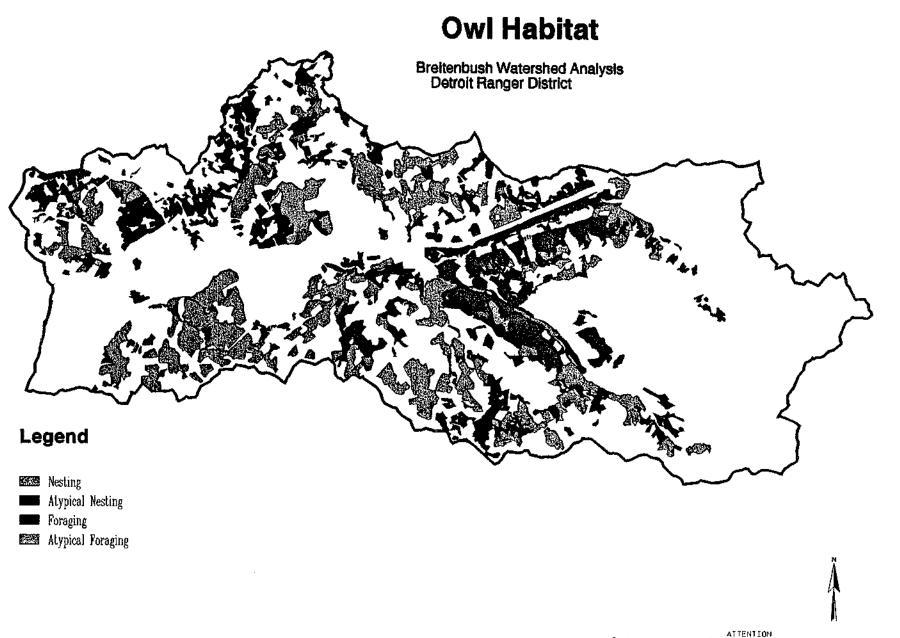
Riparian Reserves

Special Wildlife Habitat



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patches averaging about 60 to 100 acres in size. Foraging habitat is usually found in large linear blocks, especially along Devils Ridge and the north-facing slope along the North Fork Breitenbush River. There are also some mid-sized patches of habitat between Skunk Creek and Devils Creek. The rest of the LSR is fragmented with both nesting and foraging patches. Within the LSR, there are also large openings or non-habitat from previous harvest activities. These are located in the South Fk. Breitenbush, Roaring Creek and Upper Devils Creek. It will take approximately 80 to 150 years before late successional characteristics could be attained here.

#### Record of Decision, Table C-3 Species

#### Red Tree Vole

The population of red tree voles in the Breitenbush drainage is unknown at this time. The vole is important as a prey species for the spotted owl, as well as, other owls, martens and fishers. It tends to be more abundant in mature and old growth stands, which provide optimum habitat. Fragmentation of old growth is a concern for this species.

The red tree vole is a survey and manage - Category 2 species. Direction for these species is to survey prior to initiating activities and manage sites accordingly. The protocol for surveys is currently being developed.

#### Other Species or Habitats of Interest

#### Big Game

Deer are abundant in the Breitenbush watershed. Elk are also present, but not in the numbers that deer are.

The Wisdom Model was used to determine big game habitat effectiveness in the Breitenbush. The model shows that forage is limiting not only in winter range, but in summer range as well. This may not be an entirely accurate depiction of all areas, because the computer model does not represent forage generated in thinning stands well. In some thinned areas, there may actually be more forage than predicted by the model.

Road densities, another component of habitat effectiveness, exceed desireable levels throughout the watershed in winter range and in three Management Emphasis Areas (MEA) (figure III-) in summer range.

The primary termal cover in the watershed is in the Mt. Jefferson Wilderness and above road 46 while the upper Humbug area provides the primary optimal cover for big game.

#### Snag and Down Woody Habitat

Snags and down woody material are below desired levels in many areas of the watershed, primarily on managed stands and in areas of past fires.

Changing management requirements, coupled with a major wind storm in 1990, heavy snow breakage, a flood in 1996, spruce budworm infestations, and fires have contributed to increasing numbers of snags and amount of down wood in some areas of the watershed in recent years.

#### Special Wildlife Habitat Area

Dunlap Lake was designated in the Forest Plan to protect or enhance unique habitats and botanical sites which are important components of healthy, biologically diverse ecosystems. Dunlap Lake does not seem to fit the Forest Plan definition of a special wildlife habitat area. It has low species and habitat diversity. In addition, the area receives moderate recreation use, which may affect habitat usability.

The following is a list of species, not mentioned previously, that have potential habitat within the watershed. An \* next to a species denotes species seen in the watershed through observation by district personnel.

#### Record of Decision, Table C-3 Species:

- Great Gray Owl \*
- Black-backed Woodpecker
- Lynx
- Fringed Myotis

- Silver-haired Bat
- Long-eared Bat
- Long-legged Bat
- Pallid Bat

#### Appendix 1-2 Species:

- Cascade Torrent Salamander
- Tailed Frog
- Clouded Salamander
- Oregon Slender Salamander
- Common Merganser \*
- Hoary Bat
- Fisher
- American Marten

#### **R-6 Willamette National Forest Sensitive Species:**

- Red-legged Frog \*
- Northwestern Pond Turtle
- Harlequin Duck \*
- Greater Sandhill Crane
- Townsend's Big-eared Bat \*
- White-footed Vole
- Invertebrates

#### **ODFW Sensitve Species List**

- Wolverine
- Barrow's Goldeneye

Seventeen guilds (groups of species using the same habitat in a similar way) are represented by this list of species of concern. These guilds should be considered for emphasis in future management activities to assess impacts to these species of concen's habitats.

### 2. What values are associated with species and habitats?

- a) Species and habitats have aesthetic, economic, recreational, and spiritual value.
- b) Native wild gene pools have ecological value.
- c) Native species have value to ecosystem function.
- d) Habitat components necessary to sustain the variety of species indigenous to the area has ecological values (i.e. habitat distribution, connectivity, etc.)

## 3. What are the highest priority issues or resource concerns associated with species and habitats?

- a) Having habitat components necessary to sustain a variety of species native to the area.
- b) Conflicting habitat needs for various species (i.e. big game and spotted owls).

## 4. What are the management direction/activities, human uses, or natural processes that affect species and habitats?

#### a) Current Conditions

i) What are the current habitat conditions and trends for the species of concern identified above?

Habitat in the Breitenbush watershed was mapped into wildlife guilds, or groups of species using the same habitat in a similar way (Mellon, 1995). Within the Breitenbush watershed, there are 24 wildlife guilds represented.

Contrast Species: Preferred habitat for these species is a combination of early and late seral stages. Species of concern are golden eagles and great gray owls in the large home range guilds and Lewis's woodpecker in the small home range guilds. Another group of animals in this guild are big game (i.e. deer and elk).

There is habitat within both the Pacific silver fir and western hemlock zones. The habitat within this guild is concentrated in larger patches in Short Creek to Breitenbush Mountain, Devils Creek around Eagle Rock, and part of Cliffs Creek. There are also smaller fragmented blocks of habitat that are grouped together in East Humbug and Byars headwaters and Devils Creek headwaters around Spire Rock

that large home range species can use. Connectivity between patches in fair to good for medium home range species and minimal for small home range species. There are gaps within the habitat for this guild primarily in the Canyon Creek area, western and lower Humbug areas, Eagle Rock, Scorpion, and the wilderness.

Late seral habitat provides adequate snags and down wood, but in early seral habitat, snags and down woody material may be more limiting.

The Canyon Creek area and wilderness may never be able to produce late seral habitat needed for these species. Late seral habitat will likely increase within the LSR and riparian reserves and timber harvest will likely result in early seral stands being retained across the watershed outside the LSR.

<u>Generalist Species</u>: These species use a variety of seral stages. There are no species of concern in any of the home range size guilds in this watershed.

Habitat meeting requirements for generalist species is prevelant throughout the watershed. Snag and down wood availability is variable in the Breitenbush. Some areas have abundant habitat and others, especially in areas that were harvested prior to 1990, do not.

**Early Seral**: Species of concern in this habitat type are mountain quail which is a small home range mosaic species; and mountain bluebird and western meadowlark which are also small home range species, but they prefer patches.

Early seral habitat for species with varying home range sizes is widely distributed across the wateshed, mainly as a result of timber harvest, although significant patches of this habitat type are also a result of past fires, most notably around Eagle Rock. The major limiting factor in this habitat is lack of snags and/or down woody material due to past management practices and fires.

Late Seral: Species of concern in this habitat type are marten, fisher, pileated woodpecker, northern spotted owl, and northern goshawk in the large home range category; black-backed woodpecker and northern three-toed woodpecker in the medium home range category; and Oregon slender salamander, western red-backed vole, and Williamson's sapsucker in the small home range category.

Overall, highly suitable habitat is limited to places where the large patches of latesuccessional habitat remain in Leone-Hill Creeks, Devils Ridge, and the east facing slope into Humbug Creek and near the confluences of Leone and Hill Creeks. The Pacific silver fir zone has the majority of the highly and moderately suitable habitat in the watershed. Most of the highly suitable habitat contains adequate numbers of snags and down woody material.

Large home range species: connectivity is good in the eastern half of the watershed. But as you move west, connectivity lessens.

Medium home range species: Species of concern in this category, the black-backed woodpecker and northern three-toed woodpecker, are mainly found in the mountain hemlock zone or upper elevations, where there is virtually no habitat in this watershed. Gaps in habitat for medium home range species are most critical in the upper elevations, mainly the wilderness.

Small home range species: Connectivity is fair to good, with the most isolation occurring on the west slope of East Humbug Creek, however this borders the wilderness which offeres connectivity outside the watershed. Gaps occur in Wind and Slide Creek area and around Eagle Rock.

**Riparian:** Species of concern in this habitat type are common merganser, Harlequin duck, Cascade torrent salamanders, tailed frogs, Barrows goldeneye and the Bufflehead.

There are seven riparian guilds and one guild that focuses on special habitats. Of the seven riparian guilds, one guild focuses on the aquatic portion of the habitat, three guilds represent species using both the aquatic and terrestrial riparian vegetation and the remaining three guilds represent species using only the terrestrial riparian vegetation. These are further divided by the seral class in which they occur.

There are 5,016 acres of inventoried special habitats within the watershed, 5% of which are water. Most of the water is comprised of lakes which are primarily found in the wilderness or the Olallie Lake Scenic Area. For the riparian guild which focuses on the aquatic portion of the habitat, Detroit Lake, Dunlap Lake, Leone Lake and the lakes in the wilderness and the Olallie Lake Scenic Area probably provide the greatest amount of suitable habitat. There are several smaller ponds but these may not be large enough to support some species within the guild.

Riparian guilds, focused on riparian habitat in the early seral stages, comprise about 18% of the riparian reserves in the watershed. These areas are concentrated mainly in the Eagle Rock fire area, Slide Creek, lower Byars Creek, and Canyon Creek. There are also riparian areas which are highly fragmented. These are located in Mink Creek, East Humbug Creek, Devils Creek, and Hills Creek. The majority of these are concentrated in the southwest portion of the watershed. Connectivity out of the watershed is fair. Links out of the watershed can occur via East Humbug

Creek, Eagle Rock area and Canyon Creek.

Riparian guilds, focused on habitat in the mid to late seral stages, comprises 69% of the riparian reserves in the watershed and is widely distributed throughout. The major concentrations of late seral habitat occur along the main stem of the Breitenbush River, South Breitenbush River, Mansfield Creek, the upper reaches of East Humbug Creek, the upper reaches of Byars and Humbug Creeks, Cliffs Creek and portions of Leone and Hill Creeks.

Riparian guilds focused on habitat regardless of seral stage satisfies the generalist species. This guild should be well provided for within the watershed due to a mix of seral classes throughout the watershed.

<u>Snags and Down Woody Material</u>: The current condition of snags and down woody material are displayed in the graphs below. Averages were developed for various stand types and changes in management for different time periods.

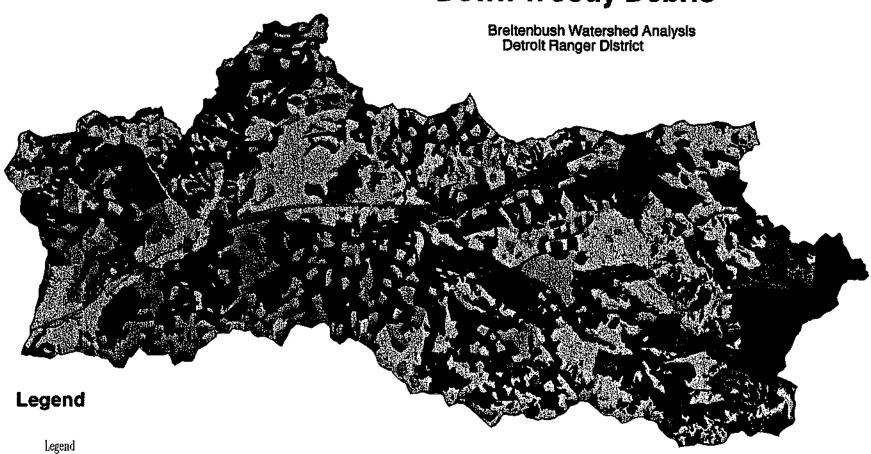
Snag levels will be retained in harvest units to comply with Forest Plan standards and guidelines. Within the LSR, snags will be created across the landscape as late-successional habitat is developing. Thus, snag levels should increase in this area. Snags will continue to be created either by disease, wind, etc. Levels should average out across the landscape as snags are created in harvest units, but many natural snags will be lost due to harvest activities and OSHA requirements. Fire suppression will also continue, which will allow stands to mature, resulting in larger snags. However, the possibility of snags being created by fire may be lost. Snags can be created in areas where levels are deficient that are adjacent to harvest units by means of KV funding. Snag levels in riparian reserves will continue to increase as well.

There are areas of the watershed that may never produce the size and quantity of snags required by Forest Plan standards and guidelines. These include the wilderness and the Canyon Creek area due to high elevation and rocky ground.

Besides these areas, snag levels are below standards and guidelines in Short Creek, Eagle Rock, and Scorpion Creek. On the other hand, snag levels are adequate or exceed standards in the Humbug, Cliffs Creek, Devils, and parts of Skunk Creek.

Down woody material: A minimum of 240 linear feet/acre will be retained on future harvest units, unless higher levels are prescribed or ecosystem conditions are such that they cannot support this much down woody material. Within the LSR, levels will continue to increase as late-successional stands develop. Down woody material will continue to be created by wind, disease, etc. This will probably occur along

## **Down Woody Debris**



High

Medium High

Low Medium

.0%

Non Forest

Pvt



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edges of harvest units and ridgetops. As with snag levels, down woody material levels should even out across the landscape over time. Levels within riparian reserves will increase. Fire suppression will allow habitat to mature creating larger diameter wood. Down woody material will not be consumed as frequently due to fire suppression efforts. Wilderness areas and the Canyon Creek area may not produce desired levels or sizes of down woody material because of rocky soils and/or high elevation growing sites.

The following table defines the number of snags and tons of down wood per acre for each of four rating classes (low, low-med, med-high, and high) used in the graphs below.

Rating Class	Snags (# per acre)	Down Woody Material (tons per acre)
Low	<1	ধ
Low - Medium	1-4	5-17
Medium - High	5-7	18-30
High	8+	30+

Assumptions in querying snag and down woody material:

Snead	
ЭЦЕКЗ	

(Low) - pre-1990 harvested units (Low-Medium) - stands 9.0" - 20.9" dbh, natural (Medium) - post 1990 harvest units

(Medium) - post 1990 harvest u (Medium - High) - stands 21" - 31.9" (High) - stands 32"+

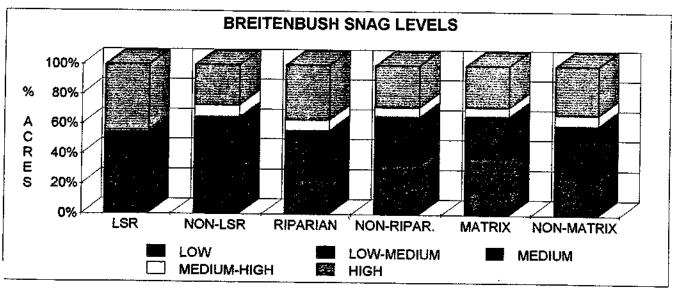
#### Down Woody Material

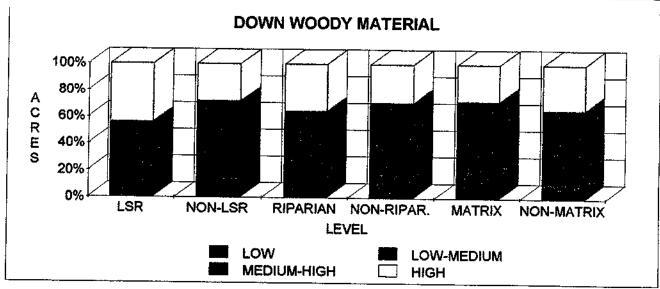
(Low) - harvested units (1970-1990) (Low - Medium) -stands 9.0"-20.9" dbh

(Medium - High) - stands 21"-32" dbh, pre-1970

harvested units, and post 1990 harvested units

(High) - stands 32"+ dbh





# ii) What are the risks to maintenance of late-successional habitat within the late successional reserve?

Fire is probably the biggest risk to maintenance of late-successional habitat within the late successional reserve (LSR) in this watershed. The following factors contribute to this risk by fire: the fire history of the watershed, the incidence of human and lightning caused fires, and high fuel loading in some areas from snow breakage or tree mortality caused by insects, etc.

Although most of the owl habitat within the LSR is currently moderate to low fire hazard, there are a few areas mainly along ridges and on drier site types where fire hazard is high. Owl pairs 14, 66 and 89 would likely be affected the most by a significant fire event. There is also a large patch of foraging habitat along the wilderness boundary, near Crown Lake, that provides important dispersal habitat that could be at risk from wildfire.

To date, most of the spruce budworm infestations in the Breitenbush watershed have occurred outside the LSR. However, in 1992 approximately 3,200 acres of Outerson and Skunk Creek areas showed signs of budworm infestation which affected some spotted owl nesting and foraging habitat. Most of the infestation was in smaller patches of habitat, but one mid-sized patch of nesting habitat was affected. This infestation may provide greater diversity for the area by increasing the amount of snags and later on, the amount of down woody material. However, it will decrease canopy closure but may create gaps which are important in older forest ecosystems.

Approximately 75% of the budworm infested area is rated as medium to high fire hazard. Of this, approximately 30% is nesting habitat and 20% is foraging habitat, so potential for loss of habitat from wildfire is great. Two known spotted owl pairs are located within this area.

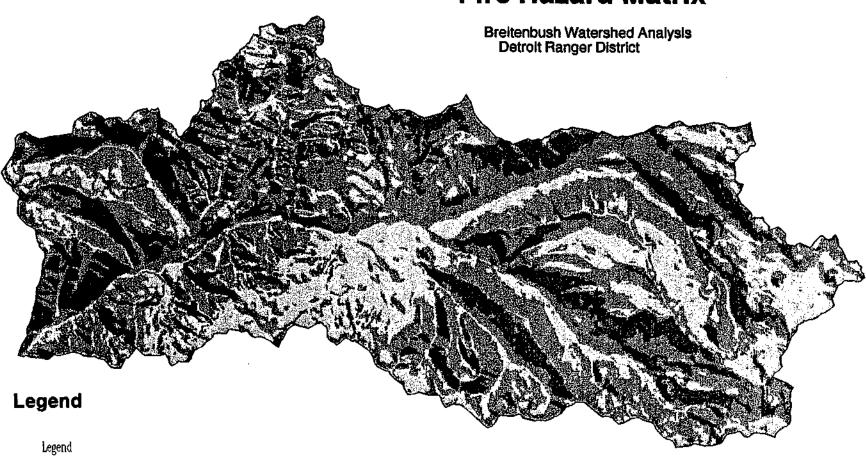
Most of the nesting habitat within the LSR is located in the southwest corner, near the budworm infestation, making it crucial to try and retain this habitat. If a fire event were to occur in this area, it may also hinder dispersal due to the juxtaposition of habitat. It would also reduce the number of pairs within the LSR.

