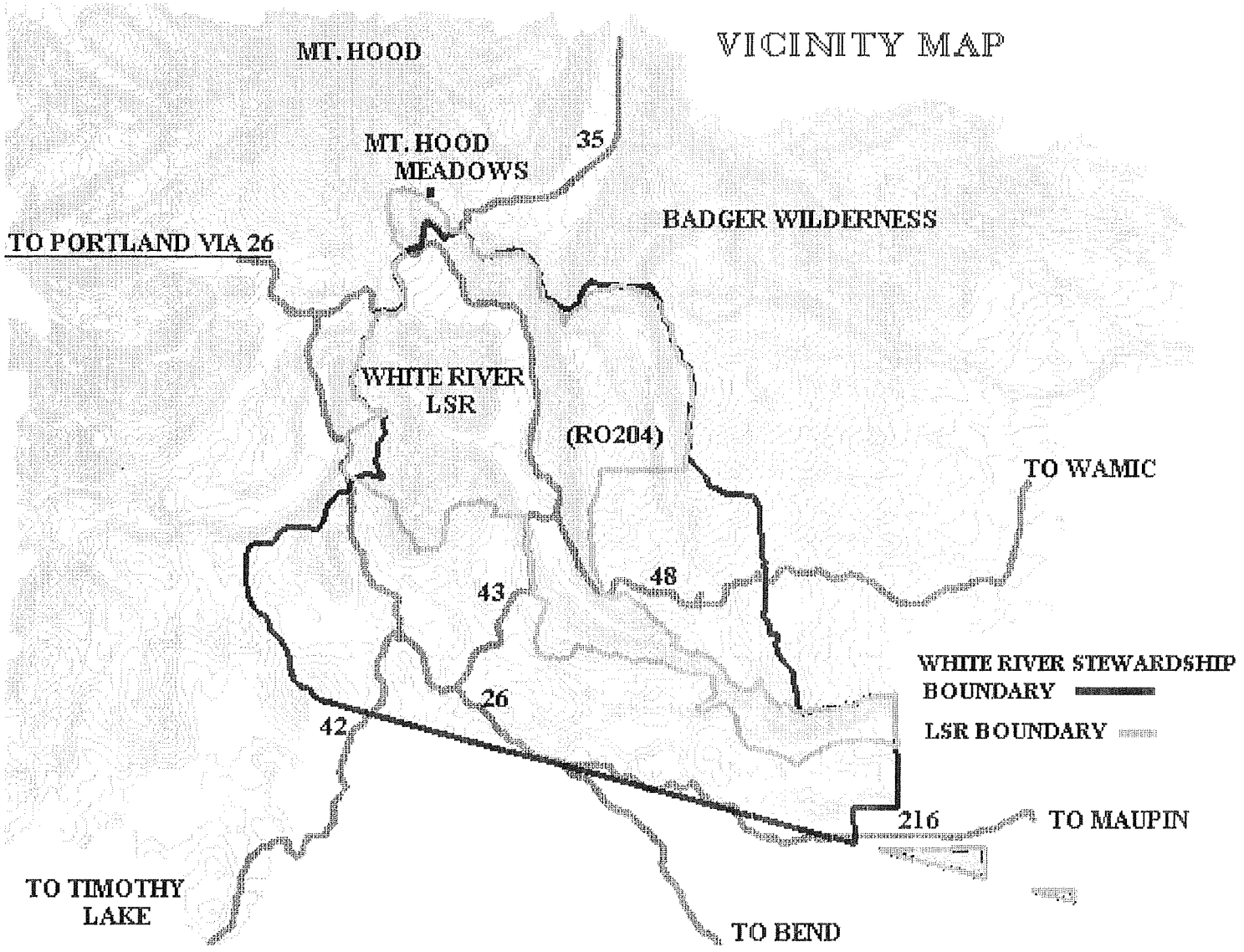
WHITE RIVER FROM TWIN LAKES TRAIL ON BIRD BUTTE