In some areas of late-successional habitat, in the watershed, there is considerable down woody material due to snow breakage this past winter, build up over the past few years, and increased insect mortality. If a significant fire event were to occur, existing late-successional habitat may be jeopardized, especially in and adjacent to the LSR. These fires would probably burn hotter and grow larger due to some of these conditions. Fuel loading reductions may be necessary in some areas to prevent a large scale loss of habitat. This may also be required in the LSR. Adequate amounts of down woody material should be left but reducing levels in specific areas may reduce the chances of a major fire event.

# iii) How do existing habitat conditions provide for spotted owl dispersal outside the late successional reserve?

Dispersal habitat was assessed using the "11-40" rule. This requires a quarter township to have at least 50% of the habitat at 11" dbh or greater and 40% or

# **Fire Hazard Matrix**



High Hazard

Medium Hazard

Low Hazard



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greater canopy closure to provide adequate dispersal capabilities.

Dispersal habitat outside the LSR is good within 16 of the 22 quarter townships containing >60% of their acreage as dispersal habitat or better.

Of 22 quarter townships in the analysis area, the following is a break out of the condition of the quarter townships.

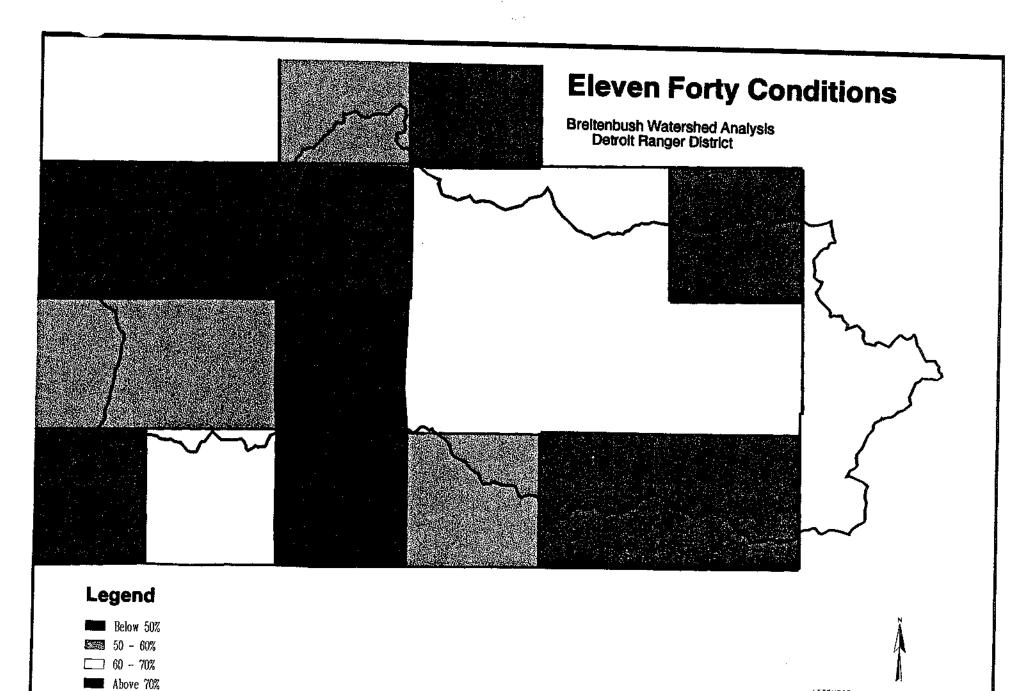
Above 70%	- 9 QT's
60 - 70%	- 7 QT's
50 - 60%	- 4 QT's
Below 50%	- 2 QT's

There are two quarter townships that are below 50%, 09062 and 10061. Quarter township 09062 encompasses the Eagle Rock area which is an area of young stands due to a fire occurrence and harvest activities. This quarter township is currently at 39.8% for 11-40 conditions. Riparian reserves within this quarter township show little dispersal capability now (Cultus Creek and tribs). It is estimated that this area will not meet 11-40 conditions for 30-40 years to come.

Quarter township 10061 is almost entirely outside the watershed, except for a few acres, but it is important because it is currently at 49.7%, it contains a linear band of private land near the watershed boundary, and more harvest can be expected on this private land. Because of the orientation of the private land along the southern watershed boundary and projected harvest activities, this private land may limit dispersal over time. For these reasons, it is important to maintain connectivity through this area.

Santiam Pass Area of Concern (AOC): The northern portion of the Santiam Pass Area of Concern lies within the watershed and covers most of the area below Road 46. This area was identified by U.S. Fish and Wildlife Service because of a concern for limiting intra-provincial movement and owl distributions. The US Fish and Wildlife Service noted that population levels are low within this area and that habitat quality and quantity are greatly reduced. The Santiam Pass AOC does not cinclude the majority of the Eagle Rock fire area. This may add to dispersal problems in this area. Four known pairs lie within the Santiam Pass AOC. Two of these are in a take situation while the remaining two are near the 40% level.

Connectivity: Connectivity from the Late Successional Reserve (LSR) to matrix lands is variable. In some areas connectivity is pretty good while in other areas fragmentation may be hampering dispersal. The area around the Eagle Rock fire provides minimal connectivity and in fact may be a barrier to dispersal. Connectivity



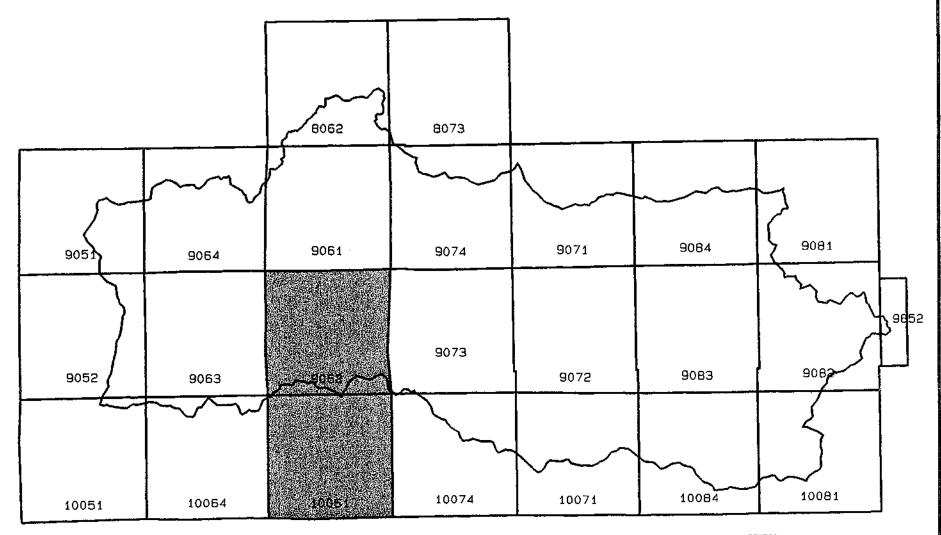
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# **Quarter Townships below 11-40**

Breitenbush Watershed Analysis Detroit Ranger District



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to neighboring Late Successional Reserves is fair, with fragmentation being the major issue.

iv) What is the condition of the riparian reserves in the watershed in terms of spotted owl dispersal habitat and the distribution of those conditions?

Under the amended Forest Plan, one of the objectives of riparian reserves was to serve as connectivity corridors among the Late-Successional Reserves. The specific issues addressed by riparian reserves for spotted owls is retention of adequate habitat conditions for dispersal. Riparian reserves, in the Breitenbush watershed, were analyzed for dispersal habitat conditions using the 11-40 Rule. Even though the 11-40 Rule is not a standard and guideline, it was used for lack of a better method to determine adequate dispersal habitat.

Overall, riparian reserves within the watershed are in good condition with approximately 70% of the riparian reserves meeting 11-40 conditions. Many riparian reserves are in better shape than the surrounding quarter townships in which they are located.

Riparian reserves in quarter township 10064 fall below 50%, but only a small portion of this quarter township is within the watershed, in the headwaters of Wind and Slide Creeks.

Riparian reserves in quarter township 09062 are near minimum levels at 50.8%. While the entire quarter township is below 50% due to the Eagle Rock fire. There are three main creeks within the quarter township, Cultus Creek, Cliffs Creek, and a Leone Creek tributary. Cliffs Creek has remained fairly intact and is typed as old growth. The Leone Creek tributary is highly fragmented, while the majority of Cultus Creek is in a stand initiation stage.

Overall, riparian reserves in the Late Successional Reserve are in good shape with the exception of the headwaters of Skunk Creek which are heavily fragmented.

v) What is the condition of big game habitat relative to land management planning standards and guidelines for habitat effectiveness? Does the current big game network meet standards and guidelines of the NW Forest Plan?

There are several trends showing up from an analysis of Habitat Effectiveness using the Wisdom Model. Every Management Emphasis Area (MEA) is below standards and guidelines (S&G's) for forage overall and in winter range with the exception of Slide MEA. However, because of limitations of the model, more forage may be available than the model displays. For instance, thinning units provide forage which is not well represented by the model.

Devils, Short and Slide MEA's exceed acceptable road densities overall and all MEA's exceed acceptable road densities in winter range.

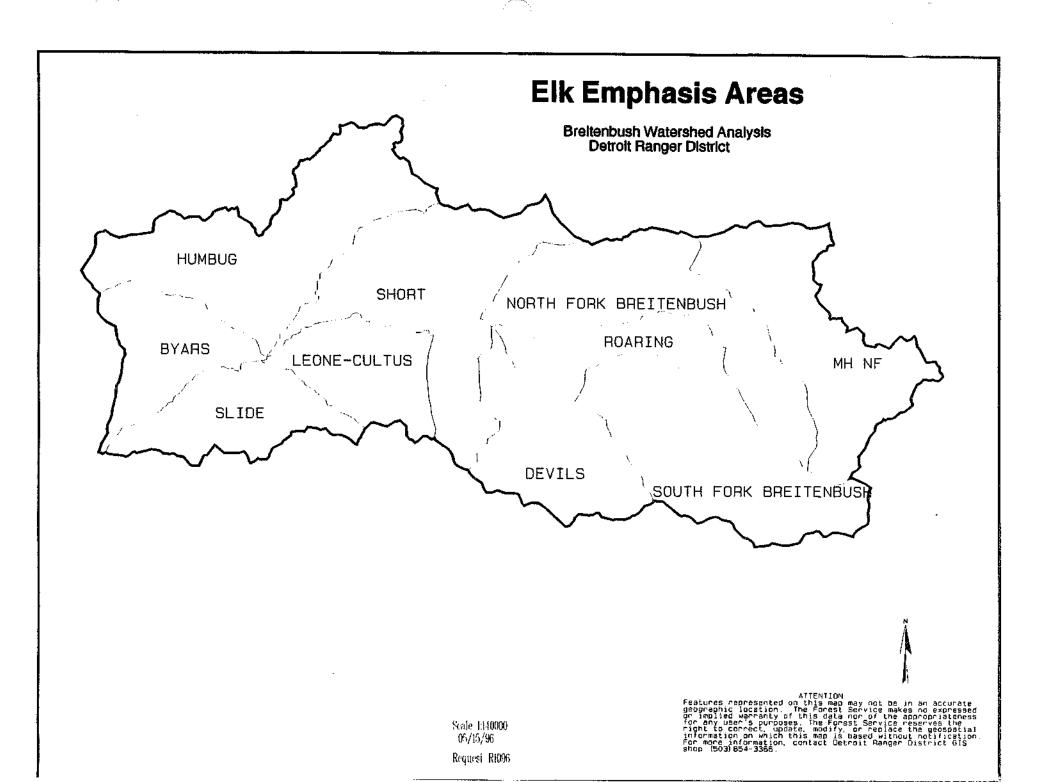
The Habitat Effectiveness Index (HEI) is below standards and guidelines in Humbug and Short MEA's where forage is very limited. Roads may also be a factor in bringing the Habitat Effectiveness Index of the Short MEA below standards and guidelines. There has been a fair amount of thinning in these areas which may be providing some forage that is not well represented in the Wisdom Model.

Because of the overall lack of forage in the watershed, big game may be turning to some of the special habitat areas for forage. These areas may become overutilized is some cases, thus degrading habitat for other species and in turn, decreasing the amount of available forage.

The Mt. Jefferson Wilderness and the area above Road 46 are primarily thermal cover and Upper Humbug is primarily optimal cover. Below Road 46, optimal and hiding cover are interspersed with forage. There are a fair amount of shelterwoods in this watershed which provide forage for big game, however, most of the forage represented in this watershed is of a lower quality than it could be.

Conflicting Habitat Objectives: The Breitenbush watershed contains several different land allocations but three main ones exist as a result of the Northwest Forest Plan (Late-Successional Reserves, Riparian Reserves and Matrix). These land allocations require that different objectives be met over the landscape.

A portion of Late-Successional Reserve (LSR) number RO214 lies within the watershed. Big game management objectives and late-successional reserve objectives are not entirely compatible. A small amount of winter range is present within the LSR. Cover will remain the same or increase with time providing higher quality cover. However, forage will become increasingly limited over time in the



LSR. LSR standards and guidelines do not allow harvest in stands over 80 years old so new forage creation opportunities in this area are limited.

In the LSR, thinnings may occur in stands less than 80 years old, for the purpose of enhancing late successional stand characteristics. For a time, these thinnings may provide lichens, etc. that serve as forage for big game, especially during the winter. However, edges will decrease, which may limit the use in this area. Special habitats may be over-utilized for a short time until the carrying capacity decreases. With the onset of the Northwest Forest Plan, Forest Service objectives for LSR's and Oregon Department of Fish and Wildlife objectives for big game are no longer in concert in these areas.

The majority of winter range follows riparian reserves and extends upslope from these. Riparian reserve objectives are compatible with providing high quality cover, but are counter to development of edges and forage. Over time, forage availability will decrease in these areas. Big game, along with many early seral associated species, will likely encounter population reductions under this senario until natural fire creates new habitat conditions.

In Matrix lands, where most of the timber harvest will occur, big game cover will likely decrease while forage increases. Open road densities could decrease due to lack of funding for road maintenance. Many short spur roads could be closed, which will lesson disturbance. Carrying capacity may decrease somewhat over time due to the limited amount of cover in matrix or the quality of habitat that is present. Thermal cover may be converted to hiding cover over time.

## vi) What and where are the unique special habitats in the watershed?

Special habitats represent a small percentage of the total watershed. The majority of these special habitats lie within the Mt. Jefferson wilderness and the Ollalie Lake Scenic Area. The following table depicts the different types of special habitats and the number of acres found in the watershed.

Figure III- . Special habitat types and amount

SPECIAL HABITAT	ACRES %
Alder	47
Cinder /Rock/Talus	3292
Dry Meadows	1
Moist to Wet Meadows	549
Moist Meadows	94
Shrub	774
Water	252
Wet Meadows	6

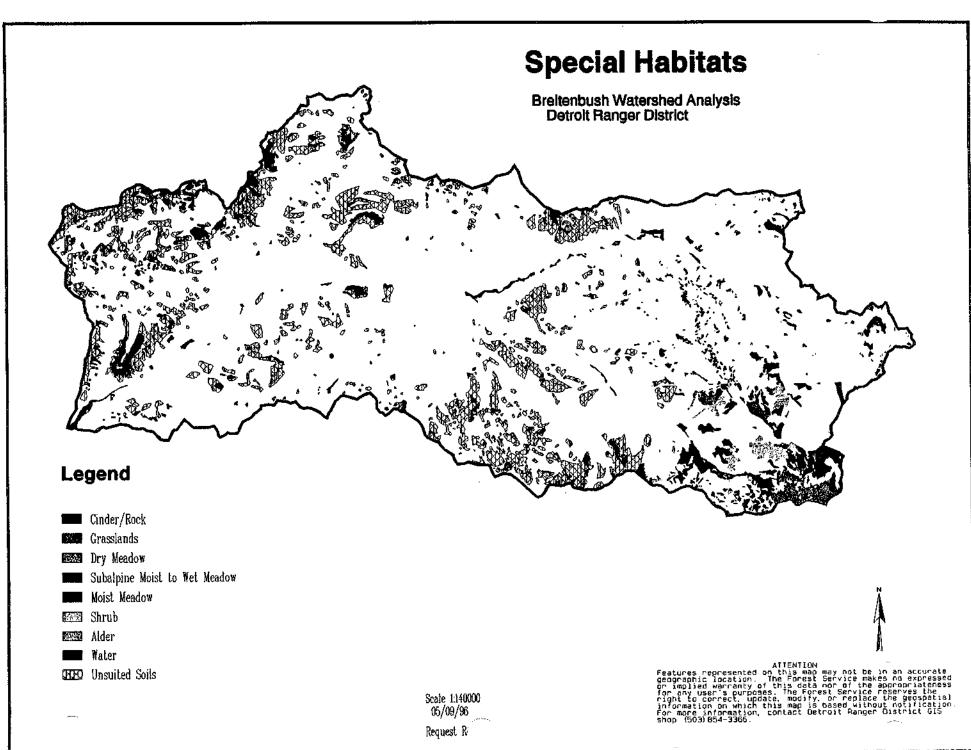
The map on the following page (figure III-\_) depicts the distribution of special habitats throughout the watershed.

Talus represents the largest component of the special habitats within the watershed. Species dependent on this special habitat are primarily the yellow-bellied marmot and pika. Other species do use this habitat type but are not totally dependent on it. Certain species of amphibians and reptiles can also be found in talus areas.

Shrub is the second largest special habitat component in the watershed. This habitat type provides habitat for a number of bird species and small mammals as well as some amphibians. Most of this component is associated with riparian reserves. It also provides a food supply for species like black bear and elk.

Moist and wet meadows are the third largest special habitat component. The majority of these are located within the Mt. Jefferson wilderness. Species like the sandhill crane and the spotted frog are dependent on this habitat type. Neotropical migrant songbirds also use this habitat type for hiding, nesting and foraging habitat.

Five species of concern are dependent on special habitats. Habitat for all five species is present within the watershed. However, pine habitat may be very limited and only occurs in the wilderness areas which may limit the presence of white-headed



## b) Reference Conditions

i) What was the historical relative abundance and distribution of species of concern and the condition and distribution of their habitats in the watershed?

Little is known of the historic abundance and distribution of wildlife within the watershed. Populations flucuate over time and species come and go as the habitats they depend on change through succession, catastrophic events or land management practices. Change is an inevitable and necessary attribute of biological systems.

Snag and Down Woody Habitat: Several historic fires have occurred in the Breitenbush watershed, resulting in highly variable snag and down wood densities across the landscape, depending on the severity of the fire.

## c) Comparison of Current and Reference Conditions

i) What are the natural and human causes of change between historical and current species distribution and habitat quality for species of concern in the watershed?

Some species which occur in the watershed have well documented trends in population declines over part or all of their range. Bats, amphibians, neotropical migrant birds, many cavity dependent species and fur bearers, are or have been, represented in the watershed and all have seen a general decline in numbers and distribution throughout their range. However, population declines may be due to more than just the watershed condition. Outside conditions also play a role. Widespread use of DDT and deforestation in Central and South American countries continues to effect many neotropical migrant birds, in addition to habitat impacts of the breeding habitat here in this watershed. Habitat loss throughout their range and loss of specific habitat components are beginning to show declines in many of these species.

The processes which shape the current forest landscape within the watershed also affect the species composition and abundance. Species which utilize a wide range of habitat types and seral stages such as the Roosevelt Elk or the American crow, are more likely to maintain relatively stable populations over time than a specific habitat dependent species such as the northern spotted owl, which may find itself homeless over large parts of its range due to catastrophic fires or harvest of old growth forests.

An analysis was done to determine differences in seral classes between 1996 and 1895 within the watershed. An accurate picture of 1895 stand conditions is difficult to assess because of the availability of information. A lot can be inferred from existing conditions and a lot can be pieced together from old photographs, etc. It was determined that there was approximately 12% more stand initiation and 22% more old growth in 1895 as compared with today's totals. Today there is more stem exclusion and stand reinitiation as compared to 1895. It appears that the structural stages are more evenly distributed today than in 1895. In 1895, the structural stages were more skewed, with the majority of the landscape being in stand initiation and old growth. This is only a small snap shot in time though. Conditions in 1695 may have been completely different.

Some assumptions can be made from these findings. Early and late seral species were probably favored in 1895, as well as, the large and medium home range species due to fire occurrence. Small home range species may have been eliminated or greatly reduced in areas due to the presence of fire, but these should have been very localized. Dispersal across these areas may have been difficult as well. During this period, mosaic and contrast species were probably not as abundant due to the nature of the openings. Fires tended to burn large areas. However, patchy fires may have provided habitat for these species though.

Most of the early seral habitat occurred in the Mountain Hemlock zone. This would have benefitted high elevation early seral species such as bluebirds, golden-crowned sparrows, and the badger. Old growth species would have also been highly favored, especially species who depend on interior habitat like the northern spotted owl, marten, and the red tree vole. An assumption can also be made that special habitats would have been maintained due to the frequent fire cycle and that encroachment may not have been a problem for meadow areas and other special habitats. Species within special habitat guilds may have maintained stable populations due to this.

Now, in 1996, mosaic, contrast, and patch species are favored such as the barred owl, great horned owl, and goshawk. Interior habitat is declining and edge habitat is increasing. We may be inadvertently increasing predator numbers, thus skewing populations. Connectivity may also be lessened with fragmentation of large patches of habitat into smaller patches due to harvest activities. Mid seral species also seem to favored more now such as the flying squirrel and hermit warbler due to harvest rotations. This may also be due to fire suppression efforts where frequent fires occurred in the past.

The vegetation report outlined some differences and similarities between vegetation of 1895 and 1996. The following will look at these in terms of wildife:

- 1. Smaller openings now than in the past. In the past, openings were created from disturbance events such as fire on a larger scale and wind on a smaller scale. These probably resulted in large openings. Today, due to harvest practices and fire suppression efforts, the landscape is more fragmented with smaller openings. This fragmentation creates more habitat today for contrast and mosaic species due to the high edge effect. It also lessons the amount of interior habitat available. Connectivity between stands may be reduced. Early successional habitat has been reduced slightly overall today than in the past. However, the areas where this habitat type exists may not be the same. Typically, wilderness, ridgelines, and south facing slopes may have more early successional habitat available in 1895 where today, this habitat type is scattered across the landscape. An assumption can be made that populations of species may be more distributed across the landscape now than in the past.
- 2. Disturbances episodic in the past with fires rather than continuous with timber harvest and sustained yields. In the past, it was not always certain that a particular seral stage would be present. But when it was present, it may have been available in larger patches. This could be said of early and late seral habitat. From a snap shot look at 1895, it was found that stand initiation and old growth were the primary seral stages at that time. Today, however, seral stages are distributed more evenly. This may be creating a greater variety of habitats for species than was available 100 years ago, allowing for more mid seral, contrast, and mosaic species. However, while increasing the number of species present in the watershed, total population numbers for interior species may be decreasing. Natural stand age distribution, shows that quite a bit of time passed between episodic events. Reproductive success was probably not affected as much with these types of events other than habitat being lost in specific areas. These events were probably of short duration also which may or may not have disrupted reproductive success. Today, disturbance such as timber harvest, is more frequent. This may have an effect on species ability to successfully reproduce and may interrupt the timing of things. Seasonal restrictions are based on dates of probable reproductive behavior. However, due to weather conditions, natural events, etc., reproductive timing could either be delayed or early, thus our activities may be affecting these individuals.
- 3. Tree reestablishment after disturbance slower in the past versus current reforestation. In the past, early successional habitat was present for a longer period of time which may have been important due to the sporadic occurrence of this seral class. The same would be said of mid seral habitat, as early seral habitat matured. This may have allowed species to occur for longer periods of time in certain areas and provide a source for other areas as the landscape changed over time. Tree reestablishment also provided for natural regeneration and a natural species mix. Exotic diseases such as white pine blister rust and species such as

scotch broom, would not have been as much of a factor in 1895 as they are today. Today, mid to late seral habitat may be attained at a faster rate due to silvicultural activities such as pre-commercial thinning, commercial thinning, etc. This is important due to habitat and interior habitat loss. Today, a wide species mix is used to replant areas. These are native species but may not be indicative of particular stands. Diseases have also been introduced which have had an effect on some species, particularly white bark pine. This may have an affect on species that rely on this habitat type. However, with a wider variety of tree species present, it may allow for more species to occupy the watershed.

- 4. Underburned conditions common in the past, no comparable condition other than shelterwoods. Underburning enhanced the understory and secured the regeneration of species like sugar pine. It also provided for pockets of diversity in which snags and down woody material were created. These habitat components are very important to many wildlife species. Underburning may have also created forage across the landscape for big game species. This may have supplemented early successional habitat. Underburning may have created many unique habitat niches also. Today, underburning is limited in scope. It is used primarily to lessen the chance for large scale habitat loss due to fire. Unique plants and trees are being reduced such as sugar pine which may be reducing certain wildlife species from occupying historic ranges.
- 5. Understory reinitiation timeline speeded up by thinning versus natural timeframe. In the past, the stem exclusion stage may have been present for a longer period of time. Natural thinning of the stand may have been prolonged. Those trees less dominant would be shaded out and out-competed. Today, we have faster growing trees which equates to mid and late seral habitat being attained sooner. This is important today due to the reduced amounts of mid and late seral habitat in the watershed. Today's practices can select and remove diseased trees and leave dominant trees within the stands. Snags and down woody material can also be created if levels are deficient.
- 6. Increased abundance of shade tolerant tree species due to lack of fire. Fire suppression has allowed species such as western hemlock, redcedar and Pacific silver fir to develop additional canopy levels along with Douglas-fir at a greater level than occurred in many stands in the past. This may provide more habitat for species utilizing this type of habitat than was available 100 years ago.
- 7. Multi-species planting results in more species at an earlier age than usually found in natural fire regenerated stands. Multi-species planting ensures biodiversity. This allows for a seed source for uncommon species in heavily managed areas where it may not be available.

- 8. Meadow and other special forest habitats currently being encroached by conifers due to fire suppression. In the past, reoccurring fires kept these areas in check. It removed encroaching conifers and other species from invading and taking over. Due to fire suppression, these habitats are being slowly lost. This is a natural process if all the elements are allowed to occur. Guilds may be lost or the number of species lost due to this. Endemic, rare species may be eliminated or reduced.
- 9. Fewer snags and logs on harvested units in areas that have had long fire return intervals, less difference where fires were frequent. Snags and down woody material were well distributed across the landscape if the fire was not all consuming. Legacies were left in early and mid seral stands for several decades. Many species require snags and down woody material for part or most of their life cycle. Reductions in these habitat components may lead to reduced populations from lack of denning, hiding, and foraging habitat. It may be several decades before replacement snags and down material will be on site that is of adequate size and diameter. Harvest activities and other land management activities, could compound the problem of reduced numbers of snags and down material. This could further decrease populations. Many of the species who require down material and snags also prefer interior habitat. Or at least these species who do prefer it, will be decreased. Mosaics, patch and early seral species will benefit.
- 10. Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval. With frequent fire occurrences, small fuels were probably burned up periodically which lessened the chance for a large scale event to take place. Snags and down material were well distributed across the landscape. In the event of an all consuming fire event, all fuels were eliminated. Today, there are high numbers of snags and down material in unmanaged areas due to insect and disease, harvest practices, and wind events. Risk for a stand replacement fire is growing. However, due to decreased amounts of interior habitat, increased levels of down material in these stands may make up for the lack of it in surrounding areas. However, if a stand replacement event occurs, down material and snag levels may be severely reduced causing populations of dependent species to decrease rapidly and may even eliminate some species from occupying the area for several decades.
- 11. Higher spruce budworm mortality due to stand conditions resulting from fire suppression. In the past, there were large contiguous stands of late-successional habitat which may have had large concentrations of insects. Snags and down material were probably more abundant. This probably resulted in pockets of diversity throughout the landscape. With the onset of fire suppression, stands are allowed to get older which equates to more structure being maintained such as snags and down material. This increases the fire danger in some areas. Increased fire danger within the LSR may not be consistent with the intent of this land allocation.

Efforts should be made to reduce levels of budworm mortality without jeopardizing the late-successional stands within the LSR.

12. Increased tree growth in managed versus natural stands at a comparable age. Early seral habitat would have been present for a longer period of time thus delaying the onset of mid and late-successional habitat. Now with silvicultural activities, we can increase tree growth within stands in order to achieve late-successional habitat characteristics at a faster rate. This is done by aerial fertilization which may introduce more nitrogen into the system than was previously here. However, due to the reduced amount of late-successional habitat, this is a preferred method. Application rates of nitrogen are relatively low and the benefits are greatly enhanced.

#### 13. Other

There are other natural and human causes of change between historical and current conditions. The introduction of exotic species, both plant and animal, have non-desired effects. Non-native plant species out compete native vegetation and may eliminate or reduce natvie vegetation. This may displace or reduce populations able to utilize these areas. These plants may also be toxic to wildlife such as tansy ragwort. These do not offer any forage value but species such as scotchbroom, may add cover to an area. Non-native animal species such as the brown-headed cowbird and bullfrog, introduce elements into the system not previously present. Native wildlife may not have defense mechanisms to deal with these species. This could lead to over-predation, low reproductive success, and undue stress.

There is also an increase in edge species not commonly found in the watershed 100 years ago. This is due to fragmentation caused be timber harvest, road building, etc. This increase may have an effect on interior dependent species.

Recreation use has also increased. This can lead to degraded habitat and disturbance. However, there is an opportunity to increase awareness and educate the public on wildlife needs and needs of habitat in general.

# IVA. Sustainable Communities



8-year old white pine plantation, pruned for boughs, blister rust control and wood quality.

# SOCIAL DOMAIN

## A. Sustainable Communities

### 1. Characterization

The North Santiam Canyon is a rural area located at the base of the Cascade Mountains. It extends for approximately thirty miles along the North Santiam River and includes five cities: Lyons, Mill City, Gates, Detroit and Idanha, and numerous unincorporated areas in two adjoining counties, Marion and Linn. The communities are clustered on either side of the North Santiam River and are between 20 and 60 miles from Salem, the nearest metropolitan area. The total population of the region is about six thousand.

Most local jobs revolve around the forest and forest products industry. Timber provides the economic base for the region. The region's forest resources are controlled by both public and private landowners. However, the vast majority of the land is managed by three public agencies: The US Forest Service, the Bureau of Land Management and the Oregon State Forestry Department. In recent years, the communities have been affected by declining timber supplies. Unemployment rates are higher and per capita income is lower than the county averages (see table below).

Community	Population	Unemployment	Per Capita Income	Percent of Community Below Poverty Litte
Idanha	213	8.0%	\$9,917	15.2%
Detroit	322	16.8%	\$11,130	11.9%
Gates	500	14.6%	\$9,400	23.2%
Mill City	1,572	10.4%	\$9,697	16.5%
Lyons	935	8.6%	\$9,625	12.2%
Marion County (total)	228,483	6.3%	\$12,228	13.2%
Linn County (total)	91,227	7.8%	\$11,443	13.5%

Besides timber resources, these public lands provide camping, hiking, and other

recreational opportunities which have the potential to attract additional tourism dollars to the Canyon communities.

# 2. What values are associated with sustainable communities?

a) Quality of life, natural beauty, recreational/tourism opportunities, availability of natural resources for sustained commodity production and economic security are valued by people in the North Santiam Canyon.

# 3. What are the highest priority issues or resource concerns associated with sustainable communities?

- a) Species protection measures and changing public sentiment about selling forest resources (like old growth) as commodities, combined with a changing political climate, have resulted in a sharp reduction in the timber supply from National Forests and other public lands, to operate local mills. This reduction has threatened the economic sustainability of the forest-product dependent communities in the North Santiam Canyon.
- b) Diversification of local economies and providing family-wage jobs has been an issue in canyon communities.

# 4. What are the management direction/activities, human uses or natural processes that affect sustainable communities?

### a) Current condition

The timber industry is still an important component of the North Santiam Canyon economy, much as it has been in the past. But when President Clinton's Economic Adjustment Initiative made money available, local communities began to seek ways to diversify their economies. One of the first things they began to do was look into ways of developing infrastructure so they could attract new businesses to the canyon. Another avenue they began to explore was ways of attracting more tourism dollars. One of many ways of doing this is to expand the tourist season to include spring and fall.

Having Highway 22, the main link between Salem and Bend, running alongside the North Santiam River and up through the middle of the canyon offers tremendous potential. The highway carries campers and water enthusiasts to Detroit Reservoir, skiers to Hoodoo Ski Area and central Oregon, and others wanting to take advantage of the natural beauty of the canyon. It also carries business and

commercial traffic, however, it is the tourist traveler that has become of an important component of the North Santiam Canyon economy. Restaurants and convenience stores dot the roadside and retail shops take advantage of visitor trade. The highway offers the potential to diversify local economies by capturing tourism business.

The North Santiam Canyon has also looked into economic diversification through secondary wood products manufacturing or through new markets in non-traditional forest products. The community received a grant to study market opportunities and to develop methodology for companies and government agencies to evaluate available sustainable supplies of these products. A potential list of products could include: boughs, Christmas trees, bear grass, sword ferns, salal, prince's pine, mosses, Oregon grape, clippings of various shrub species, huckleberries, mushrooms, tree cones, post and poles, shakes, and firewood, etc. .

#### b) Reference condition

Surrounded by forests, it was timber that drew the first white settlers to the North Santiam Canyon in the early 1800's. The railroad provided a link between the communities when roads were impassable, making it possible to take logs and lumber down to the Willamette Valley, and bring goods and passengers back up the canyon. By the 1930's the region boasted its own resort--Breitenbush Hot Springs, theaters, a toy factory and a bakery. Throughout the 1940's the timber industry expanded, bringing more work and more residents to the canyon community. Hoodoo Ski Area was developed, drawing visitors up the winding canyon highway. In the 1950's Detroit Dam was completed, creating one of the largest reservoirs in the state and a significant recreation resource.

While timber has been the backbone of the region's economy, it has been a fickle one. As early as 1893, the community had to adjust to mill closures, then boom periods of little or no unemployment. From the 1940's through the 1970's mills may have closed, but enough other jobs existed within the industry to absorb the local workforce. In the 1980's the combination of high-tech mills requiring fewer workers, and a decrease in the timber harvest caused by environmental concerns over spotted owl habitat, significantly cut employment opportunities in the timber industry. The region was left with few employers that offered wages which could support families and unemployment began to rise.

## c) Comparison of Current and Reference Condition

The percentage of high-wage forest product industry jobs has decreased over reference conditions.

Local communities are starting to diversify their economies more than they have in the past. New businesses are mostly associated with tourism at this time, but additional diversification is being investigated.

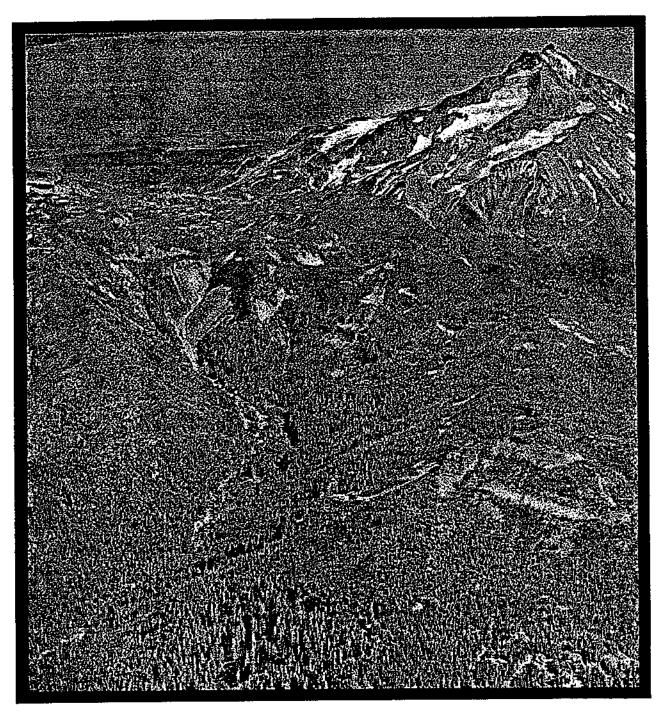
Timber, the raw material of local mills, is being offered in much smaller quantities than in the past from public lands.

Special forest products offered from this watershed are on the increase and will likely continue to increase in the near future.

Recreation use of the watershed is on the rise over that in the past, and the tourism dollars associated with recreation have increased and are likely to continue to increase over time.

# IVB. Scenic Values

and and the



Mt. Jefferson and S. Fork of the N. Fork of the Breitenbush

# IV. SOCIAL DOMAIN

# **B.** Scenic Quality

## 1. Characterization

The corridor along the Breitenbush River and the high country along the Cascade crest with its peaks, volcanic cones, glaciers, lakes and subalpine meadows, has long been valued for its scenic and aesthetic qualities. Throughout history, maintaining the visual and aesthetic character of the watershed has been very important to people, and is displayed through various protective legislation and visual management practices. Earlier practices included Forest Reserve and Primitive Area legislation. Current protective practices established through various formal processes include: the Breitenbush Viewshed corridor identified in the Forest Land Management Plan; administratively designated Olallie Lake Scenic Area and Breitenbush National Scenic Byway; and Congressionally designated Mt. Jefferson Wilderness area, Pacific Crest National Scenic Trail, and South Breitenbush Gorge National Recreation Trail; as well as, Wild and Scenic River eligibility status for portions of the mainstem Breitenbush River and South Fork of the Breitenbush River. The quality of the Forest's scenic resource is important to the existing local tourist industry, to local communities attempting to diversify their economic base, and to the Pacific Northwest. The Breitenbush Community, located within the watershed, relies on tourism and has expressed concern about maintaining the integrity of the surrounding landscape.

# 2. What values are associated with scenic quality?

a) Scenery has aesthetic and economic value.

# 3. What are the highest priority issues or resource concerns associated with scenic quality?

- a) Given existing vegetative patterns and land allocations, an important issue is the management of the landscape to maintain and/or enhance the inherent beauty of the Breitenbush viewshed.
- b) The Breitenbush Community is concerned about preservation of their scenic backdrop, an important aspect of their economic well being. Some portions of their scenic backdrop are in other than scenic land allocations.
- c) The powerline corridor is a concern because it detracts from the overall scenic quality in

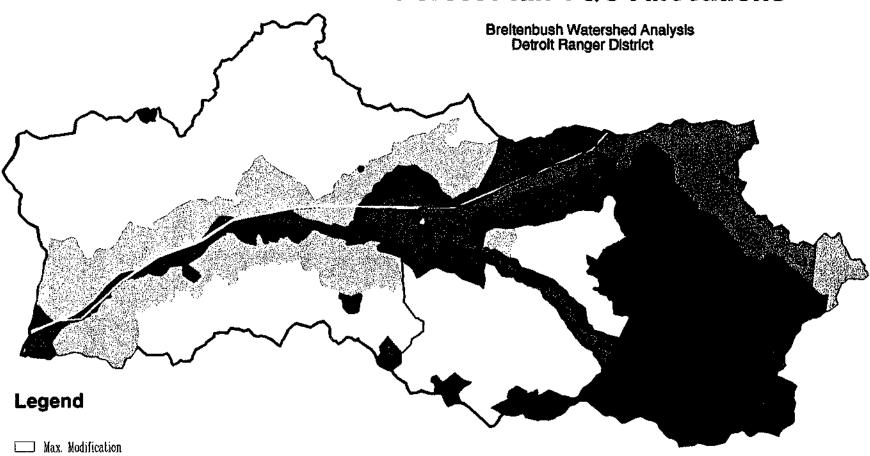
the Breitenbush watershed.

- 4. What are the management direction/activities, human uses or natural processes that affect scenic quality?
  - a) Current condition
    - i) What is the existing condition of the scenic resource, and how do we manage the landscape to maintain and/or enhance the inherent beauty of the Breitenbush viewshed?