WHITE RIVER LATE-SUCCESSIONAL RESERVE ASSESSMENT

And WHITE RIVER STEWARDSHIP AREA LANDSCAPE DESIGN

EASTSIDE PARTNERSHIP OF THE MT. HOOD NATIONAL FOREST --Amended Final of JULY 1, 1996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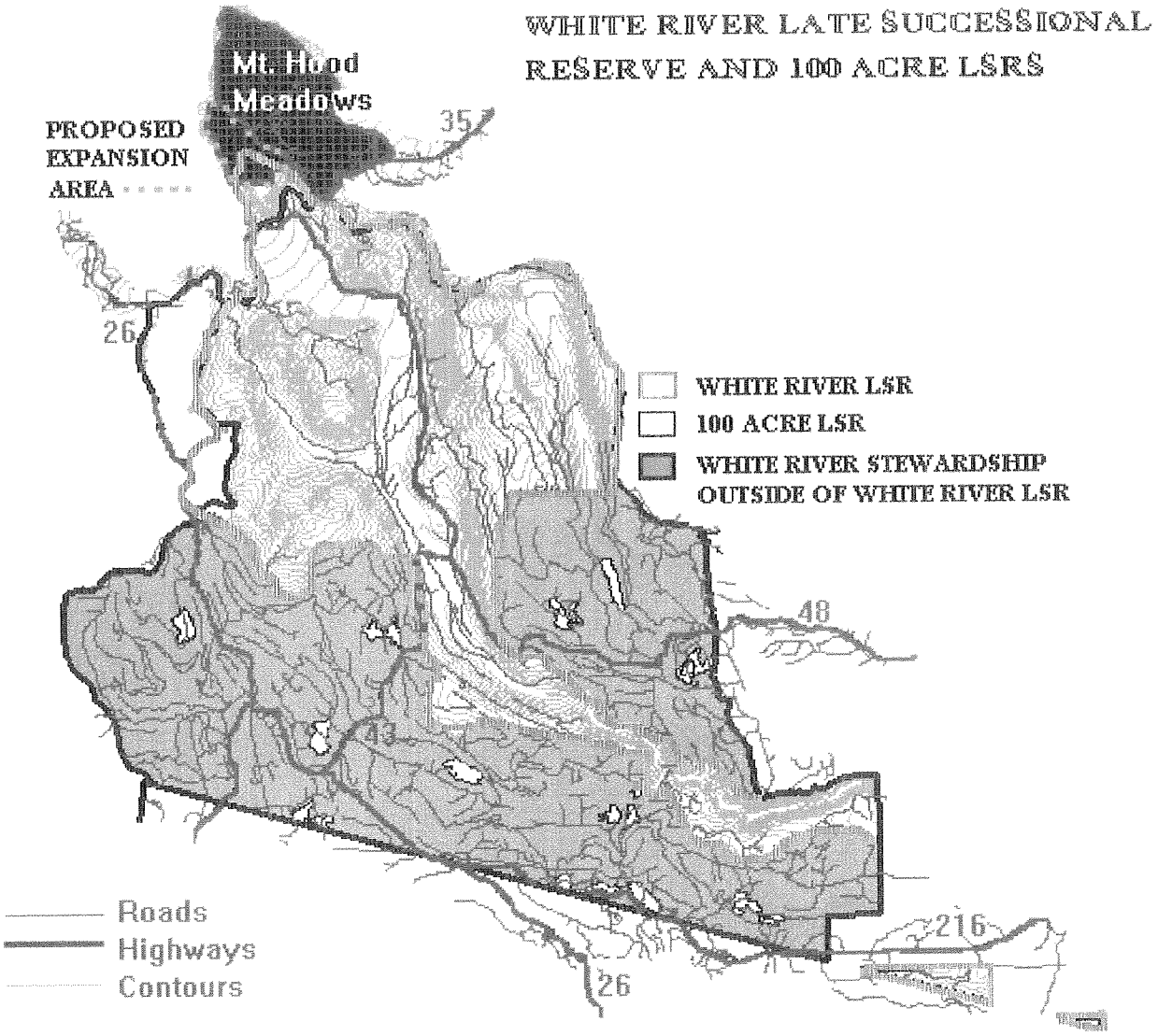
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PART I

INTRODUCTION

The Eastside Partnership of the Mt. Hood National forest presents this assessment of the White River Late Successional Reserve (LSR) and 100 acre LSRs within the White River Stewardship Area. This effort represents the latest in a series of landscape scale analyses involving the White River Stewardship Area. Previous analyses pertinent and contributory to this assessment are:

- **Barlow Road Integrated Resource Assessment** -1991-Analyzed desired conditions for the Barlow Road Historic District.
- **Large Scale Analysis Pulse Project** 1994-Analyzed the complex social, biological and physical relationships on the Mt. Hood National Forest and adjacent lands.
- **White River Wild and Scenic River Management Plan**-1994-Amended the Mt. Hood Forest Plan to protect the outstandingly remarkable values of the White River corridor.
- **White River Watershed Analysis** 1995-Analyzed the White River subbasin as a Tier 2 Key Watershed under the Northwest Forest Plan.
- **White River Stewardship Area Landscape Analysis and Design** (LAD)1995-Applied the results of watershed analysis to a set of site specific desired conditions for the White River Stewardship Area portion of the White River subbasin.
- **Eastside Partnership Access and Travel Management Plan** 1995-Brought forward the results of the White River Stewardship LAD with reference to desired infrastructure and integrated it with the total Eastside ATM plan.

This assessment provides information and a site-specific description of current management direction to:

- Apply ecosystem management and the Mt. Hood Forest Plan as amended by the Northwest Forest Plan.

The scale used for analysis is roughly 75,000 acres. We used the Pulse scale (forest-wide) to study interior habitat connectivity among neighboring Mt. Hood National Forest Late Successional Reserves. You will notice throughout this document that the assessment team used the scale of the White River Stewardship Area to provide landscape and management context for the LSRs.

The White River LSR (RO204) lies within the White River Stewardship Area and is comprised of approximately 34,500 acres. Twelve 100 acre LSRs within the White River Stewardship Area will also be assessed.

OUR OBJECTIVES

The objectives of the assessment team are the following:

- To validate and refine the desired conditions for the White River LSR as described in the White River Watershed Analysis and Landscape Analysis and Design.
- To assess the quality of ecosystem function as pertains to the goals of late successional reserves in the Northwest Forest Plan. We used three major indicators to analyze existing and potential function as an LSR: 1) Resiliency, 2) Connectivity and 3) Riparian condition.
- To prioritize management action where improvement of function is possible through management while indicating necessary mitigation, design parameters and monitoring needs.
- To categorize present and future social use in terms of site specific interpretation of the standards and guidelines of the Northwest Forest Plan.
- To develop triggers for landscape-level reassessment.

THE VISION BEHIND IT

The members of this assessment team are all experienced field personnel. Most have participated in each of the previously mentioned large scale analyses. We also spend many hours in the White River drainage. You may notice some original information in this document. This is a direct result of trying to apply criteria, data or theories from other places and finding out they just don't reasonably represent conditions here.

Every analysis portrays, whether declared or not, a philosophy which drives the direction of inquiry. We believe that single-species or single-purpose projects are less useful than consideration of the function of habitats within an ecosystem as a whole and the function of these habitats within the framework of what existed before Euro-American settlement changed disturbance regimes. However, we realize that there is no going back to that time. Landscape elements and processes are altered both on Forest Service lands and adjacent areas. The genius of analysis is to create enough knowledge to enable the design of a landscape which functions within the framework of our time.

PARTICIPANTS

- **Eastside Council**
- **Core Assessment Team**

Diana Ross, Lead Steward, L.A.
Dale Wondercheck, Wildlife Biologist
Louisa Evers, Fire Ecologist
Duane Bishop, Fisheries Biologist
Doug Jones, Recreation Forester

- **Associate Stewards**

Tamara Shannon, Silviculturist
Jordan Wood, Genetics
Cora Lee Groce, Customer Service
Michelle Lawson, Vegetation Team
Carol Ann Johnson, Soil and Water
John Pierce, Protection and Facilities

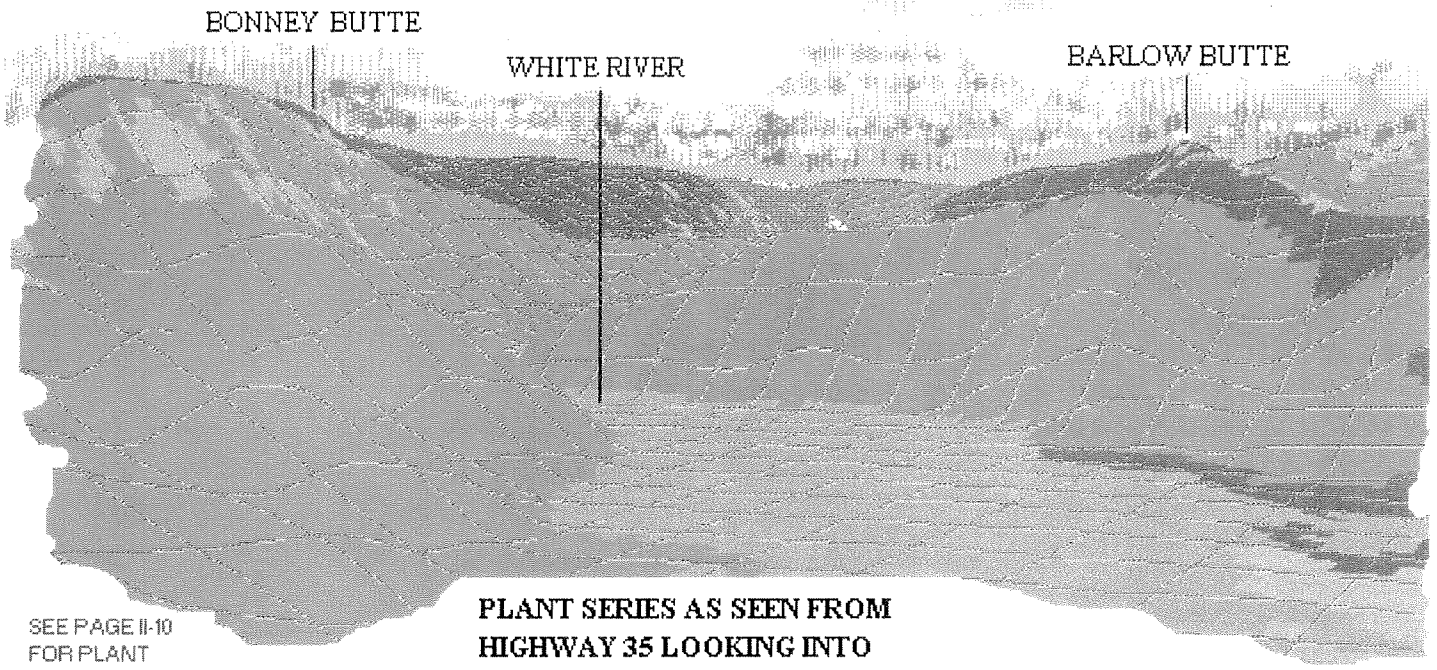
- **Consultants**

Lance Holmberg, Botanist
Susan Nugent, Botanist
Nancy Diaz, Area Ecologist
Kim Mellen, Ecologist