<u>Visual Management</u>: The Willamette National Forest Land and Resource Management Plan has assigned Visual Quality Objectives (VQO's) for each Management Area (MA) on the Forest (figures IV-1 and IV-2). For the purpose of the analysis, it is assumed that the small piece of private land above Slide Creek will maintain a Maximum Modification Visual Quality Objective and Breitenbush Community private land is managed to meet a VQO of Retention.

Currently, there are no Visual Quality Objectives assigned for the Late Successional Reserve (LSR) and Riparian Reserves that lie within the Breitenbush. Within the LSR and Riparian Reserve, 11,988 acres or 17% of the Reserves have a VQO of Maximum Modification or Modification under the Forest Plan. However, with the newly designated allocations, the Reserves will likely be managed to achieve at least a Partial Retention VQO in order to meet the objectives of creating and maintaining late-successional habitats.

# **Forest Plan VQO Allocations**



Modification

Partial Retention

Preservation

Retention

Ollalie Scenic Area

Mt Hood NF Outside Scenic

Warm Springs Scenic

✓ Lsr

Scale 1:140000 05/14/96

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Figure IV-2. Visual Quality Objectives by Management Allocations

11gure 17-2. Visual Quanty Object	Mires by Managem	ent Anoca	HOUS
Management Allocation	Visual Quality Objective	Acres	Percent of Watershe d
Wilderness (MA-1/MA-A2) Old Growth Groves (MA-7)	Preservation	15,287	22
Special Interest Areas (MA-5a) Special Habitat Areas (MA-9d) Dispersed Rec. Lakeside Settings (MA-10f) Scenic Retention Foreground (MA-11f) Breitenbush Community Olallie Lake Scenic Area (MA-A4)	Retention	7,079	11
Scenic Partial Retention Middleground (MA-11c) Scenic Partial Retention Foreground (MA-11d) Developed Recreation Sites (MA-12a/b) Administrative Sites (MA-13b) Olallie Lake Scenic Area (MA-A4) Mt. Hood Upper Clackamas Viewshed (MA-B2)	Partial Retention	7,045	10
LSR/Riparian Reserves - Former Modification Allocations (General Forest and Scenic Modification Middleground)	Partial Retention	11,988	17
Scenic Modification Middleground (MA-11a)	Modification	9,239	13
General Forest (MA-14a) Special Use Permit Area (MA-13a powerline) Private	Maximum Modification	18,753	27
Totals		69,391	100

Existing Visual Condition: At this time, 25% of the watershed comprises an early seral stage with seedlings and sapling size stands; 39% is composed of stands in a mid seral stage with pole and small size tree classes; while 31% of the area contains a mix of medium and large size trees in a late seral stage (figure IV-3). Within the Wilderness, Olallie Area and Warm Springs, many of the stands, although considered old growth, contain seedlings to small size trees due to the shorter growing seasons and harsher site conditions. Approximately 2% of the total area has relatively new harvest units considered in disturbed condition.

Figure IV-3. Existing Visual Condition - Size classes by Management Allocation

	Early Serai		Mi	Mid Serai		Seral		
Mgost Area	Seed- lings	Sap- lings	Poles	Small Trees	Med. Trees	Large Trees	Non- Foresi	Total Acres
Wilderness	132	948	4507	3799	2369	418	2575	14,749
5a	2	1	0	164	0	17	0	183
7	0	0	0	0	54	16	0	70
9d	1	4	34	25	0	0	9	73
10f	21	0	0	10	12	87	0	130
11a	990	3040	612	2754	374	1459	8	9,237
11c	295	535	218	798	10	515	2	2,373
11d	0	1	2	17	1	0	0	21
11f	38	143	63	508	9	383	4	1,148
12a	2	0	5	25	0	45	0	77
12b	0	0	0	4	0	3	0	7
13a	166	213	55	130	2	22	7	595
13b	0	1	5	0	0	6	0	12
14a	2065	3850	1104	4264	2832	3797	143	18,055
15	120	404	127	764	209	968	12	2,604
16a	2330	1559	496	3702	1414	4984	74	14,575
16b	9	16	1	304	362	465	3	1,176
Private	0	15	21	4	2	130	30	202
Mt. Hood	20	0	1	2	180	0	0	203
OLSA	0	0	420	1549	725	0	486	3,181
WSR	0	31	284	273	34	0	89	711
water	0	0	0	0	0	0	37	37
Acres	6,190	10,760	7,955	19,096	8,590	13,316	3,480	69,392
Percent	9%	16%	11%	28%	12%	19%	5%	100%

Viewshed Condition Analysis: The Forest Plan's goal for scenic management areas are to "maintain desired visual characteristics of the forest landscape through time and space." Achieving long-term visual quality goals in a forest environment works in direct proportion to how well time and space are managed. Time sequence over a landscape involves combinations of old growth and younger age classes. This provides visual variety but will shift in location as trees are harvested and new ones grow to take their place. Planning this dynamic situation through space and time is important to achieve an attractive sequence of views. To address the time and space component, maximum disturbance rates and harvest rate objectives for each allocation was assigned to each subdrainage to determine area available for harvest over the landscape.

Overall existing disturbed condition for all Scenic allocations within the Breitenbush Viewshed is consistent with Forest Plan Standards. An analysis was completed looking at existing disturbed conditions by subdrainages to see how regeneration harvests were distributed. Overall, Byars (92b), Humbug (92d), Mansfield (92h), S. Fork Breitenbush (92k), and North Fork Breitenbush (92h) subdrainages have the highest disturbed rate conditions within the watershed indicating where the most recent harvest activity has occurred (figure IV-4). The only subdrainage above desired disturbed condition is North Fork Breitenbush (92i) in MA-11f. Over half of this subdrainage now lies within the designated area managed as Late Successional Reserves. The asterisks in figure IV-5 indicates the most restrictive acreage between harvest rates and maximum disturbance allowances. This acreage should be used as a guide to plan future regeneration harvests, by subdrainage, in the Breitenbush to best distribute management activities.

Although recent harvest activities are currently consistent with Forest Plan standards, the sizes, arrangements, and geometric character of treatments over the past fifty 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. Currently, 21 stands are inconsistent with 1990 Forest Plan standards for maximum created opening sizes due to regeneration harvest activities. These stands were harvested primarily during the 1980's, prior to the current Forest Plan. Total acreage of these stands is 906 acres. To the casual viewer, the Existing Visual Condition of the landscape in the Breitenbush can be described as Natural Appearing within the Mt. Jefferson Wilderness, Olallie Lake Scenic Area; and Slightly to Heavily Altered outside of Wilderness.

**Scenic Concerns:** The powerline corridor occupies 595 acres, paralleling Road 46 for the entire length of the Breitenbush watershed. This unnatural feature along with its high contrast towers dominates many segments along the road. The wide

Figure IV - 5.

**Breitenbush Viewshed Condition Analysis** 

Mgmt Area/ Planning Subdrain.	HRO	EDC	MDC	Unsuited/ Unavail.	Suited & Avail.	Maximum Disturbed Allowed Acres	Visually Disturbed Acres	Harvest Rate Objective Acres	Current Decade Harvest	Avail. Harvest (HRO)	Avail. Harvest (MDC)
11a	0.12	0.096	0.24	2514	6214	1491	599	746	55	691*	892
92a	0.12	0.05	0.24	430	337	81	17	40	17	23*	^ 64
92ь	0.12	0.24	0.24	143	374	90	88	45	0	45	2*
92c	0.12	0.00	0.24	465	93	22	0	11	0	11*	22
92d	0.12	0.24	0.24	81	434	104	106	52	0	52	-2*
92e	0.12	0.04	0.24	_ 117	453	109	20	54	16	38*	89
92f	0.12	0.00	0.24	32	105	25	0	13	0	13*	25
92g	0.12	0.05	0.24	177	541	130	28	65	0	65*	102
92h	0.12	0.20	0.24	141	388	93	76	47	2	45	17*
92i	0.12	0.22	0.24	169	589	141	129	71	12	59	12*
92m	0.12	0.08	0.24	49	460	110	35	55	0	55*	75
92n	0.12	0.05	0.24	316	1073	258	49	129	8	121*	209
92p	0.12	0.03	0.24	53	270	65	9	32	0	32*	56
92q	0.12	0.04	0.24	308	1002	240	41	120	0	120*	199
92r	0.12	0.01	0.24	33	95	23	1	11	0	11*	22
11c	0.10	0.094	0.20	824	1589	318	149	159	6	153*	169
03i	0.10	0.00	0.20	14	27	5	0	3	0	3*	5
92a	0.10	0.04	0.20	41	51	10	2	5	0	5*	8
92g	0.10	0.03	0.20	29	190	38	5	19	0	19*	33
92h	0.10	0.00	0.20	17	165	33	0	17	0	17*	33

Mgmt Area/ PSub.	HRO	EDC	MDC	Unsuited/ Unavail.	Suited & Avail.	Maximum Disturbed Allowed Acres	Visually Disturbed Acres	Harvest Rate Objective Acres	Current Decade Harvest	Avail. Harvest (HRO)	Avail. Harvest (MDC)
92i	0.10	0.18	0.20	613	774	155	142	77	6	71	13*
92m	0.10	0.00	0.20	1	110	22	0	11	0	11*	22
92n	0.10	0.00	0.20	109	272	54	0	27	0	27*	54
11f	0.05	0.039	0.10	194	875	88	34	44	θ	44*	54
92a	0.05	0.00	0.10	16	7	1	0	0	0	0*	1
92b	0.05	0.00	0.10	5	69	7	0	3	0	3*	7
92d	0.05	0.00	0.10	0	15	2	0	1	0	1*	2
92e	0.05	0.08	0.10	8	93	9	7	5	0	5	2*
9 <b>2</b> f	0.05	0.00	0.10	2	3	0	0	0	0	0*	0*
92g	0.05	0.04	0.10	58	117	12	5	6	0	6*	7
92h	0.05	0.05	0.10	9	58	6	3	3	0	3*	3*
92i	0.05	0.12	0.10	14	50	5	6	3	0	3	-]*
92m	0.05	0.06	0.10	5	231	23	13	12	0	12	10*
92n	0.05	0.00	0.10	24	98	10	0	5	0	5*	10
92p	0.05	0.00	0.10	0	11	1	0	1	0	1*	1*
92q	0.05	0.00	0.10	53	123	12	0	6	0	6*	12
15	0.00	0.03	0.00	1887	0	0	25	0	0	0	0
92đ	0.00	0.01	0.00	276	0	0	1	0.	. 0	0	0
92e	0.00	0.01	0.00	149	0	0	1	0	0	0	0
92g	0.00	0.03	0.00	251	0	0	5	0	0	0	0
92h	0.00	0.01	0.00	173	0	0	3	0	0	0	0

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Mgmt Area/ PSub.	HRO	EDC	MDC	Unsuited/ Unavail.	Suited & Avail.	Maximum Disturbed Allowed Acres	Visually Disturbed Acres	Harvest Rate Objective Acres	Current Decade Harvest	Avail, Harvest (HRO)	Avail. Harvest (MDC)
92m	0.00	0.06	0.00	323	0	0	15	0	0	0	0
16a	0.00	0.09	0.00	5754	0	0	386	0	0	0	0
92i	0.00	0.07	0.00	3045	0	0	192	0	0	0	0
92 <b>j</b>	0.00	0.01	0.00	1076	0	0	2	0	0	0	0
92k	0.00	0.23	0.00	898	0	0	192	0	0	0	0

HRO = Harvest Rate Objective outlined in Forest Plan Standards and Guidelines

**EDC** = Existing Disturbed Condition

MDC = Maximum Disturbed Condition allowed within Standards and Guidelines of the Forest Plan.

Note: Only those subdrainages in 15 and 16a that have had previous regeneration harvest are shown. MA 15, 16a and 16b had former scenic allocations. MA 15 and 16a contain units considered in disturbed condition under Forest Plan allocations. Other allocations exist in the viewshed (eg. 5a, 7, 10f, 12a and 12b) but are not depicted on table since no harvest activities have occurred in these areas.

clearances are noticed in several areas such as near Mansfield Creek where the casual viewer can see an expansive view of the landscape. Areas where the electric transmission line is visible from the road would normally be classified as retention or partial retention foreground. It is obvious that these areas will never achieve this objective, but modification at best.

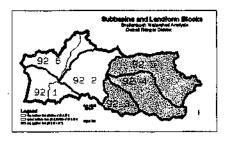
The Breitenbush drainage has a history of large stand replacement fires. The recent Flood of '96 created several landslides across the drainage. In the event of large fire or landslide, the visual character can dramatically change the landscape. In high risk areas for large events, short term visual degradation can occur until the area recovers.

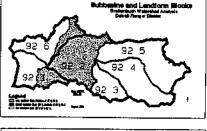
### b) Reference condition

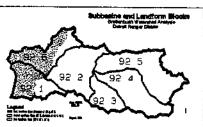
### i) What is the historical scenic condition in the watershed?

Prior to development of road access within the Breitenbush watershed the condition of the scenic resource was a natural appearing landscape shaped by a long history of natural processes, marked by periodic events of flooding, land flows, and wildfire which consumed large areas and understories of old growth stands in valley bottoms. The diverse landscape structure formed the scenic resource of the watershed which is composed of:

- Eastern Landform Block High Cascades:
   Contains steep U-shaped glaciated valleys
   with flat valley bottoms and steep rocky
   walls that abruptly transition to rolling
   uplands and flat glaciated plateaus in the
   High Cascades.
- Western Landform Block Western Cascades:
   The most distinguishing features are the sharp, steep V-shaped canyons with stunning relief over 3500 feet, and contains terraces along the Breitenbush River.
- Central Landform Block Transition:
   A geomorphically diverse and highly complex landscape that ranges from extensively glaciated upland benches and headwalls at higher elevations; to large-scale stabilized slump complexes; to







localized areas of actively unstable land flows; to steep, shallow soiled, highly dissected headlands with rock scarps and bluffs; and finally to extensive areas of lower elevation benches, and flat terraces.

This landscape, covered by older and younger coniferous forests, accentuated with rock formations, glaciers, numerous subalpine lakes and meadow openings, and bisected by streams tributary to the Breitenbush River, is what has attracted many people to the watershed over the last century.

In 1895, 33% of the Breitenbush contained seedling/sapling size stands in early seral stage; 14% of the watershed comprised pole and small sized stands in mid seral stage; and 40 percent was composed of medium and large size trees in late seral stage. Various non-forest habitats feature 13% of the area. Historically, the watershed has had large areas disturbed by fire occurances which is suggested by the evidence of relatively young stands. Natural in origin and random in composition, the Existing Visual Condition (EVD) of the watershed would be considered Natural Appearing.

The vast majority of the older stands found in the watershed today date from the early 1600's when fires burned over most of the watershed. In 1901, a Forest Reserve map indicates that 48% of the watershed was recently burned. Between 1914 and 1967, 6719 acres were burned in the watershed. These areas, now young stands, are still evident today within the viewshed in Canyon and Byars drainage and around Eagle Rock.

Plans for a road adjacent the Breitenbush River from Detroit to Breitenbush Hot Springs made it necessary to coordinate logging plans with scenic roadways. In 1920 Fred Ames and Fred Cleator made such plans for the projected sales on Canyon and Humbug Creeks. These included providing a 100-250 feet scenic strip between the railroad track and river so logging trains would run behind the scenic corridor. In 1930, Cleator made plans to build a road up the North Fork of the Breitenbush River to Olallie Lake to connect with the Mt. Hood Loop Road. This would unite the northern Santiam (Willamette) and the Mt. Hood National Forest into an integrated recreation complex. A road was developed accessing the Breitenbush Hot Springs before 1931 and access to Olallie Lake by road was developed before 1935 as depicted on historic forest maps.

The first significant human initiated disturbance occurred during the 1930's which included clearcutting timber and hauling via the newly constructed railroad in the lower Breitenbush from Detroit up to the confluence of Humbug Creek. A decade later new roads were constructed and harvesting practices consisted of logging the lower elevation, easier ground first. The 1950's marked the post-war boom, when

there was a rush to open forests for rapid development through increased timber sales and road construction in the higher elevations. From the 1950's through the 1980's, increasingly these activities produced significant alterations of the Natural Appearing landscape outside of wilderness, resulting in a mosaic of patch cuts in various stages of regeneration. Since the 1980's, shelterwood and thinning harvest practices changed the character across the landscape. The 1980's began the practice of over snow logging on overstory removal units, and the beginning of commercial thinning in second growth stands. The 1990's brought regeneration modified to meet wildlife and long-term productivity objectives, increased stream protection and helicopter logging.

Figure IV-6. Harvest by Decade

Desirie .	Clearent Acres	Shelterwood Acres	Thinning Acres
1920	61	0	0
1930	1,031	0	0
1940	0	0	0
1950	842	0	0
1960	3,786	6	0
1970	2,411	0	232
1980	3,816	1963	638
1990	361	132	325
	12,368	2,101	1195

By the 1990's, 20% of the watershed had been regeneration harvested and reforested since the 1920's (Figure IV-6). Up to the 1950's, the scenic condition ranged from Natural Appearing in the areas that had not been developed to Moderately Altered where harvest activities and road construction occurred. By the 1980's, management activities created significant changes to the landscape over time, ranging from Natural Appearing within Retention and Preservation allocations to a Heavily Altered Visual Condition where developments occurred. Past management activities did not consider visual objectives as evident by the large size (scale), and design of units; eg. geometric shapes, harsh edges, and mid-slope roads with exposed steep cuts and fills. Created openings were not designed borrowing textures, and shapes from the existing landscape character.

#### c) Comparison of Current and Reference Condition

i) What are the natural and human causes of change between historical and current scenic conditions?

Management activities such as timber harvest, powerline construction and road construction are the most significant human causes of change between historical and current scenic conditions within the Breitenbush drainage. While fire and vegetative growth are the most significant natural causes of change between historic and current scenic conditions.

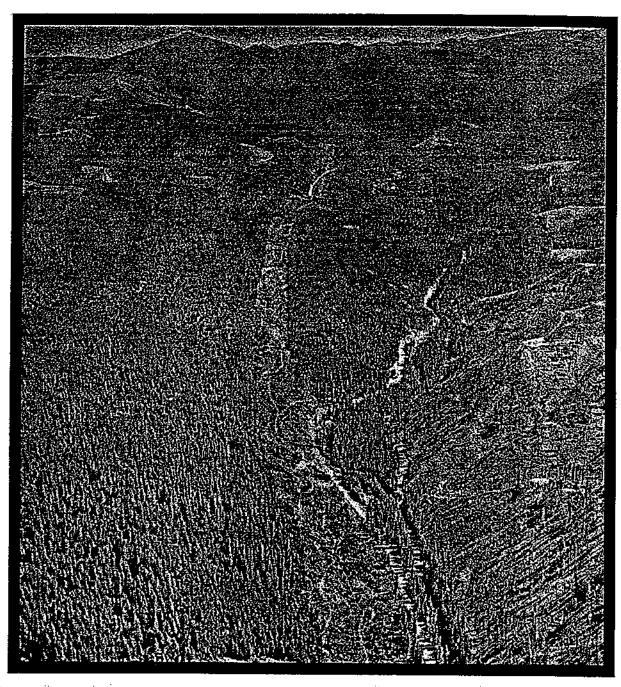
The area harvested during current times is roughly comparable to the area burned during reference times, but the scenic impacts are different. Harvest units tend to have straight sides and usually appear square or rectangular in shape, while fires tend to have more feathered edges and more variable shapes. Harvest units tend to be smaller and more numerous while fires tend to be larger and fewer in number.

**Trends:** The future visual condition of the watershed is expected to improve over current conditions when considering several developments and trends affecting Forest land management activities. As Forest managers begin to focus more attention on balancing human use and product extraction with management of natural processes the appearance of the watershed, in time, is expected to approach Visual Condition of Moderately to Slightly Altered.

With the development of the Forest Plan and associated standards for management of scenic resources, including the control of harvest rates, unit sizes and shapes, treatment alternatives, and methods such as thinning and individual tree selection, the design and distribution of activities within the watershed are expected to be less apparent to the casual viewer.