- **Cooperators**

Zig-Zag Ranger District
Timothy Stewardship Team

WHITE RIVER LSR FROM HIGHWAY 35
SEARCH FOR THE RANGE OF NATURAL CONDITIONS



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FOR PLANT
SERIES LEGEND

PLANT SERIES AS SEEN FROM HIGHWAY 35 LOOKING INTO WHITE RIVER CANYON

- VIEWER IS LOOKING SOUTHEAST

SEARCH FOR THE RANGE OF NATURAL CONDITIONS

We know we must design management for the social, biological and physical processes of this time period. We also know we cannot accurately measure the landscape elements and processes which took place for ten thousand years before our time. However, developing a vision of the past is just as important as developing a vision for the future. It provides context, reference and inspiration.

GEOLOGIC PROCESSES

Mt. Hood and the White River subbasin are part of the Cascade Range and fall within the region called the Central High Cascades. The High Cascades overlie the eastern portion of the older Western Cascades and developed from volcanism, flows, and uplift during the late Pliocene and Pleistocene mountain-building period approximately 4.5 to 2 million years ago. Glacial activity during the late Pleistocene and the Holocene, along with subsequent erosion from wind and water, further shaped the area. Rock types such as cryptocrystalline silicates, basalts, andesites, and volcanic glass resulted from the formation of the area and can be used for stone tool formation. Overall, the basic landform of the Northwest and the White River subbasin is the same today as it was when humans first arrived in the area.

CLIMATIC PROCESSES

The climate in the White River subbasin has changed over time, and this has contributed to different land-use patterns by humans. There were pre-glacial and glacial conditions during the late Pleistocene, a warming to cool and moist conditions during the early Holocene, warmer and drier conditions during the mid-Holocene, and a return to cool and moist conditions during the late Holocene. Local variations and changes in climate probably occurred during these times (White River WA, 1995).

During watershed analysis, we divided the subbasin into smaller analysis units. The primary units used are based on climate and geomorphology. The climatic division separates the subbasin into three zones known as:

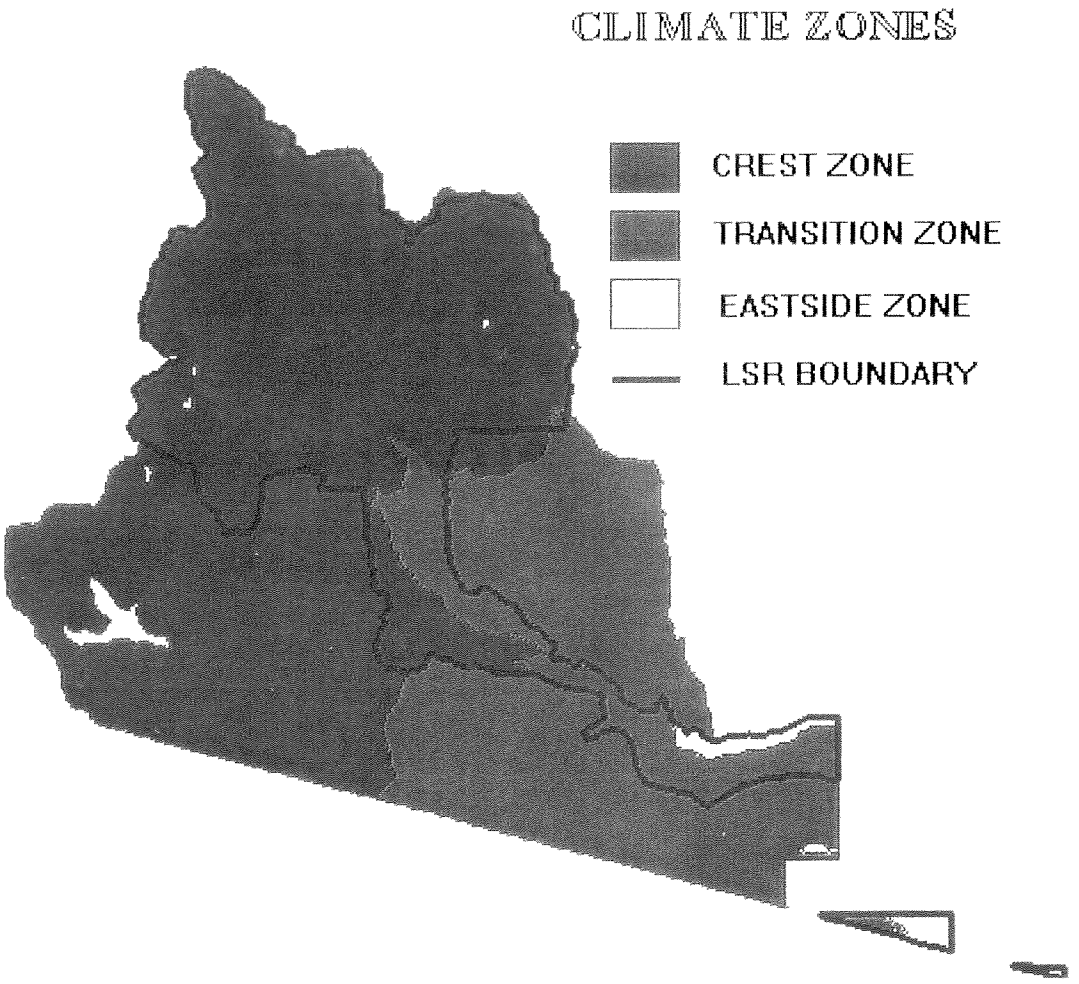
- Crest
- Transition
- Eastside

All discussions assume conditions described for each of the three zones.