Implementation of the Forest Plan as amended by the 1994 President's Plan; which allocated land for the preservation of Late Successional Reserves, increased the size of riparian reserves, reduced annual harvest rates, and established standards for management of a wide range of forest resources, is expected to have a beneficial effect on the quality of the scenic resources in the future.

 $\mu_{\rm c} (N) (\frac{1}{2} N)$ 



Powerline Right-of-way in the Breitenbush. Eagle Rock Fire, burned 1967. (1972 photo)

### IV. SOCIAL DOMAIN

#### C. Facilities

#### 1. Characterization

The transportation network, including roads, trails, accompanying drainage structures and bridges make up a large portion of the facilities in the Breitenbush watershed. Other components include structures such as summer homes, buildings associated with the Breitenbush Community, snow shelters, fire lookouts, fire guard stations and other improvements such as campgrounds, water systems, power lines, signs and gates, etc.

#### 2. What values are associated with facilities?

- a) Commercial, administrative, private and public access to National Forest lands is valued for the opportunities it provides for recreation, commercial, and administrative operations, etc.
- b) Recreation facilities are valued for the comfort, safety and shelter they provide, as well as, for aesthetic and historic reasons.

# 3. What are the highest priority issues or resource concerns associated with facilities?

- a) Conflicting management objectives and/or resource impacts resulting from construction, maintenance, protection and use of various facilities
  - Virtually all recreation facilities and many roads and bridges, etc. in the watershed are located in riparian reserves. Managing these facilities is often in conflict with Aquatic Conservation Strategy objectives and/or late-successional reserve (LSR) objectives.
  - Many facilities were damaged in the Flood of 1996, repair of these facilities may be in conflict with other resource objectives.
- b) The ability to adequately maintain facilities and provide for public safety, given shrinking budgets.
- c) Public access to public lands in light of reduced road maintenance budgets, flood damage, etc.

# 4. What are the management direction/activities, human uses or natural processes that affect facilities?

#### a) Current condition

i) What is the existing condition and trends of the facilities within the watershed?

Transportation facilities: Forest Road 46 provides the primary access between the Willamette and Mt. Hood National Forests. It also bisects the watershed and parallels the Breitenbush River for the majority of its 16.9 miles. The Breitenbush Road (46) is a double lane paved Forest Highway and is the only road on the district with a Maintenance Level 5. This road has been designated a National Forest Scenic Byway and is proposed for Oregon State tour route designation.

The remaining system of collector and local roads provides access to federal and private land for public use and resource management and protection. The Forest Service maintains 249 miles of road that accesses 202 acres of private land and over 69,000 acres of public land.

Following are the total miles of road by category. Miles are based on the GIS transportation data base.

Figure IV-7. Total miles of road by category.

Road Owner	Villes of Roads	Part of Road System or No.	
Forest Service	16.9	Yes	Arterial Roads
Forest Service	55.5	Yes	Collector Roads
Forest Service	157.0	Yes	Local Roads
Forest Service	18.8	No	Temporary roads not obliterated, power line access roads and roads to dispersed recreation sites
Private	1.4	N/A	N/A
Total	249		

There are probably additional miles of private road and nonsystem Forest Service roads in the analysis area, but they have not been well inventoried or tracked. Road miles included in this analysis area are those miles that are on the GIS system, TRAN layer. This information has not been field verified.

Road Management: Management of the transportation system includes road resource protection, as well as, providing a variety of recreational experiences and management opportunities. Road Management Objectives need to determine purpose and use of each road, regulate traffic use during wet weather to prevent damage to riparian resources and the road infrastructure, and establish maintenance levels that reflect our ability to schedule and perform the maintenance activities. Restriction of access and travel should be the minimum to achieve management objectives consistent with legal requirements, user safety, environmental considerations and economics.

The Breitenbush road system has provided a broad range of access to all areas within the watershed. The flood on 1996 has changed this scenario to some extent. At the present time assessments are still being made. The full extent of damage will not become apparent until surveys can be completed on the entire system. The map on the following page (figure IV-8) illustrates areas of the watershed where damage has closed roads. Three major areas have been closed to vehicular access: Deadhorse Creek, Short Mountain and Scorpion Creek. There are numerous sites closed due to flood damage but the areas that aren't accessible are small or there are alternative routes into the area. Many roads that were traversable by passenger cars last year are now only accessible to high clearance vehicles. In reality this last winters storm event just accelerated the trend of roads closing due to lack of maintenance and use.

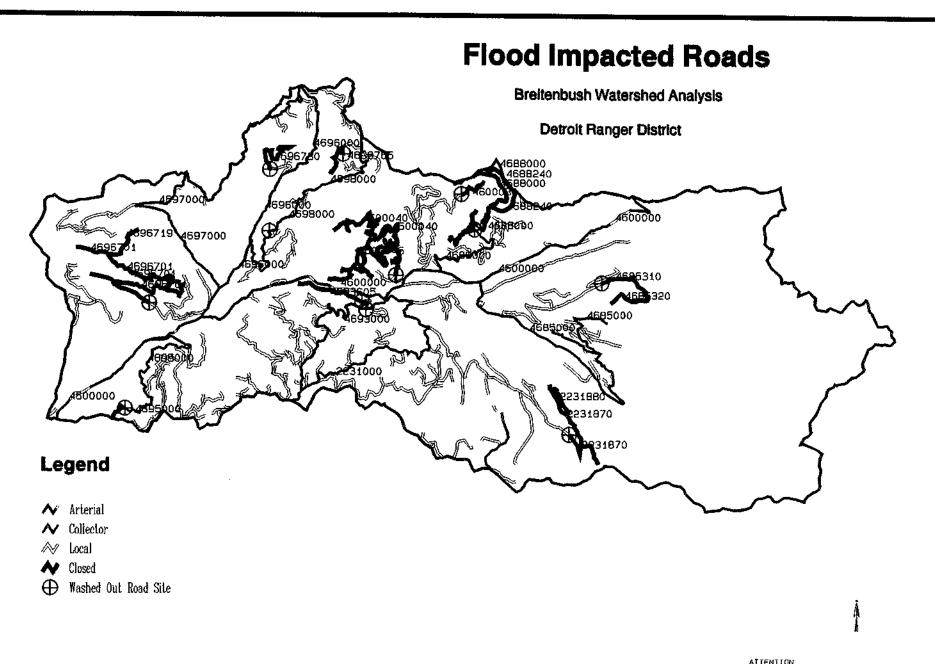
Below is a generalized description of user needs and access condition.

• **Recreation**: The road system provides for a broad range of recreational opportunities in a variety of settings.

There is access to all the developed campsites and trail heads, though there is some localized damage to the roads that calls for extra caution by travelers. Access to Breitenbush Lake on Warm Springs Indian Reservation land is via the 4220 road. The road provides a loop access route into the Ollalie Scenic Area. The section of the road to the north of the lake is not being maintained and will eventually become a non-loop road.

Dispersed recreational opportunities have been reduced in areas behind roads closed by flood damage, as well as, gates that exclude motorized travel due to wildlife or various other resource concerns.

Flood-related road closures have created friction between the Forest Service and some of the public. There has been a high vandalism rate to the closure devises and signs. Maintenance and repairs to these closures have been difficult to keep up with. Public safety is a major concern due to the difficulty of keeping the public out of unsafe situations.



Features represented on this map may not be in an accurate geographic location. The Forest Service makes no expressed or implied warranty of this data nor of the appropriateness for any user's purposes. The Forest Service reserves the right to correct, update, modify, or replace the geospatial information on which this map is based without notification For more information, contact Detroit Hanger District GIS

Increasingly roads will be closed for a variety of reasons or will naturally closed themselves due to the absence of maintenance. With declining road maintenance budgets, and concerns related to watershed quality and wildlife habitat effectiveness, road decommissioning and obliteration will be common in the future. As roads are closed, more pressure may be placed on roaded areas outside of closure, and former roaded dispersed areas will probably not receive the use that previously existed. "Established" users of an area may be displaced to other areas that remain accessible. Roads with the highest use will result with the most significant impact on users. The public perception of access is that they have grown accustomed to the current access and expect the same level of service.

In contrast these closed roads have increased opportunities to bike and hike free from interference with motorized vehicles.

Breitenbush Road (46), did sustain damage in the 96 storm event and was closed for several months. In May of 96 the road was opened for public use. Repairs will continue through the next few years. The route is presently closed to Highway 224 at Ripplebrook. This has affected use patterns in the Breitenbush. The drive from Detroit to Estacada, via this route, is a popular scenic drive. Estacada has experienced reduced tourism dollars because of the road closure. The estimated date to reopen this road is in 1998.

The Olallie Lakes Scenic Area attracts seasonal recreation use and is accessed by Forest Road 46 to Road 4220. Road 4220 serves as the only road access for recreation, administration, and emergency fire evacuation. As recreation use of the area has increased, so has human-caused fire occurrence. This coupled with areas of insect killed trees has increased the risk of wildfire in the area. With the high fire risk and limited access, public safety is a concern.

• *Fire:* Access for motor patrol needs for fire detection was hampered in this watershed area.

The primary site used for detection during lightening storms was lost with the road failure on Leone Creek. Access time was increased from 15 minutes to 40 minutes. A secondary site up Short Creek is also inaccessible at this time. A lookout site becomes ineffective when access time is beyond 30 minutes from the Breitenbush guard station. Establishment of new detection sites is in progress.

Access into Fox Ridge (4698) and the Slide Creek, Hoover Ridge (4695) area is limited to small high clearance vehicles. The larger engines and water tenders will be unable to negotiate narrow road sections and slumped road prisms created by the 1996 storm event.

Response time for initial attack situations will increase until road closures and damage from the storm can be repaired.

Most pump chance access roads are still open.

A recent fire created the need to fix road 4696 701.

Commercial Operations and Permittees: The 96 flood has reduced access
opportunities to commercial operations; timber harvest activities, Special
Forest Product harvest, mineral uses and personal use permits.

Timber Sale contracts have provided an opportunity to repair flood damage to haul routes that had been affected. Roads 46 and 4685, both highly used for recreational purposes, are being repaired through this avenue. If repairs went through normal ERFO channels these routes could have been closed for up to three years before work could be completed.

- Ownership: Access to private land is adequate at this time. With the
  decreased ability to maintain roads there is a need to renegotiate cooperative
  agreements to help meet the needs and management objectives of all parties.
- Administrative: Access opportunities to meet resource management needs and management allocation requirements were reduced by the 96 flood. Preparation for commodities harvest; silvicultural and fuels treatments of managed stands; wildlife species and stream condition surveys; habitat enhancement, mitigation and restoration projects are just examples of management activities that are impacted. There will be an increase in cost in performing almost all aspects of resource management activities. This was a trend already being felt. The flood has accelerated the impacts.
- Power line Access: Bonneville Power Administration (BPA) and Portland General Electric (PGE) constructed a system of spur roads to access the power line and towers for construction and maintenance activities. It is unknown exactly how many miles of roads this entails, as inventory of location, condition and length of these roads has not been done. Management of the power lines is done through Memorandums of Understandings between these agencies and the Forest Service. These Memorandums were last updated in 1982.

According to the agreements, BPA and PGE are responsible for all maintenance of the transmission line access roads which are not part of the Forest Service system. Most of these power line access road have not been incorporated to the Forest Development Road System. Maintenance by BPA

and PGE should include water-barring of roads and seeding and fertilizing of cut banks or fills.

As per the agreement, Forest Service activities may not close or hamper access to transmission lines or towers for maintenance or emergency use.

Some of the access roads were damaged in the 1996 flood.

Road densities/Closures: Current road density for the analysis area is 2.30 mi/sq mi with wilderness acres included. Road density, with wilderness acres removed, increase to 2.72 mi/sq mi. Road densities by subwatershed are shown in figure IV-8.

Figure IV-8. Road Densities in Miles per Square Mile by Subwatersheds

2 7 September 1 1 March 1 1 Subwater sileds							
Subwatershed	Road Density w/o Wilderness	Road Density w/ Wilderness	Road Density w/o Wilderness w/Closures	Road Density w/ Wilderness w/ Closures			
92 1 Lower Breitenbush	3.38	N/A	3.17	N/A			
92 2 Middle Breitenbush	3.64	N/A	3.51	N/A			
92 3 Devils Creek	2.70	2.46	2.59	2.36			
92 4 S. Fk. Breitenbush	2,33	1.09	N/A	N/A			
92 5 N. Fk. Breitenbush	1.36	1.09	1.32	1.05			
92 6 Humbug Creek	2.77	N/A	2.07	N/A			

- Road closures have not been widely implemented in this area. Closure effect
  on road densities are also shown in figure IV-8. Data does not reflect the
  storm damage closures, most of which are temporary in nature.
- The closure system consists of combination of closure devices including locking gates, guardrail barricades and aluminum non-locking pole closures.
- Motorized travel in most closure areas is restricted for the public, but administrative travel is not.

Figure IV-9. Surface Types and Functional Classes (in miles) for Forest Service system roads

Subwatershed	Asphalt Surface	Appregate Surface	Improved Surface#	Native Surface	Function Class	Function Class	Function Class
	Juniare	Suracc	541144	Surface	Arterial	Collector	Local
Lower Breitenbush 92 1	4.9	33.8	2.3	1.0	4.5	6.1	31.4
Middle Breitenbush 92 2	6.3	48.3	15.4	4.3	6.2	15.0	53.0
Devils Creek 92 3	0.0	20.0	1.0	0.2	0.0	1.6	19.6
South Fork Breitenbush 92 4	0.0	23.4	0.1	0.2	0.0	9.3	14.3
North Fork Breitenbush 92 5	5.9	14.3	0.5	5.8	5.7	4,4	16.4
Humbug Creek 92 6	0.3	38.4	1.9	0.9	0.2	19.0	22.2

<sup>#</sup> Improved denotes a surface type of Pit-run or Grid-rolled material other than crushed aggregate. Road could have only spot rock or be surfaced with this material full length.

Figure IV-10. Road Maintenance Levels (in miles) for Forest Service system roads

Subwatershed	Maintenance Level 1	Maintenance Level 2	Maintenance Level 3	Maintenance Level 4	Maintenance Level 5
Lower Breitenbush 92 1	7.8	29.9	0.8	0.0	4.5
Middle Breitenbush 92 2	23.7	36.5	7.9	0.0	6.2
Devils Creek 92 3	9.4	10.9	1.0	0.0	0.0
South Fork Breitenbush 92 4	6.0	6.4	11.2	0.0	0.0
North Fork Breitenbush 92 5	4.7	15.5	0.5	0.0	5.7
Humbug Creek 92 6	12.1	11.9	17.2	0.0	0.2

- Vandalism of closure devices is high and maintenance inadequate.
- Enforcement of closures, due to the condition of closure devices, lack of adequate signing and the tendency for closures to be left open for long periods of time, is difficult.
- Roads behind closures have not been put in a storage condition to reduce maintenance needs.
- Road Maintenance Funding: Declining maintenance dollars are resulting in reduced access for all users in many areas of the watershed. Few of the local system roads receive annual maintenance. Overall, less surface, drainage and roadside maintenance is being done. At present roads are closing themselves through cut or fill slope failures, stream crossing failure and brush encroachment.

These "closures through neglect" do not provide protection against resource damage or protection of the large capital investment made when these roads were constructed.

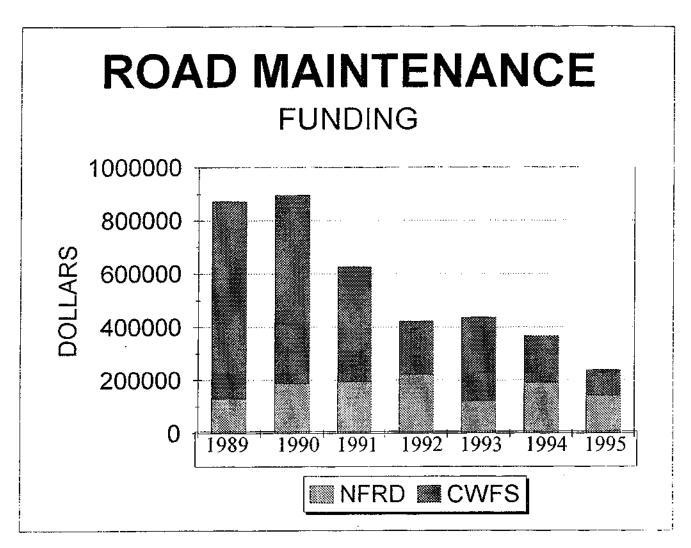
Over time, only those roads where maintenance is performed will remain open.

Other roads may remain open dependent on:

- level of use that will discourage brush encroachment
- vegetative type not prone brush encroachment
- soil stability or back and fill slope design that are not prone to sloughing of material that can block drainage or road prisms
- the condition and functionality of the drainage system.

Trails: The Forest Service maintains 36 miles of recreational trails, including two of national and regional significance: the South Fork Breitenbush Gorge National Recreation Trail and Pacific Crest National Scenic Trail. Over the years, trails have been relocated and improved for resource protection, erosion control, safety and aesthetics. In addition, the proposed Urban Link Trail which will "link" Portland to the Pacific Crest National Scenic Trail at the Olallie Lake Scenic Area, will connect this watershed with adjacent watersheds. Also, the Breitenbush Community has constructed and uses a couple of informal trails on Forest Service land that they maintain.

Campgrounds/Summer homes: Campgrounds and summer homes occupy 85 acres and are located primarily within riparian reserves. The area in riparian reserves dedicated to developed recreation facilities and use is 54 acres. Currently, there are 79 sites available at the five Breitenbush campgrounds. Facilities at Breitenbush, Humbug and Cleator Bend Campgrounds include picnic tables, fire rings, water systems, sanitary facilities (vault toilets, and garbage collection), tent sites, and adequate parking including some room for RV's. Upper Arm Campground provides picnic tables, rock fire rings, vault toilets and garbage service but no water. The Breitenbush Lake Campground is located on the Warm Springs Indian Reservation



NFRD: Congressional Allocations; CWFS: Timber Generated Dollars

and is currently administered by the Mt. Hood National Forest. Warm Springs Reservation funds the maintenance for this campground. This rustic campground contains 20 camp units with picnic tables and fire rings, a historic 3-sided picnic shelter and vault toilets. The is no potable water or garbage services at this campground. Breitenbush, Humbug and Cleator Bend are managed by a concessionaire program which provides campground operation, maintenance and visitor services. The Flood of '96 damaged several campsites in Cleator Bend and Breitenbush.

Developed sites are vulnerable to vandalism, and receive normal "wear and tear" through use and age, and incidental damage from weather events. The condition of developed recreation facilities is assessed annually and documented in the District's Infrastructure Database. This assessment documents the specific conditions of all the facilities within a developed site area and identifies and schedules needed maintenance or replacement. Many of the pit toilets are old and in need of replacement. A complete list of the facility condition assessment of individual sites in the Breitenbush can be obtained from the RRIS files at the Detroit Ranger District.

In addition to natural causes, hazard trees are created as a result of recreational related damage. Public safety and liability is a concern within all developed sites including campgrounds, administrative sites, summer homes, trail heads, parking areas, snow shelter and minimally developed dispersed sites. These areas receive highest priority for falling hazards to protect visitors.

There are 72 recreation residences located on the Breitenbush-Devils tract which provide seasonal occupancy within this area. Some of the summer homes have been affected by changing stream channels during flood events. The Flood of '96 has caused the Devil's Creek channel to divert. During high water events, a new channel surrounds and affects four summer homes. Potential for channel shifts threatens several homes on the Breitenbush River.

In addition, the Breitenbush/Cascade Viewpoint formerly consisted of a trail and a platform overlook. The sign and structure were removed in 1990, due to safety hazards. The area had not been maintained, and was beyond repair. A large turnout and small parking area still exists. The site has been taken off visitor maps, but is still heavily used by the public.

Trends: Traditional appropriated funding for campground operation and maintenance is declining. Budget reductions may inhibit maintaining facilities to the levels of use they receive. The Forest Service is looking to the private sector to manage public campgrounds in order to keep campgrounds open. Campground, trail and other facility construction and reconstruction have been funded through the Capitol Investment Program which too is facing cutbacks. Recreation managers will need to look at alternative ways of funding recreation development in the future. Potentially, user fees may be implemented on National Forests in the future as a means to support recreation use on federal forests.

Breitenbush Community: The community has a variety of facilities and structures

such as cabins, lodges, geothermal heating system, hydroelectric power, and water system. Their hydroelectric power and water system supported by the Breitenbush River were severely damaged by the Flood of '96.

**Breitenbush Guard Station**: This facility is still used in the summer months by fire personnel who patrol the Breitenbush drainage.

Signs/gates: There are many regulatory, warning and informational signs located throughout the watershed. In addition, gates and barricades control access to selected portions of the transportation system. Frequently, vandalism of gates on closed roads may be found throughout the watershed, allowing access to areas that require resource protection. Administration of road closures have been difficult and costly. Many signs and closure devices are destroyed or removed.

**Power lines:** Bonneville Power Administration and Portland General Electric have power lines that bisect the length of the watershed. Their concern is maintaining the corridor free of trees that interfere with the maintenance of the power line. Due to the steep terrain of this watershed, off road vehicle use occurs primarily under the power lines. Firearm target shooters have severed and damaged power lines.

Gold Butte Lookout: This old fire lookout is only rarely used as a lookout anymore. It is infrequently manned during times of extreme fire danger. The lookout is open for public use, and is the only lookout on the District and one of the few in the Region, open for overnight visits.

**McCoy Snow Shelter:** This shelter was constructed in 1988 for the use of winter sports enthusiasts.

#### b) Reference condition

i) What were the major historical facilities in the watershed?

**Trails:** The high cascades were traversed by a network of trails made by Indians, pioneers and prospectors.

In 1874 a trail from Idanha to Breitenbush Hot Springs was completed.

In the late 1870's or early 1880's there was a trail following the Breitenbush River from it's confluence with French Creek to the hot springs.

1911 Santiam National Forest maps show a trail leading form the railroad grade at Detroit up the Breitenbush River drainage, continuing to the east side of the Cascade Mountains near the Warm Springs Reservation. This same map also depicts a trail leading from Boulder Creek north the Breitenbush Hot Springs.

In 1914, a trail up the South Fork of the Breitenbush River was constructed for a fire emergency and used by a pack train.

In the early 1900's, Oregon Skyline Trail became a well known alpine trail route threading the high passes of the Oregon Cascades from Mt. Hood to Crater Lake and traversed the entire length of the Mt. Jefferson Primitive area.

Other trails followed but most of the Forest Service trails were originally built for purposes other than recreation. They were constructed for administrative purposes that required direct access. Little attempt was made to design trails with scenic vistas and gentle grades. Often trails climbed excessive grades and had poor drainage and hazardous stream crossings for horses and hikers.

Relocation of Skyline Trail occurred over a period of years in the 1960's and into the 1970's. The trail was relocated to provide a more direct north/south route. It was relocated to areas high on the crest to provide scenic overlooks and away from heavily traveled corridors. The National Trails System Act was passed in 1968, which provided "instant" designation of the Skyline Trail that was then renamed the Pacific Crest National Scenic Trail. The South Breitenbush Gorge National Recreation Trail was born.

**Railroad**: In 1892 the railroad built into Idanha provided main access to the canyon area and was used as major access from the west instead of roads.

During the period between 1894 and 1907, Hammond Lumber Company constructed a railroad grade and tracks up the Breitenbush drainage. The railroad grade is depicted on several maps up the French Creek; about six miles along the Breitenbush River Canyon from Detroit. However, evidence of the grade extending further up the drainage can be viewed in the field up to Canyon Creek.

**Road network:** Development of this transportation system has occurred primarily in the last 50 years. Prior to the 1940's most of the timber land was accessible through a large trail system. Below is a synopsis of the major transportation events of the last 100 years that contributed to the development of the current Breitenbush transportation system.

Highway 22, although not in the watershed, made possible the development of access into the Breitenbush. The following is a chronology of highway 22 development:

- 1913 road in current Highway 22 location ended at Niagra
- 1926 a road was constructed from Niagra to Detroit. Road was primitive and in places, very difficult to negotiate. Rail still major access mode.
- 1935 approximate time highway built at present location from Detroit east thru to the Santiam Jct. Access from the east prior to this time was only by trail.
- 1948 the highway was built on it's present location from Gates to Detroit.

This event really opened up the upper canyon country as auto and truck access had been very difficult up until then. When the highway was finished the railroad was dismantled at the site of the dam.

#### Development of access in the Breitenbush watershed

- 1920's first commercial development to hot springs, road built, trails only beyond.
- 1931 road into Elk Lake.
- 1935-37 road from hot springs to Breitenbush Lake. Also road to Elk Lake ties into the mines on the Little North Fork.
- 1949 map shows the Breitenbush road going from Breitenbush Lake over to Ollalie and on over to Bear Springs and the Timothy Lakes area. This is the present day 4220 road.
- 1964 map, Breitenbush road over to the Clackamas at present location.
   Road up Skunk Creek and up the South Fork of the Breitenbush to the first Switchback. Also road connects up over Boulder Ridge to Idanha from Cleator Bend.

Construction methods up until the mid seventies generally consisted of the side casting of fill material with no compaction requirements. Drainage structures were built to meet the minimum drainage requirements. Long term transportation planning and integrated resource analysis were not used. Roads were often built landing to landing with little thought to long term needs. In 1973 new standards were implemented to improve the quality of Forest Service road construction to provide for a higher level of resource protection. By this time however, most of our major transportation routes had been constructed using the construction practices of the day.

Information sources: Maps from 1881, 1892, 1893, 1896, 1913, 1931, 1936, 1948, 1959, 1964, 1974, 1980.

**Road Maintenance**: Past emphasis on timber management has resulted in a large road system to gain access to timber and other Forest commodities. Timber sale revenue paid for the majority of road construction, reconstruction and maintenance. As timber harvest activities have decreased so have the traffic generated funds for maintenance and purchaser performed maintenance. In conjunction with timber revenue decreases, appropriated dollars from Congress are erratic.

**Breitenbush Guard Station:** was constructed in 1935 as part of the Civilian Conservation Corp program. This building is listed on the National Register of Historic Places.

Gold Butte Lookout: This fire lookout was built in 1934 by the Civilian

Conservation Corps. Eight years later a cabin was staffed year round as part of the AWS during World War II. The cabin no longer exists.

The lookout site was abandoned as a fixed detection point for fires in the early 1960's and plans were made to remove all the equipment and burn the structure. A hiking group prevented its demise and organized the preservation of the lookout. The Pacific Crest National Scenic Trail Fund raised money and provided volunteer labor to rehabilitate the structure. The lookout is visited year round by numerous hikers leaving their signatures and comments in the register located inside the lookout. The comments over the years suggests how special the lookout is to the growing number of visitors.

Other facilities: Facilities such as campgrounds, summer homes, Breitenbush resort and trails were developed in areas where prehistoric and historic uses occurred. Many trails, facilities and supporting infrastructure were constructed through the Civilian Conservation Corp (CCC) program. These facilities include Breitenbush, Breitenbush Lake and Humbug Campgrounds, Gold Butte Lookout and the Breitenbush Guard Station. Over the years, these facilities have been improved and rehabilitated. Breitenbush and Humbug Campgrounds were upgraded and expanded in the early 1960's to meet the demand. In addition, Cleator Bend was built in the early 1960's as a picnic ground, and was converted and upgraded to a campground in 1974. Other improvements include developing accessible facilities, providing longer spurs for RV campers and developing new water systems. Summer homes on the Breitenbush/Devil's tract were built as early as the 1930's but most were constructed in the 1950's and 1960's.

Since most recreational developments occur within the flood plains, many structures and facilities were affected or destroyed by the Flood of 1964. Several summer homes were destroyed and campgrounds were damaged. The Villa Maria Chapel organization site was lost to the Breitenbush River later.

#### c) Comparison of current and reference condition

**Road Management:** Management of the road system is changing due to current and projected federal road maintenance budget declines and to the multiple resource objective needs described in the amended Forest Plan.

Economics: Decreases in annual maintenance budgets are down 70% from the late 1980's. A direct correlation brings the miles of road that can be maintained in this watershed from 249 miles to an estimated 75 miles. With reductions in the numbers of maintenance workers, resulting in a less efficient operation, 75 miles may be a high estimate.

This 75 miles corresponds very closely to the system of arterial and collector roads in the watershed. Few of the remaining local roads receive annual maintenance. As a result roads are closing themselves through cut or fill slope failures, stream crossing failures and brush encroachment.

Some of the damage that occurred in the 1996 storm event can be linked to the lack adequate maintenance.

Forest Plan as amended by the ROD: The Willamette National Forest Land Resource Management Plan established a goal for "the transportation system to provide visually pleasing and efficient access for the movement of people and material involved in the use, protection and management of forest lands". Two ROD designations introduce Standards and Guidelines substantially different from the earlier Forest Plan. These are Late-Successional Reserves and Riparian Reserves.

Late-Successional Reserves: 15,719 acres, 23% of this watershed lie in this designation. Road construction in Late-Successional Reserves is not recommended unless potential benefits exceed the cost to habitat impairment. Roads will be kept to a minimum and be routed through non-late-successional habitat where possible. Alternative access methods should be considered to provide access for activities in reserves.

Road maintenance may include felling hazard trees along rights-of-way. Leaving material on site should be considered if available coarse woody debris is inadequate. Topping trees should be considered as an alternative to felling.

With the exclusion of most timber harvest activities within this allocation, it may be hard to rationalize maintaining a large road system that was built to access land for timber harvest.

Limiting access will make enhancement and restoration projects more difficult and expensive to implement.

Risk to Late-Succession old growth habitat from catastrophic fire events will increase as access to large blocks of land is decreased.

Riparian Reserves: Standards and guidelines prohibit programmed timber harvests, and management of roads, grazing, mining and recreation to achieve objectives of Aquatic Conservation Strategy. See revised Forest Plan standards and guidelines for specific road management information.

Current standards in road design and construction practices and existing Road Management systems and programs go a long way in meeting the Aquatic Conservation Strategy objectives. Decreases in work force make it difficult to maintain existing systems and programs.

There is as estimated 58 miles of road located in riparian reserves. In addition, roads cross Class 1,2 and 3 streams approximately 182 times in this watershed.

Inventory and risk analysis to riparian conditions in a 100 year storm event have not been done. Analysis processes have been established but shortages d

personnel available to do the work has delayed its completion. Probabilities that upgrading of stream crossings to accommodate the 100 year flood would occur are slim due to limited dollars and the high cost of such construction. Available restoration dollars should be spent on higher return projects such as stream restoration and road decommissioning and storage.

Roads will be storm proofed, decommissioned or obliterated as the localized sites are identified and analyzed.

#### Other Facilities:

- Facility condition is affected by age, natural elements, and human use; including "wear and tear" and vandalism.
- Declining maintenance funding for publicly owned facilities are resulting in the degradation of facilities.
- Flood events and erosional processes have a severe impacts on facilities such as campgrounds, water systems, structures including summer homes and footbridges, and trails.
- Demand for accessibility, regulations, resource protection, and change in user needs creates a need for upgrading and improvement of facilities
- Blowdown and snowdown damages or destroys facilities.

## IVD. Human Uses



Breitenbush Hotel - 1920's

### IV. SOCIAL DOMAIN

#### D. Human Uses

#### 1. Characterization

a) \*What are the major human uses, including tribal uses and treaty rights? Where do they generally occur in the watershed (e.g. map the location of important human uses)?

Breitenbush is one of the oldest recreational destinations in the North Santiam Basin on National Forest land due to the popular hot springs located on the Breitenbush River. Access to this area was established early. Essentially we use the same corridors today that American Indians used for thousands of years, although we have changed their character greatly. Campgrounds, resorts and trails were developed in areas where prehistoric and historic uses occurred. People have always been drawn to areas along water, meadows, unique topographical features and vista points, whether for recreation, sustenance or cultural values. Future use patterns will likely follow the same corridors as long as access is provided and management direction allows use to continue.

#### Kinds of use

Current recreation use is a result of user preference, as well as the types of settings and opportunities available within the landscape, as defined by management direction. With its many unique, attractive features, Breitenbush provides a favorable setting for various recreational activities including: developed and dispersed camping, hiking, fishing in the river and lakes, swimming, picnicking, sightseeing, berry picking, nature study, mountain biking, horseback riding, soaking in the Breitenbush hot springs, off-road vehicle use, and scenic driving. Seasonal activities include high cascade hunting for big game in the fall; rafting and kayaking during periods of high water; and cross-country skiing, snowmobiling and other snowplay activities during the winter months. Since the Flood of 1996, the Breitenbush River has been cleared of dangerous logs and has become a new favorite hot spot for class IV river runners during peak flows.

In addition, there are 72 recreation residences on the Breitenbush-Devils tract which provide seasonal occupancy for a variety of recreational endeavors, as well as, the Breitenbush Hot Springs Retreat and Conference Center, a privately-owned commercial resort offering various seminars and services promoting holistic health, well being and spiritual growth.

Other human uses of the Breitenbush include: domestic water source; power line corridor for lines belonging to both Bonneville Power Administration and Portland General Electric; public and commercial rock source (provided by nine developed rock quarries in the area); potential geothermal development; supply of various forest resources such as timber and firewood for both commercial and private use; and various special use events that occur occasionally such as concerts, educational workshops, motorcycle events, etc. Communities would like to see visitor opportunities developed to capture tourism business during winter and to expand the season into the spring and fall (see figure IV-11).

Tribal Uses: Prehistorically, inhabitants traveled along the ridgetops and valley floors to access areas for gathering food and medicinal herbs, quarrying obsidian and chert for tool manufacturing, hunting, an collecting cedar bark for making baskets, mats and clothing. Heavy snowfall in the Cascades suggests that human activities were confined to late spring, summer and early fall.

Historically, Native Americans from the Warm Springs reservation visited the Breitenbush Hot Springs area regularly, crossing over from east of the Cascades using the old Rapidan trail. The Warm Springs traditionally camped near the town of Detroit and fished for salmon and white fish near the confluence of the Breitenbush and North Santiam Rivers. It is highly likely that these areas within and adjacent to the Breitenbush watershed were occupied by humans annually for thousands of years during snow free months.

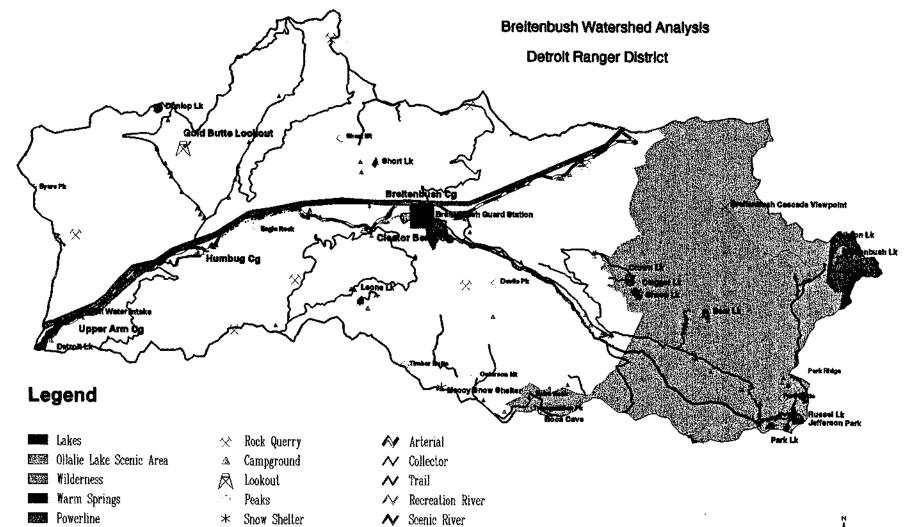
Currently, the Warm Springs tribes gather edible roots and huckleberries in the Breitenbush watershed, much as they have done in the past. Each year prior to digging the roots, a feast is held in honor of the end of winter and the beginning of spring. The roots traditionally, were the first fresh foods in the diet after the long winter. Prior to the feast, nobody is allowed to dig the edible roots. The Huckleberry Feast takes place in August. Prior to this feast, nobody is allowed to pick berries. These feasts are an integral part of their culture.

#### Where use occurs

The Breitenbush road is the primary access route into the watershed and is and extensively traveled, scenic route between large population centers. Landform and topography are obvious influences on human use patterns, particularly the development of "human corridors." Due to the steep topography of this drainage, the greatest concentration of use is along the accessible portions of the Breitenbush River corridor (usually within the riparian reserves) and plateaus in the high cascades. Since a large percentage of use is confined to a smaller area, it makes this drainage unique from neighboring watersheds where use is relatively dispersed.

Besides the river corridor, intensive recreational use occurs in the Mt. Jefferson

## **Human Uses**



Scale 1:140000

₩ild River

Other Special Sites

Dispersed Campgrounds

Breitenbush Permit Area

Breitenbush Hot Springs

Breitenbush Summer Homes

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Wilderness, Olallie Lake Scenic Area, and accessible lakes including Breitenbush, Short, Leone and Dunlap.

Recreation use is lineal in nature, as dispersion of use is dependent on access via roads and trails. Recreation occurs in primarily two landform types; gently sloped glaciated uplands where many lakes occur and river terraces. The diverse landscapes which compose the Breitenbush watershed vary in type and importance of available recreation settings. The Breitenbush drainage offers a number of opportunities for water-based recreation which are the highest in demand. They also provide outstanding opportunities for viewing scenery that are unique to each areas landscape characteristic. Few other landscapes within the watershed have features which draw recreation use like lakes, rivers and scenic topographical features. Some recreation use can be expected throughout the watershed, although the pattern of use is not tied to a specific landscape or destination. All open roads, for example, can have some recreation use by hunters or adventure seekers, although such use can be sporadic or opportunistic.

#### When use occurs

Due to limited access into the Breitenbush watershed during winter months, recreation use primarily occurs during spring, summer and fall with peaks during Memorial, Fourth of July and Labor Day weekends, and other holidays and weekends throughout the summer. The Breitenbush Road is plowed in the winter to access the Breitenbush Hot Springs Conference Center and Retreat which provides year round services.

Different areas and elevations of the watershed are used for different activities according to the season (i.e. kayaking, snowmobiling, hunting and swimming) Recreation use is weather dependant. Use peaks on those weekends and holidays that have favorable sunny and hot weather. A summer with poor weather results in dramatic decreases in use when compared with that of favorable weather.

#### **Primary Users**

Most frequent users of the Breitenbush watershed, approximately 85%, are from the mid-Willamette Valley, North Santiam Canyon and Portland Metropolitan area. Since these major population centers are located within a two-hour drive, this area serves as a "backyard destination" for many repeat visitors.

#### 2. What values are associated with human recreational uses?

a) Recreational use of National Forest lands is valued for the experiences associated with the activity, and the relaxation and enjoyment that it gives people. It refreshes people both mentally, physically and emotionally.

# 3. What are the highest priority issues or resource concerns associated with human recreational uses?

- a) There is more demand for recreational opportunities than supply available
  - Increasing demand has resulted in impacts to resources and user experiences such as social crowding, scenic quality, and user conflicts.
- 4. What are the management direction/activities, human uses or natural processes that affect human recreational uses?
  - a) Current Conditions
    - i) \*What are the current conditions and trends of the relevant human uses in the watershed?

ROS demand and supply: The information on recreation demand that is reported in the Oregon State Comprehensive Outdoor Recreation Plan indicates a high and increasing demand for recreation settings featuring low levels of development and management activity, with relatively low levels of use, and where motorized access is not permitted (SCORP 1988). The 1994 SCORP goes on to state that there is a pronounced preference by the public for more semiprimitive and primitive settings, and that this issue requires greater examination and direction of efforts statewide to meet this demand. Thus, it is clear that settings catering to these recreational standards are especially valuable to the public.