TABLE OF CLIMATIC ZONES

ZONE	DESCRIPTION	CLIMAX SPECIES	MAJOR EARY SERAL SPECIES
Crest	Cold, moist winters with consistent snowpack; warm, dry summers. Forest conditions greatly resemble those west of the Cascade crest.	western hemlock mountain hemlock Pacific silver fir whitebark pine subalpine fir	Douglas-fir western larch western white pine noble fir lodgepole pine Engelmann spruce western redcedar
Transition	Cool, moist winters with inconsistent snowpack. Forest conditions are a mix of Crest and Eastside zones.	grand fir western hemlock- Douglas-fir	Douglas-fir ponderosa pine western larch western white pine incense-cedar
Eastside	Cool, semi-dry winters where snowpack often does not last all winter; hot, dry summers.	Douglas-fir ponderosa pine Oregon white oak	ponderosa pine Oregon white oak incense-cedar

ZONE	CONIFEROUS RIPARIAN ASSOCIATES	FIRE GROUPS
Crest	Pacific yew	5, 6, 7, 8, 10
Transition	Pacific yew western redcedar Engelmann spruce western hemlock north of White River	3, 4, 9
Eastside	western redcedar western larch grand fir	1, 2, 11


CLIMATE ZONES
CREST ZONE
TRANSITION ZONE
EASTSIDE ZONE
LSR BOUNDARY

LANDSCAPE ELEMENTS

To describe the past and present forest conditions in a manner that was easily comparable we developed diagnostic stand types. *These types do not describe every potential stand or existing stand on the landscape.* Instead they are meant to describe key indicator stands that tell us something about the difference between stand conditions before 1855 and today. These stand types are a combination of structure types from Chadwick Oliver's Stand Dynamics, species types, seral stage, and climatic zone. We found it necessary to describe stands using all of these factors because White River is a transitional mosaic of eastside and westside conditions within the Cascade Range. Using seral stage alone, as in Early, Mid, Late, for example, is unhelpful in this landscape because the Open Park-like stand type is a much different sort of late seral type than Late Seral Tolerant Multi-story. Using plant series alone is unhelpful because it does not reveal the structures.

The White River Watershed Analysis Team first developed these stand types along with the White River Stewardship Team. The stewardship team then refined them during Landscape Analysis and Design.

The table to the right displays the range of natural conditions for each stand type by climatic zone within the White River Stewardship boundary. We used several sources of information and professional judgment to develop the ranges:

- GLO survey notes.
- 1901 survey of the conditions of the Cascade Range Forest Reserve.
- 1916 map of forest types and fire occurrence.
- Diary and journal notes from Joel Palmer (pioneered Barlow Road with Sam Barlow in 1845 and '46), Lt. Abbot (surveyed for railroad route across the northern Cascades in 1855), and members of Sam Barlow's family.
- Comparison of 1901 stand condition map with existing stand types to "grow stands backwards".
- 1939 Aerial Photos and early lookout photo panoramas.

On page II-5 you will see the landscape described by the table on the right. It is a scientific representation in that all of the above factors were used to create it. It is a "snapshot in time" which is instructive for comparison to current conditions. There are major differences in size, shape, and connectivity of patch types, prevalence of structure types, and species composition.

TABLE OF RANGE OF NATURAL CONDITIONS BY ZONE FOR WHITE RIVER STEWARDSHIP

STAND TYPE	ZONE	%OF ZONE RNC
Stand Initiation	CREST	10-25
Stem Exclusion Mature Stem Exclusion	CREST	10-20 20-30
Cathedral	CREST	20-30
Late Seral Tolerant Multi-Story	CREST	10-20
Riparian Hardwood	CREST	25-50
Riparian Conifer	CREST	70-90
Stand Intitiation	TRANS	5-15
Stem Exclusion Mature Stem Exclusion	TRANS	5-15
Cathedral	TRANS	30-50
Late Seral Tolerant Multi-Story	TRANS	5-15
Open Park-Like/ Open Intolerant Multi-Story	TRANS	10-20 15-35
Riparian Hardwood	TRANS	10-20
Riparian Conifer	TRANS	70-90
Stand Initiation	EAST	1-10
Stem Exclusion	EAST	1-5
Cathedral	EAST	1-15
Open Park-Like	EAST	75-95
Riparian Hardwood	EAST	30-80
Riparian Conifer	EAST	5-30