The current roaded settings have the capacity to accommodate a large percentage of Recreation Visitor Day's (RVD's) in the watershed. However, with declining access due to road closures or decommissioning, the ability to accommodate projected use levels as indicated in the Forest Plan may not be met. Therefore, use levels can be expected to reach maximum capacity sooner than projected.

According to the Forest Plan as amended by the 1994 President's Plan, no new roads will be constructed in remaining portions of inventoried (RARE II) roadless areas, however, management activities may occur within those areas. Thus, any developments that occur in roadless areas will change the characteristic of the landscape and may remove potential semiprimitive opportunities that could otherwise be available.

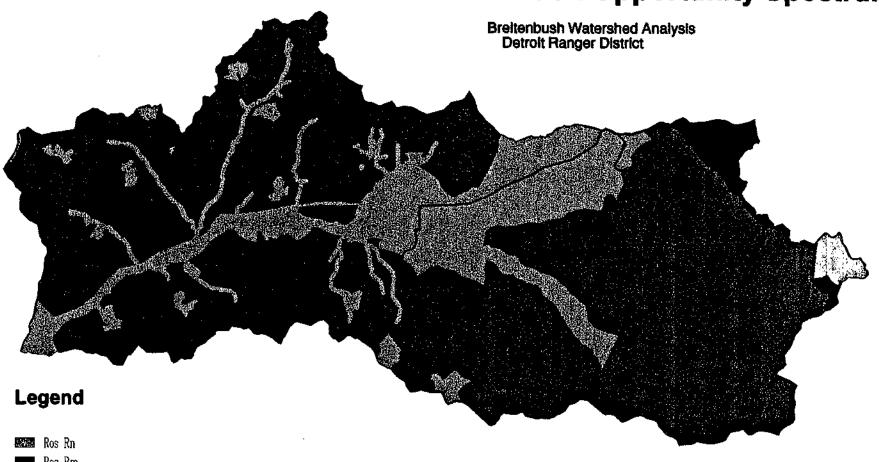
ROS Trends: Total dispersed recreation capacity for the Forest exceeds projected total use levels through 2040 (Forest Plan 1990). This relationship, however, is not consistent among all Recreation Opportunity Spectrum (ROS) classes (figure IV-12). Even if existing inventories of semiprimitive opportunities were maintained, future demand is expected to exceed capacity by the year 2010. In addition, between 2010 and 2030, use within all Wilderness ROS classes will exceed inventory capacity. It is likely with future demands at Mt. Jefferson Wilderness, limits to daily entrances will be required. This will have implications on semiprimitive areas outside of the Wilderness, potentially displacing users to limited existing non-wilderness semiprimitive areas. Providing areas alternative to Wilderness will be needed to help alleviate pressure of increasing numbers of visitors desiring that setting and experience.

Late Successional Reserves may represent an opportunity to provide dispersed recreation settings. Given the conservation objectives and species viability concerns associated with the Reserves, it is likely these settings will result in additional protection, as well as an opportunity to provide a desired and demanded recreation setting. These areas will be important, given the high demand that exists in the region for dispersed recreation, especially Semiprimitive settings. They may provide an opportunity to achieve this setting, since there is a limited and potentially a declining supply that will be available. In addition, portions of the Mt. Jefferson North Roadless Area is still in an undeveloped state and can meet the minimum requirements for potential future Wilderness consideration by Congress.

Recreational Access Trends: Increasingly roads will be closed for a variety of reasons or will naturally close themselves due to the absence of maintenance. With declining road maintenance budgets, and concerns related to watershed quality and wildlife habitat effectiveness, road decommissioning and obliteration will be common in the future. In addition, the Flood of 1996 has closed many roads due to extensive damage. The implications of this are twofold. Closed access will remove some roaded dispersed opportunities that presently exist. Increasingly as roads are closed, more pressure may be placed on roaded areas outside of closure, and former, accessible roaded dispersed areas will probably not receive the use that previously existed. "Established" users of an area may be displaced to other areas that remain accessible. Roads with the highest use will result with the most significant impact on users. The public perception of access is that they have grown accustom to the current access and expect the same level of service.

In contrast, some of these areas may provide for additional semiprimitive motorized and nonmotorized opportunities over time. "Roads to trails" opportunities could arise for mountain biking, horseback riding or lowering standards for maintenance could provide opportunities for off-road vehicles use such as trail bikes or all-terrain

## **Forest Plan Recreation Opportunity Spectrum**



Ros Rm

■ Ros Wrs

Ros Spm

Ros Spn

Ros Wasn

Ros Wssm

✓ Lsr



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vehicles. Generally, there is a direct relationship between length of trails and the amount of use it receives. The further the trail, the lesser the use. If current roads or portions of roads to wilderness trail heads are closed and converted to trails, access to popular destinations would be more difficult which may have an overall positive affect on wilderness resources especially in high use, high impact areas.

Wilderness Trends: The trend is leaning toward more regulated and restricted measures at highly concentrated and impacted areas in order to meet the intent of wilderness management policies and direction. Although restrictions are resorted to as last level measures, the sheer numbers of visitors and the anticipated growth of use prompt these types of actions. As restrictions such as limited entry are implemented, increasing demand may affect other "alternative" areas as a result of potential displacement of visitors. With increased regulations and restrictions comes a need for additional administration, e.g. more wilderness patrols. Monitoring implemented regulations and restrictions will be required to determine effectiveness.

Based on the assumption that funding will be available to implement Wilderness Implementation Strategies and Forest Plan guidelines, the condition of wilderness resources and associated experiences are expected to improve in the future based on these developments. Efforts over the past few years to collect use data and monitor use patterns and campsite conditions are directed toward realizing field conditions that are consistent with current management direction. Extensive monitoring through the use of a wilderness use permit system and field surveys are providing new information for making onsite management decisions.

Currently, several outfitting and guiding operators have service days within the wilderness portion of the Breitenbush watershed. Outfitting and guiding permit requests are becoming more popular. A demand or needs assessment must be completed before approval of such a permit. Commercial use will be managed in accordance with standards outlined in the Forest Plan. Recreation use exceeds capacity in many areas of the wilderness. The plan identified areas such as Jefferson Park, as an "Area of Particular Concern." Although there is a demand, new commercial permits will not be approved and existing commercial use will be reallocated or reduced in those areas.

**Dispersed Recreation Trends:** The primary recreation emphasis on the Forest is on the management of dispersed recreation opportunities. With road access decreasing, accessible, roaded opportunities will decline respectively.

With projections of increased population growth for the mid-Willamette Valley and Portland Metropolitan areas, increased recreation use of the Breitenbush watershed

can be expected for a wide range of dispersed recreation activities. For the period (1980-1989, the Forest experienced an average 2.7% yearly increase in all forms of dispersed recreation use. With projections of increased use of 1.7-4.9% for all the different forms of dispersed recreation found in the Breitenbush, an increased demand for dispersed activities is anticipated. Based on these factors and the general trends of past use, it seems appropriate to assume that future participation in dispersed activities in the Breitenbush will increase as long as opportunities are provided.

The watershed will continue to receive a high intensity of dispersed use within accessible riparian reserves resulting in further needed management actions to resolve resource and social impacts.

The potential demand may place additional pressure on the resources of the Breitenbush and amplify the need for intensive management of recreational use within the watershed. A response to future use may require new strategies for responding to situations where human use exceeds ROS standards for extended periods of the normal use season or if resource degradation becomes a concern. This may possibly include: a change to a management area with standards more closely aligned with the type of use taking place or altering kinds of use based on resource driven issues; or hardening or development of the area to better accommodate the type and level of use.

Resource concerns occur throughout the watershed as a result of dispersed recreational activities. For example, many human ignited fires have occurred as a result of leaving campfires unattended, careless smoking and fireworks. Public education and fire prevention programs will always be a need as long as people use the forest.

Developed RecreationTrends: The historic rate of annual growth for general camping activities on the Forest is 3.4%. The Oregon State Comprehensive Outdoor Recreation Plan for Region 8 (Breitenbush is within this region) projects a 3.7% average annual increase in the demand for camping activities for the period of 1991-2010. Developed camping or day use at developed sites has a relatively flat trend due to full occupancy conditions on summer weekends. Camping and day use are simply limited by the available facilities. Visitors frequently mention their frustrations about the difficulty of getting a campsite, especially near Detroit Lake. Often visitors are displaced to dispersed sites in the Breitenbush and North Santiam Drainage. The Detroit Lake Composite Area Management Guide identified a need to develop 490 campsites by the year 2010 as a result of the market study. In addition, demand for developed day use facilities is greater than the existing supply. In the future, with growing population and increasing demands for camping and day

use facilities, there will be a need to develop more of these sites. Since Breitenbush Road is a designated National Scenic Byway and a potential Oregon State Tour Route, it will be marketed on various tourism maps which will promote and encourage use of the watershed. This may create a need to develop additional facilities in the future. Future development will be limited by suitable soils and slopes, primarily located in the eastern landform block and adjacent the Breitenbush Community.

Current capacity of campgrounds is sufficient to accommodate projected amounts of increased use during weekdays. However, it is insufficient to accommodate current peak weekends and holidays during the summer, and projected amounts of increased use. More visitors are recreating during the week, to vacation away from the growing weekend crowds.

Current capacity at McCoy snow shelter and Gold Butte Lookout is sufficient to accommodate projected amounts of increased use. However, it may be inadequate to accommodate projected demand during peak periods of weekend use. There is only a small amount of lookouts open to public overnight use so supply for this opportunity will be limited.

Although recreation homes, private club and organization sites are in high demand, current policy discourages issuing special use permits for new sites to private clubs and individuals. It is viewed as a private privilege and does not promote public use of the land.

<u>User Conflict Trends</u>: Future challenges will concern a wider range of customers who demand high quality experiences. Their diverse interests will cause conflicts among users and uses to increase.

ii) How and where are current levels of recreation use impacting resources and user experience including, scenic quality, social encounters, and user conflicts?

Wilderness: There has been a 12% increase in number of visits to the Mt. Jefferson Wilderness since 1991. Wilderness areas in the watershed are easily accessed by numerous roads to entry points, several less than one mile from the Wilderness boundary. The combination of easy access and close proximity to major population centers has resulted in high day and overnight use. Easy access to popular locations has lead to intensive use that poses unique challenges to wilderness management. Intensive use has subsequently resulted in resource and social impacts that have impeded the attainment of wilderness management objectives.

In high impact wilderness areas, the standards for managing standing and down

woody debris are not being met. Consumption of limited campfire wood has far exceeded the rate of natural accumulation. The result has been the depletion of woody debris and snags needed for nutrient cycling and wildlife habitat.

A limits of acceptable change (LAC) campsite inventory of 115 sites was examined to assess site resource conditions and effects on user experience. Forest Plan standards and guidelines were used to assess whether campsites were meeting desired resource conditions. The inventory indicates 21% of campsites exceed acceptable standards for barren core area, and 36% of sites experience tree damage and loss in excess of the standard.

Furthermore, people have resorted to cutting down and damaging standing green trees for firewood. In 1995, a campfire ban was put into effect for the Jefferson Park area because the ecological function of these sensitive subalpine areas was being interrupted by the loss of decomposing wood and vegetation.

Most wilderness campsites occur within the riparian zone of lakes and streams. Virtually all riparian areas accessed by trails have been impacted by camping. Seventy-two percent of the campsites are located within 100 feet of a stream or lake and do not meet Forest Plan standards and guidelines. In addition, 19% of campsites are located within 100 feet of a trail, which also does not meet standards.

Impacts to campsites are rated as light, moderate, heavy and extreme which is summarized by WRS class in *figure IV-13*. Composite ratings for each campsite are dependent on several parameters and weighted based on site elevation. Parameters considered are directly a result of recreational-related use which include: vegetation loss, barren core area (compacted soil), total campsite area, tree damage, root exposure, fire ring or other developments, fire scar, cleanliness, social trail development to campsite, and number of other campsites within sight and sound.

Figure IV-13. Composite Campsite Impact Ratings

Totals	122	41	38	26	17	35%	1.62
Semi- primitive	108	33	34	25	16	38%	1.66
Primitive	6	3	1	1	1	33%	1.5
Pristine	8	5	3	0	0	0%	1.23
Wilderness Resource Spectrum	# of Sites	Light c1.25			Extres e>2.2		Average Rating
		Num	ner of Sites	Impacted	by Ratin	2 1	

Based on 1987-88 LAC inventories.

In areas of intensive recreation use, 35% of the sites have impacts rated as "heavy to extreme." Campsites within the semi-primitive class have the highest percentage. Thirty-eight of these sites are rated as heavy or extreme. Thirty-three percent of the sites within the Primitive class are rated as heavily or extremely impacted, and none of the Pristine campsites receive this kind of impact. Those areas with concentrated recreation use identified in the Wilderness Strategies Project Environmental Analysis are called "Key Impact Areas." Key impact areas within the Breitenbush portion of Mt. Jefferson Wilderness are Jefferson Park and Crown Lake. These areas were based on overall composite ratings that ranged from heavy to extreme. These areas have priority for study and implementation of Wilderness Management Strategies including restoration, regulation and restrictions.

The inventory of wilderness campsites suggests that scenic quality and user experiences within most Wilderness Resource Spectrum settings have been affected by the conditions noted. While wilderness campsite conditions may diminish the intended user experience, effects to downstream water quality is unknown.

Wilderness Strategies implemented in 1995-96 including designating campsites and campfire bans within Jefferson Park are a step toward meeting Wilderness management objectives. However, in high elevation environments, the conditions noted for many of the wilderness campsites may require significant time for recovery of denuded riparian vegetation, consumed down woody debris and compacted soils.

Prior to 1995, Russell Lake had exceeded acceptable standards for camp solitude.

The area surrounding this subalpine lake is very open. Thus, camping out of sight and sound of others is more difficult than in lower elevation forested areas. Since the designation of campsites, campsite solitude should be closer to achieving the acceptable standard within the designated campsite zone. With increasing use, other sites outside this zone will be used or created, and potential for not meeting this standard may arise.

Jefferson Park currently exceeds acceptable encounter standards on both weekends and weekdays. With easy access into the Wilderness, day use trips are on the rise. Encounter rates on trails will increase since visitors are going up and down trails twice in one day.

Wilderness Implementation Strategies include designating campsites at Jefferson Park (Russell and Park Lakes), and prohibiting campfires at Jefferson Park were implemented in 1995-96. The measures should start moving those affected areas closer to current management direction and the intent of the Wilderness Act. The plan is to monitor these areas to see whether the actions are working. During this time, managers will determine if the changes are effective, and consider whether actions should be modified or expanded to other areas.

Dispersed Activities: Since the time the dispersed campsite inventory (outside of wilderness) was completed in 1988, and based on current knowledge and some field verification of several areas, actual condition of many sites has deteriorated due to increasing use and lack of traffic control within sites. The number of campsites has also increased. More evidence of "dry" camping, away from water is seen throughout the watershed, due to the limited of available campsites near water on peak use weekends. Approximately 72% of the campsites are located within a riparian reserve.

Dispersed campsites located away from riparian areas do not get the intensity of use or impact as those in riparian areas. These are generally located in the upper portions of the watershed, and are used by big game hunters for a short season during the fall. These sites are often located where existing developments have occurred such as a landing, turnout or end of a spur road. For the most part, frequency of use is from infrequent to moderate while impact from previous use is light to moderate. Many rock pits and storage areas receive intensive use and accommodate large groups but overall impact to the site is light since there are no resources to damage. These sites compose 35% of the total dispersed sites or 57 sites and their existence and location tends to fluctuate from year to year.

Those campsites that receive the most frequent use, subsequently, receive the most impact to resources ranging from moderate to extreme damage. Conditions of the

most heavily impacted dispersed camping sites within the Breitenbush include: soil compaction, erosion, vegetation loss and tree damage. Many hazard trees are created as a result of recreational related damage. Vehicular access to sites is not limited which attributes to some of the degradation of these sites. Another contributing factor to the condition they exhibit is the amount of use individual sites receive each season due to their popularity or proximity to specific areas of interest such as the Breitenbush River.

The inventory sample of dispersed campsite conditions suggests that scenic quality and user experiences at many sites is being affected by use patterns and behaviors that shape the size and condition of sites. The sample indicates that 36% of the sites experience substantial site degradation in excess of the norm. Since the time the dispersed campsite inventory was completed, it is suspected that this percentage has increased.

Popular locations often lead to concentrated campsites within a confined area which leads to campsites located within sight and sound of each other. Approximately 43% of campsites are located within sight and sound of other campsites.

The Breitenbush watershed attracts more large groups than neighboring watersheds. Many of the large sites that have a cluster of campsites are often occupied by large groups. "Remote" group camping is an activity that is increasing within the watershed. Many of these groups tend to be young in age and want to be "left alone" to party. A level of rowdyism and other undesirable behaviors occur in many of these situations, and conflicts arise with adjacent visitors who are trying to enjoy their visit. Other groups such as multi-family groups or organizations also use some of the larger sites for dispersed camping. Generally, campsites occupied by large groups have more resource impacts to the site than small groups which have been apparent at some of the sites.

Until recently, Upper Arm Campground has been a dispersed camping area that exhibits signs of overuse including resource damage, vandalism, and sanitation problems. This area has been occupied by over 200 people on many weekends during the summer. The area became an administrative problem due to the sheer numbers of people, and the difficulty of controlling large crowds; and undesirable behaviors such as harassment to other visitors, drug and alcohol parties, excessive noise, fighting, discharging firearms and criminal activity. Increasingly this area, as well as some other "free of charge" dispersed campsites, attract homeless people to live for extended periods of time. At the time of this writing, Upper Arm has undergone drastic administrative changes including designating and improving six campsites and converting the remainder of the areas to day use.

Dispersed site conditions within the watershed exhibit other characteristics that are function of visitor behavior. It is common to find human waste proximal to dispersed sites. In addition, often waste associated with the camping experience; product containers, cigarette butts, discarded hygiene products, retired camping equipment and furniture, and other assorted goods, are left behind at the site. Also, personal garbage from people's homes have been dumped in many areas.

This residue left by dispersed users is a concern in terms of public health and safety, particularly during periods of peak concentrated use. During this period the presence of human waste and other debris around dispersed camp areas may pose a threat to the health and safety of the users present. While visitation is of relative short duration and seasonal nature, effects to downstream water quality is unknown. Dunlap Lake warrants additional discussion. A microorganism indicative of sewage pollution has been previously identified at this lake. Camping at this popular spot occurs uphill from the lake. An old vault toilet exists but is deteriorating and doesn't always get used.

The presence of human waste and debris, tree damage and loss, denuded and compacted camp areas, suggests that both the scenic quality and the intended recreation experience opportunity have been diminished for a significant number of sites within the watershed.

<u>User Conflicts</u>: More people sharing a "static" resource is leading to increasing use conflicts. These conflicts arise from sheer numbers, different perceptions of what is an appropriate setting, user etiquette and user impacts on the recreation resource. Most of the conflicts occur between users near and on Detroit Lake. Occasionally jet skiers will disregard the five mile per hour rule in the Breitenbush arm and upset those that are fishing from boats or shore. Conflicts exist when young groups of people exhibit disruptive and disrespectful behavior to others and the resources.

There may be incidental conflicts between cross-country skiers and snowmobilers.

Horse use and non-horse use has long been a traditional conflict between these user groups within a wilderness setting. At both ends of the continuum, members of each user group would like an experience void of the other group's presence. Horse groups have expressed the desire to have trails designated for the sole purpose of horseback riding only. Some hikers feel that horseback riding is not an appropriate activity within the wilderness setting, and have at times made hostile comments to horse users. Hikers object to the horse manure on trails or presence of confined animals near water and view areas.

Increasingly, campsites at campgrounds are used for day-use picnicking which

causes conflict with those who want to camp. Day use facilities are limited and short in supply.

Disruptive behaviors that causes conflicts between users occur in several areas in the watershed primarily in the Breitenbush Corridor. These include loud parties, fireworks, nuisance ORV use, and discharging of firearms in areas in close vicinity of other visitors.

Other conflicts that occur are those that violate wilderness regulations and detract from user experiences, including mountain bike use and group sizes exceeding the maximum of 12 people per group. Large groups, by their nature, have a disproportionately negative impact on opportunities for solitude in wilderness.

iii) What are the current recreational demands? How can the watershed best provide diverse opportunities that reflect the current and future needs and demands of forest visitors within the capacity of the land and its resources?