TABLE OF VEGETATION STRUCTURE DEFINITIONS

STAND STRUCTURE TYPE	TOTAL CANOPY CLOSURE %	LAYER CANOPY CLOSURE %	SPECIES AND AVE. DIAMETER	OPENING SIZE	SNAGS/AC >20" DBH >40'HT.	LWM/AC >20" x 120'
STAND INITIATION (SI) (ALL ZONES)	0-70%	REMNANT LAYER 1 0-<40% LAYER 2 0-70%	MOSTLY INTOLERANTS* REMNANT LAYER 1 >10" LAYER2 <5"	TYPE CONSIDERED AN OPENING LAYER 1 REMNANT	EXISTING - 1 RNC (MODE) 10 RNC (RANGE) 2-32 DFC*[3] 4-12	EXISTING - 0 RNC (MODE) 5 RNC (RANGE) 2-32 DFC*[3] 4-8
STEM EXCLUSION (SE) (ALL ZONES)	>70-100%	NOT LAYERED EXCEPT WITH SURVIVING REMNANTS PREVIOUS STAND (<30%)	MOSTLY INTOLERANTS >5"- < 9"	NONE GENERALLY	EXISTING - 0 RNC (MODE) 6 RNC (RANGE) 1-16 DFC *[4] 4-8	EXISTING - 0 RNC (MODE) 9 RNC (RANGE) 3-48 DFC 3-8
MATURE STEM EXCLUSION (MSE) (CREST, TRANS)	70-100%	LAYER 1 <30% LAYER 2 70-100% LAYER 3 <10% (OR ABSENT)	LAYER 1 > 21" MOSTLY INTOLERANTS LAYER 2 >9-<21" MIX	FEW GENERALLY BUT CAN OCCUR IN STAGNATED STANDS WITH HIGH MORTALITY	EXISTING - 0 RNC (MODE) 4 RNC (RANGE) 1-5 DFC 4-5	EXISTING - 2 RNC (MODE) 6 RNC (RANGE) 4-11 DFC 4-8
UNDERSTORY REINITIATION (UR) (CREST,TRANS)	>=40-<=60%	LAYER 1 >30-55% LAYER 2 <25%	LAYER 1 >=12"- MOSTLY INTOLERANTS LAYER 2 <5"-MIX	<1 ACRE <10% OF AREA	EXISTING - 3 RNC (MODE) 6 RNC (RANGE)5-20 DFC 5-12	EXISTING - 4 RNC (MODE) 8 RNC (RANGE)5-21 DFC 5-8
CATHEDRAL (CA) (ALL ZONES)	60-90%	LAYER 1 60-80% LAYER2 <25%	LAYER 1 >=20"- MOSTLY INTOLERANTS LAYER 2 <5"-MIX	1/8-1/2 ACRE <5% OF AREA	EXISTING - 4 RNC (MODE) 6 RNC (RANGE)3-10 DFC 4-8	EXISTING -4 RNC (MODE) 8 RNC (RANGE)5-12 DFC 5-8
LATE SERAL TOLERANT MULTI-STORY (LS) (CREST,TRANS)	60-100%	LAYER 1 60-90% LAYER 2 10-30% LAYER 3 10-30%	LAYER 1 >21"- MOSTLY INTOLERANTS LAYER 2 >=5"-MIX LAYER 3 <5"-TOLERANTS	<2 ACRES <10% OF AREA	EXISTING - 4 RNC (MODE) 8 RNC (RANGE)6-28 DFC*[3] 6-8	EXISTING -7 RNC (MODE) 10 RNC (RANGE)4-29 DFC*[3] 4-12
OPEN PARK-LIKE (OP) (TRANS, EAST)	25-40%	LAYER 1 25-40% UNDERSTORY IS MANY AGES AND SIZES	LAYER 1 >20"- INTOLERANTS PONDEROSA PINE MAJOR COMPONENT	1/2-3 ACRES <20% OF AREA	EXISTING - 2 RNC (MODE) 2 RNC (RANGE) 1-3 DFC 1-3	EXISTING - 1 RNC (MODE)1 RNC(RANGE)1-3 DFC 1-3
OPEN INTOLERANT MULTI-STORY (OM) (TRANS)	>40%-<60%	LAYER 1 30-60% UNDERSTORY IS MANY AGES AND SIZES	LAYER 1 >20"- MOSTLY INTOLERANTS PONDEROSA PINE DOUGLAS FIR SOME GRAND FIR	1/4-2 ACRES <15% OF AREA	EXISTING - 2 RNC (MODE) 3 RNC (RANGE) 1-5 DFC 1-5	EXISTING - 1 RNC (MODE) 3 RNC (RANGE) 1-5 DFC 1-5
FIRE EXCLUSION MULTI-STORY*[2] (FEM) (TRANS)	70-100%	LAYER 1 10-60% LAYER 2 10-20% LAYER 3 5-30%	LAYER 1 >20"- INTOLERANTS LAYER 2 5-18"- MOSTLY INTOLERANTS LAYER 3<=4"-TOLERANTS	NONE GENERALLY BUT HIGHLY VARIABLE AND UNSTABLE	EX - 1	EX - 2