There is more demand placed on the watershed than what is being supplied.

Demand for recreation opportunities within the Breitenbush is expected to increase due to the growing population. There is room for additional development within the drainage and some opportunities have been identified.

The Breitenbush currently provides a wide range of recreation opportunities. Although new recreation activities may emerge in the future, it is expected that the current pattern or traditional recreation uses would continue at an increased rate. However, preferred settings near water are a finite resource.

In a statewide survey, general recreational demands include more semiprimitive and primitive settings. Listed below are the recreational demands that have been identified for the Breitenbush:

- Winter sports opportunities and facilities, particularly for snowmobilers
- Areas for mountain biking, four-wheel driving and all terrain vehicles
- White water boating
- More sophisticated improvements at campgrounds such as flush toilets and showers, RV hookups, sanitary stations, and large spaces for RV parking
- Group sites
- Accessible recreational opportunities and facilities for people with disabilities
- Day use and camping opportunities and facilities.
- Interpretive services

- Special designations such as wild and scenic river, scenic byways, etc.
- Hot springs
- Areas for special use events

#### b) Reference condition

i) What are the major historical human uses in the watershed, including tribal and other cultural uses?

#### 1840-1900

Early Visitors of the Breitenbush: In the 1840's John Breitenbush was the first Euro-American to visit the Breitenbush hot springs, after acquiring knowledge of the springs through his association with the Native Americans in the area. The years following, hunters and trappers frequented the hot springs during trips into the Breitenbush drainage.

In circa 1873 John Minto and Henry States led an expedition up the North Fork of the Santiam River in an attempt to find a pass over the Cascades. Upon reaching the mouth of the tributary to the North Santiam River they meet John Breitenbush and later named the river after him. One of the trails that Minto examined for a route over the Cascades was the South Breitenbush. This trail ends at a wagon road on the east side of the Cascade Mountains.

The high country was highly attractive to adventurers who engaged in mountain climbing, botany, fishing, hunting and photography. The first western mountaineering club, Oregon Alpine Club was organized in 1887 followed by a "true" climbing club called the Mazamas.

John Hollingsworth started operating pack trains in 1897, taking visitors into the Breitenbush Hot Springs.

Early Forest Reserve proposals and designations during the 1880-90's stressed the importance of preserving wilderness values and scenery, as well as, protection of city watersheds and salmon spawning grounds.

On September 28, 1893, the Cascade Range Forest Reserve reaching from the Columbia River nearly to the California border was created.

Prior to the Reserves, sheep men had established driveways and ranges in the Cascades. Some sheep men had used the same range in the Mt. Jefferson area since the 1880's. Sheep men wintered their flocks in the valleys of eastern

Oregon. After lambing season, they began to trail their flocks toward the mountains as snow levels receded. They reached the alpine meadows by August and by September they would begin trailing their flocks back down to the eastern valleys. The sheep industry protested against their exclusion from the Reserve and there were instances of trespass.

During this time, sheep grazing was a controversy with a variety of other forest uses. There was some opposition to sheep grazing in the reserve from recreational groups, primarily the Mazamas, who continued to use the reserve for their outings, mountaineering, hunting and fishing. There was also opposition from Native Americans and Euro-Americans who utilized the huckleberry meadows, as the presence of sheep was considered incompatible with berry picking.

The years of 1896-1897 a wave of protest was brought about by the sheeping industry. In June of 1896, Congress passed a resolution that cut the Reserve into three smaller reserves. One of these areas was a 30,000 acre area near Mt. Jefferson. Except for these areas, the forests were opened to grazing and settlement.

#### 1900-1940

River valleys were vital factors in determining the pattern of settlement, transportation routes and resource utilization. The North Santiam River with it's tributaries the Little North Fork and Breitenbush were routes into the interior and provided the easiest access.

In the Detroit area, commercial logging had developed early due to the railroad. Hammond Lumber Company constructed a railroad grade and tracks up the Breitenbush drainage sometime between 1894-1907. Harvesting occurred on the lower reaches of the Breitenbush River in the 1920's.

Circa 1911 Mark S. Skiff, from Salem, Oregon, applied for a special use permit to occupy about three acres of land to construct a hotel, sanitarium, cabins and acquire water rights to three mineral springs along the Breitenbush River (Lower Breitenbush Hot Springs). Many problems arose, especially concerning water rights but in 1913 a final permit was issued granting him rights to construct the above buildings for his proposed summer resort business. The hot springs resort was eventually established in 1923 and had road access built into it.

Outdoor recreation began to grow during the 1920's through the 1930's,

sparked by the increasing ownership of private automobiles. In response to the recreation demand, there was a national and regional effort to provide areas for summer homes and campgrounds to encourage people to visit and enjoy our national forests.

During the 1920's, changing public needs and demands for recreational use of the Breitenbush resulted in planning and designing roads, campgrounds, and two summer home tracts.

Plans for a road adjacent the Breitenbush River from Detroit to Breitenbush Hot Springs made it necessary to coordinate logging plans with scenic roadways. In 1920 Fred Ames and Fred Cleator made such plans for the projected sales on Canyon and Humbug Creeks. These included providing a 100-250 feet scenic strip between the railroad track and river so logging trains would run behind the scenic corridor. In 1930, Cleater made plans to build a road up the North Fork of the Breitenbush River to Olallie Lake to connect with the Mt. Hood Loop Road. This would unite the norther Santiam (Willamette) and the Mt. hood National Forests into an integrated recreation complex. A road was developed accessing the Breitenbush Hot Springs before 1931 and access to Olallie Lakes by road was developed before 1935 as depicted on historic forest maps.

The Civilian Conservation Corps (CCC) program was used to advance recreation developments in the Breitenbush. The CCC provided the survey work for the summer home tracts; built and relocated trails such as the Skyline Trail; built trail side shelters; built four Forest Service campgrounds including Breitenbush, Breitenbush Forks (as seen on the 1936 North Santiam Recreation area map), Breitenbush Lake, and Humbug; Gold Butte Lookout and Breitenbush and Breitenbush Lake Guard Stations.

During the 1920's, the Chemeketans and Obsidians outdoor clubs were formed. They used the Upper North Santiam for their mountaineering and hiking adventures. Along with the Mazama's and Oregon Alpine Club, they often assisted in mountain rescue work and serving as advisory groups for recreational planning.

In 1919, the Forest Service began to consider plans to build a trail from the Columbia River through the Upper North Santiam onto Crater Lake, in part using existing trails and pioneering new ones. In 1920, with the leadership of Fred Cleator, the Oregon Skyline Trail (now known as the Pacific Crest Trail) was officially born and marked the beginning towards the grandiose network through Oregon. There was a need to relocate trails with steep gradients and

to sign the routes more clearly. In addition, plans were made to develop campsites along the way. Cleator's developments were put into effect with CCC relief help in the 1930's.

This was an era in which scenic mountain highways were becoming popular. Cleator planned a Skyline Highway taking off from existing roads south of Mt. Hood and connecting with existing roads near Crater Lake. The Old Skyline Road was developed on the Mt. Hood side and is the 4220 Road that exists today. The highway would run west of the Skyline Trail and through the Breitenbush drainage. The projected attracted a great deal of public attention but the hard times of the 1930's put an end to the project. It isn't until the 1990's when his vision finally approaches reality.

The Mt. Jefferson Primitive Area, established October 10, 1930 was the first primitive area established in the present Willamette National Forest. An expansion was made on June 8, 1933.

Prominent recreation features that attracted outdoor enthusiasts at this time are still popular today. Mt. Jefferson was seen by Lewis and Clark on March 30, 1806 and named in honor of the President of the United States. The first ascent to the peak, according to Mazama History, was made August 12, 1888. Jefferson Park was thought a masterpiece of natural artistry and awed by many.

Oregon Skyline Trail became a well known alpine trail route threading the high passes of the Oregon Cascades from Mt. Hood to Crater Lake and traverses the entire length of the primitive area. The Oregon Skyline Trail was not recognized of great local importance but was recognized as one of the main future recreation assets of the State at that time. As the trail became more popular, a great number of lakes including barren lakes had been stocked with native and nonnative fish.

Increasingly between 1915 and the 1930's became a strong emphasis on using the high country for recreation. By 1930, a general recognition within the Region was clear; that recreational use of peaks, passes, glaciers, subalpine meadows and lakes was to be dominant with sheep grazing taking a backseat as a secondary use.

In the 1880's sheep grazing began in the Primitive Area. The Wild Cheat S & G allotment was summer range for 1200 head of sheep. The allotment included the Jefferson Park area and South Breitenbush.

With more land in the high country dedicated to recreation, it became more difficult to find suitable sites for driveways to herd sheep. Sheep travel was diverted from major recreational trails to lesser used ones. With recreational pack trains traveling the Skyline Trail to favored highland camps, competition for forage grew between sheep and pack stock. As a result, sheep grazing within the Primitive area was terminated by the late 1930's and hasn't been allowed since. Jefferson Park was closed to grazing in the middle 1930's because of overgrazing. The remainder of the allotment was closed in the late 1930's because of lack of adequate access.

The 1930's through 1940's was marked by changing patterns in recreational use. The early recreational uses up to this time were hunting, fishing, camping, berry picking, and photography. In addition to the traditional recreational uses, automobile camping increased while use of horses, except in the back country, declined. With new visitors from out-of-state discovering the area's peaks and other points of interest, mountain climbing and hiking increased.

After the completion of the relocated North Santiam Highway during 1948 and construction of Detroit Dam in 1953, the Breitenbush received an influx of visitors and recreation use tripled.

The period after World War II was marked by major changes in American recreational habits. General prosperity and abundant leisure time led to more use of the national forest. Accelerating technological advances, including the development of equipment, transportation, and sports that necessitated more space, and the need to set aside specialized areas for activities such as cross-country skiing, snowmobiling, trail/mountain bikes, hanggliding, off-road vehicles, pack trains, high tech backpacking/mountain climbing, whitewater boating, RV camping, jet skis, stream and lake fishing. This meant a need to develop more facilities for recreational groups enjoying the forest. It also meant meeting the needs of the wilderness groups, who demanded more land to meet their particular type of experience.

#### 1960-1990

Wilderness Management: A proposal was recommended on August 11, 1967 to incorporate portions of the Mt. Jefferson Primitive Area and some lands immediately adjacent for designation under the National Wilderness Preservation System. Public hearings were held during 1964 and 1966. Within the Breitenbush, the recommended boundaries included additions along the North and South Forks of the Breitenbush River.

After years of deliberation between the Forest Service and public interest groups, Congress, in October of 1968, established the Mt. Jefferson Wilderness (Public Law 90-548).

With passage of the Oregon Wilderness Act of 1984, 8,189 acres that had been evaluated under RARE and RARE II, was designated under the National Wilderness Preservation System. Areas within the Breitenbush that were included were: Triangulation Peak, Cheat Meadows and Firecamp lakes. No other Wilderness boundary changes have occurred since this time. The remaining 9,684 acres were released for multiple use management. A large portion of the Breitenbush was affected by this change. Since the release of these lands, a portion of this area has been affected by management activities. By the 1960's with tighter budgets, the direction was to build fewer but bigger campgrounds in order to concentrate people to specific areas. Many small, scattered campgrounds existed on the District but were considered inefficient for management purposes. They were also a higher risk for potential human ignited fires. Many of these were converted to dispersed sites and new campgrounds were built and existing ones expanded. Cleator Bend was built in the early 1960's as a picnic ground and was converted and upgraded to a campground in 1974. Breitenbush and Humbug Campgrounds were upgraded and expanded in the early 1960's. In the early 1960's, two recreation projects, Big Forks Campground (on the confluence of the North and South Breitenbush) and Short Lake Picnic Ground, were designed but they never saw implementation. The remaining small campgrounds such as Upper Arm, Dunlap and Leone Lake maintained some minimal facilities, e.g., toilets, campfire rings and tables.

A majority of the 13,445 acre Breitenbush Known Geothermal Resource Area, an area designated by the U.S. Geological Survey as having high potential for geothermal development, lies within the watershed. In the past, there has been a high interest in geothermal exploration in the Devils Creek drainage. In 1981, a geothermal drill site was constructed near Devils Peak to determine the possibility of obtaining a lease for geothermal development. The area is still an identified Known Geothermal Resource Area and the potential geothermal resource is managed according to the Geothermal Steam Act of 1970.

The Geothermal Steam Act of 1970 was passed as part of a nationwide program designed to reduce our national dependency on imported energy. The Cascade Range along with other areas of recent volcanism in the western states is believed to have considerable geothermal energy potential. Among the possible uses of geothermal energy are generation of electrical power, space heating and industrial processing. Discovery and development of economically

usable geothermal energy resources could contribute significantly to fulfillment of energy needs on a local basis. Geothermal exploration and development has been a topic of controversy in the past.

The lower Breitenbush Hot Springs permit area, originally developed by Mark. S. Skiff in 1923, has changed hands a couple of timesover the years. The last permittee acquired the area in 1979, and destroyed all but one of the existing buildings on this 40 acre parcel of Forest Service land. The permittee's plan for a new resort included building 44 rental cabins with attached hot tubs, a bunkhouse, 12 RV campsites with hookups and 10 tent campsites, a swimming pool, bath houses, a landscaped pond, restrooms, parking, and a community building including office, snack bar, and seminar rooms. The plan also included restoring the hydroelectric plant which was destroyed and removed by the Flood of 1996. The permit was terminated in 1996 due to failure on behalf of the permittee to adhere to the work schedule.

Today, the area is undeveloped, and contains remnants of the original hot springs resort including one building, a few old deteriorated hot tubs with hot water piped into them, and a dump site of appliances and garbage generated from the removal of the cabins. The site is becoming a popular dispersed camping area and is exhibiting similar site conditions described in the dispersed recreation assessment. More people are becoming aware of the existence of the hot tubs and increasing use has been observed. Approximately, 11 acres of the area lies within a riparian reserve.

During the 1970's through the 1990's, there had been a constant growth in demand for winter sports opportunities. This demand included a wide variety of activities such as snowmobiling, cross-country skiing, snowshoeing and general snowplay.

Winter recreation facilities were developed at Santiam Pass as early as the 1940's. However, these areas were very heavily used throughout the season and often operated beyond their design capacity. The resulting congestion and overcrowding became difficult to administer and ultimately detracted from the visitor's experience. There became a need to develop additional snow parks and emphasis was placed on dispersed winter sports opportunities outside the Santiam Pass area. The goal was to accommodate the growing demand while providing opportunities closer to the Willamette Valley. The Detroit District Winter Sports Management Plan was developed in 1989 to address the need for additional winter sports areas.

In 1984, McCoy Creek Snowmobile Area was developed through a

cooperative effort between the Forest Service and the North Santiam Snowmobile Club. In 1988, the club completed construction of a snow shelter on the upper McCoy Road.

In December of 1988, in response to public comment and intensified concern regarding the management of Forest rivers, a process was initiated to determine Wild and Scenic River eligibility of those rivers identified through the Draft Environmental Impact Statement and proposed Forest Plan. The Forest identified segments of the Breitenbush and South Breitenbush River as eligible for inclusion in the National Wild and Scenic Rivers System.

Wilderness use, since the mid 1940's has increased dramatically. Ease of access along with the growing demand has resulted in the Wilderness receiving use in excess of its capacity. Signs of resource damage were becoming more apparent and there was a need to quantify the impacts. During the 1980's, wilderness managers implemented a process for establishing acceptable levels of Wilderness use called Limits of Acceptable Change (LAC). LAC inventories of existing campsite conditions were conducted during the late 1980's. Rehabilitation of heavily impacted sites was a common practice at this time. In addition there was a need to measure the social impacts within high use areas. Monitoring encounters between groups of people began and continues to be conducted by wilderness managers to determine level of crowding and opportunity for solitude.

#### c) Comparison of current and reference condition

- i) What are the causes of change between historical and current human uses?
  - Recreation Use Patterns: Essentially we use the same corridors today that American Indians used for thousands of years, although we have changed their character greatly. Campgrounds, resorts and trails were developed in areas where prehistoric and historic uses occurred. People have always been drawn to areas along water, meadows, unique topographical features and vista points, whether for recreation, sustenance or cultural values. Future use patterns will likely follow the same corridors as long as access is provided and management direction allows use to continue.
  - Promotion of Recreation Opportunities: In the 1920's-1930's, early national and regional efforts promoted National Forests for people to come and enjoy. Breitenbush was target for development at this time but was considered remote, back country to a majority of the population, including Mill City. Transportation was slow and limited. Conditions affecting leisure time and its

use have changed quickly during the last 40 years. People began to have more leisure time, and better mobility through improved access and increasing ownership of private automobiles. Considered Willamette Valley's "back yard," the Breitenbush is receiving increase use. Local communities, with the decline of the timber industry, are trying to build strong, diversified rural economies by promoting tourism and recreational opportunities in the area. Areas in the forest are at or reaching capacity levels. These areas should not be promoted and focus should be on "demarketing" those places that have reached capacity. Creating new areas and promoting lesser used areas would be a solution. The information highway is paving the way for promoting recreation opportunities on the Internet. Encouraging use may have adverse affects on the resources or create social issues within the watershed.

• Changing Demographics and Recreational Demand: Changing demographics reflects on changing and increasing recreational use and demands. In 1910, the U.S. operated on a rural economy that had 90 percent of its population living in rural areas. The population had not achieved the mobility or the freedom from sustenance requirements that would give the time and means for recreation. After World War II, society became more affluent, urban growth started to boom, transportation systems improved and industrialization has been replaced by the information society resulting with more leisure time. Rapid population growth has the most dynamic influence on recreational use.

Many societal changes have occurred in the last few decades. Our society is becoming increasingly older, better educated and ethnically diverse. Americans are becoming increasingly concerned with environmental quality, quality of life, and the responsiveness of government to public needs. There is heightened concern with fitness and health. Americans are more urban and mobile, many wanting higher levels of services, developments, and conveniences. Changing lifestyles include smaller families, two-income family households, and single-parent households. With new legislation and accessibility developments, people with disabilities more "mobile" and able to visit the National Forest.

New Technology and Recreational Demand: Prior to World War II, recreation uses were traditional, eg. hunting and gathering, fishing and camping. Post World War II was marked by major changes in American recreational habits. The interest in various types of recreation has varied as the population's way of living has varied. Accelerating technological advances, including the development of equipment, transportation, and sports, necessitated more space, and the need to set aside specialized areas for activities such as cross-country skiing, snowmobiling, hanggliding,

trail/mountain bikes, off-road vehicles, pack trains, hi-tech backpacking/mountain climbing, whitewater boating, RV camping, jet skis, and stream and lake fishing. This meant a need to develop more facilities for recreational groups enjoying the forest. It also meant meeting the needs of the wilderness groups, who demanded more land area to meet their particular type of experience. Although difficult to predict, new uses will emerge in the future, but historical uses will continue. People have strong ties to traditional, long-standing activities and places they enjoy.

- Facility Construction: The construction of transportation networks in combination with improved means of transportation (i.e. automobile), made access much easier and has resulted in more people recreating in the National Forest than in historical times. In addition, the construction of Detroit Dam resulted in more access to water-based recreation.
- Competition for Use of Resources: Legislation, brought about by public disagreement and debate amount management and protection of forest resources, was brought about in large part by competition for the scarce resources that are available now as compared to the past. Legislation such as the Wilderness Act, Wild and Scenic Rivers Act, Endangered Species Act, Clean Water Act, etc. resulted from this controversy. Often times, many of the legislative solutions conflicted with each other. Because of such legislation and public sentiment, practices such as sheep grazing have disappeared from the watershed. In addition, timber harvest is on the decline in recent years.
- Funding Levels: Funding levels are decreasing and demand for recreation opportunities is increasing. In order to fulfill this demand, agencies are looking at new ways to provide recreational opportunities such as user fees and privatization of the operation of the facilities (concessionaires).
- Resource Damage: Social crowding has resulted in increasing resource damage at the more popular recreation areas.