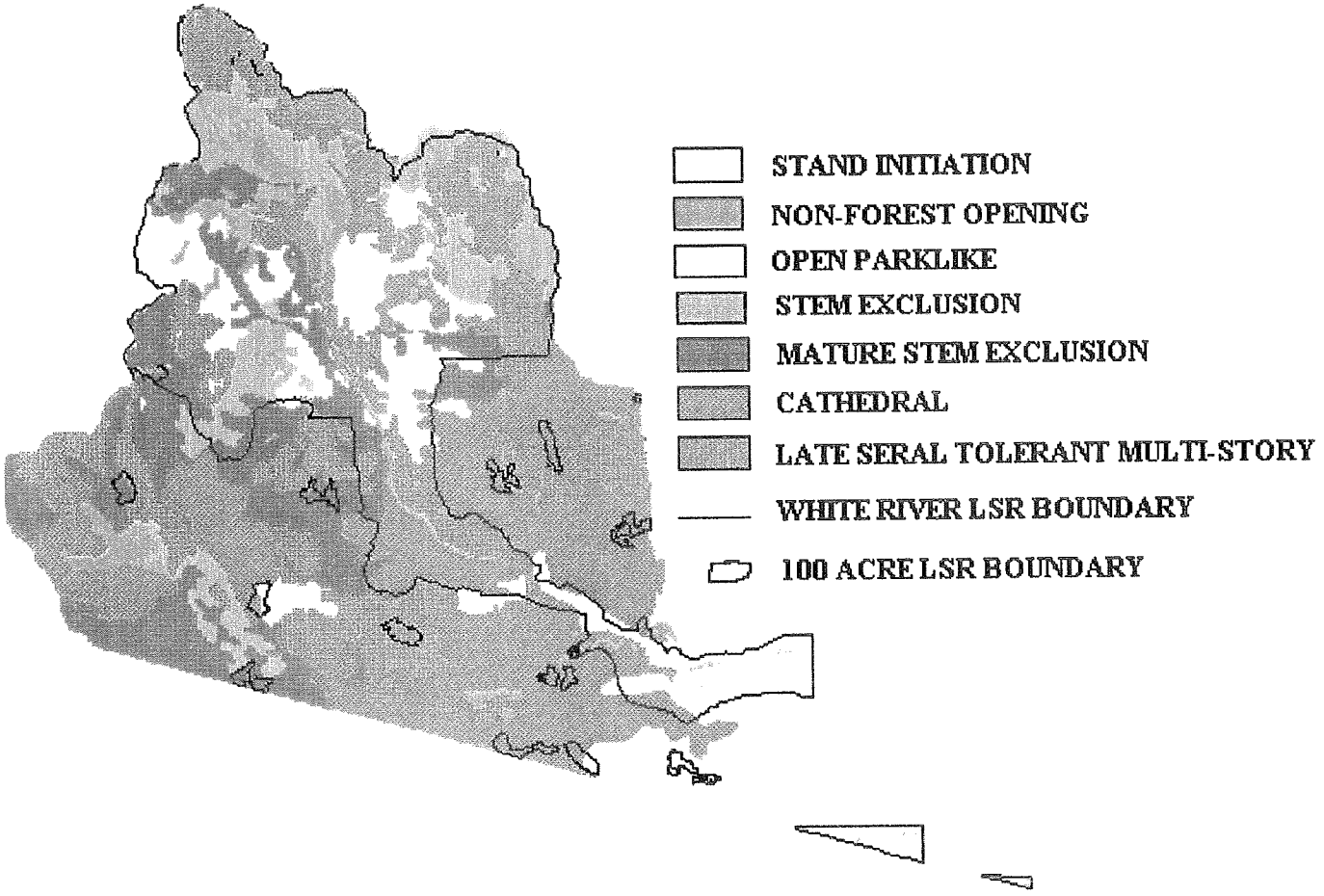
* Intolerant of Shade -- Species: Douglas-fir, Ponderosa Pine, Noble Fir, Western Larch, and White Pine .
Tolerant of Shade --- Species: Grand Fir, Silver Fir, Western Hemlock, and Mountain Hemlock .

*[2] Became prevalent after 1855.

*[3] Applicable to areas OUTSIDE LSR only.

*[4] All Desired Future Condition (DFC) Snag/LWM levels to be applied only to managed stands.

VEGETATION STRUCTURES CIRCA 1900



PRE-1855 LANDSCAPE

Crest Zone: The Crest Zone is the most productive and biologically diverse climatic zone in the subbasin. Abundant moisture and a favorable temperature regime provide an environment capable of supporting a high diversity of plant and animal species in all successional stages. The strong glacial influence is most evident in this portion of mainstem White River, providing many unique habitats within the floodplain.

The large-scale disturbances were infrequent and created large mosaics on the landscape. The fire and insect regime would result in landscapes where either very young or very old forests seemed to dominate. Some stands would approach near-climax conditions between resetting disturbances, a condition virtually unknown in the Eastside and Transition zones. Burning by American Indians for huckleberries created large, persistent brushfields at selected locations, primarily in upper White River and the Camp Windy-Barlow Butte area.

Late Seral Tolerant Multistory stands were the "classic" old growth described in so many papers and articles on spotted owls and westside old growth. Stands were dense, multi-canopied, and usually highly diverse in plant species. Abundant snags and snag patches combined with large numbers of downed logs created high quality habitat for species associated with these forms of dead trees. Once a stand or portion of the landscape reached this condition, it could persist for many decades due to the "speed" at which this structure developed and the infrequent nature of resetting disturbances. However, resetting disturbances were more frequent than in similar stands on the westside such that the Late Seral Tolerant Multistory stand type did not cover as much area as we originally expected.

The Crest Zone had other stand types that also provided habitat for species dependent on older, closed-canopy forests. The Cathedral stand type was also present, although comprised of mixed conifers rather than predominantly ponderosa pine and Douglas-fir. Several disturbance types would create Cathedral stands, but unlike in the other zones, this stand type did not persist. Instead, it moved to either Late Seral Tolerant Multistoried or to another stand type intermediate between Cathedral and Late Seral.

Early seral stands typically covered very large areas. Fire and insects and disease were very closely tied together with all three disturbance types interacting to create large openings and fairly elaborate vegetative mosaics. When a stand-replacing fire burned, it usually covered several hundred to several thousand acres. Reburns were common. There was high edge contrast between Early Seral stands and the undisturbed or lightly disturbed adjacent stands. After a certain point fires, insects, and disease outbreaks apparently subsided over the entire zone and a long period ensued in which little or no new openings were created.

Brushfields often developed after a large fire and various brush species would dominate the site for 10-20 years. After 20 years, conifers would begin to dominate. Usually conifer regeneration was abundant and stands had a high number of trees per acre. If a stand escaped the small scale disturbances or lodgepole pine dominated the regeneration then the stand might stagnate. It does not seem that such high density stagnating stands developed very often or covered a large percentage of the landscape. Usually species diversity was high enough that species-specific differential growth rates prevented most stands from stagnating. Most of the Crest Zone stands also appeared to have been self-pruning and self-thinning.

Riparian areas, with a few exceptions were very similar to the uplands. The

perennial streams tended to have a larger percentage of unburned and lightly burned areas than the intermittent streams. The Riparian Conifer stand type was the most common with hardwood brush in the understory. Resetting disturbances were infrequent enough and forest canopy continuous enough that riparian areas did not serve as a significant barrier to fire spread. White River sand flats is a very unique area with its own unique ecology and disturbance regime. Black cottonwood was a very important species in large portions of the sand flats.

Other streams where the Riparian Hardwood stand type seems to have been significant are upper Boulder Creek, lower Barlow Creek, lower Iron Creek, and Mineral Creek. Of these four streams, the last three lie in the White River floodplain so are under the same hydrologic, microclimatic, and soil conditions. Upper Boulder Creek lies in an area of many springs and wet areas, such that it appears to have burned very infrequently. When it did burn, we believe the fire was of higher severity than elsewhere in the Crest Zone, creating less of a mosaic on the landscape. Black cottonwood and quaking aspen would quickly exploit this new opening. Slower than average recovery rates and beaver ponding allowed the Riparian Hardwood stand type to persist for much longer than might otherwise be expected.

Any streams where the Riparian Hardwood stand type was present also have evidence of beaver ponding. We believe in the Crest Zone that the combination of conditions which created generally open stand conditions also promoted both hardwood trees and beaver activity in an elevation zone where we normally would not expect to find either.

Transition Zone: The Transition Zone was more diverse than the eastside zone. It contained stand types typical of both the Crest and Eastside zones. Open Park-like stands could be found on south aspects near the eastern edge of the Zone. These stands differed from the more typical Open Park-like stands of the Eastside Zone by having less Oregon white oak and more Douglas-fir. The understory was still grassy, although the species may have differed from the Eastside Zone.
This zone also contained a distinctive stand type . Open Intolerant Mulitstory stands dominated where frequent underburning fires in the lower elevations created the same general type of stand as Open Park-like; but since most of the Transition Zone lies in the Grand Fir Series, the stands created contained some grand fir and more Douglas-fir than Open Park-like stands contained. We also believe they had greater canopy closure as compared to Open Park-like stands. (See pg. II-4).

Cathedral stands dominated the higher elevation uplands and intermittent streams. Transition Zone Cathedral stands were very similar to Eastside Cathedral stands in both species mix and stand structure. Ponderosa pine and Douglas-fir were the most common species. Western larch was scattered throughout the stand type. Western hemlock, grand fir, western white pine, and other conifer species began appearing towards the western half of the zone, particularly around White River. The understory was often brushy with such species as vine maple, hazel, ceanothus, and manzanita. Ponderosa pine and Douglas-fir regeneration was also common in the understory. The understory vegetation was apparently both clumpy and well distributed, depending on the disturbance history and most recent disturbance type in each stand. There was low contrast between Cathedral, Open Park-like and Open Intolerant Multistory stand types.

The western edge of the Transition Zone would frequently escape major disturbances long enough to allow the climatic climax species to begin dominating the stand. These stands typically have two or more canopy layers with scattered

snags and snag patches and "emergent" trees such as very old ponderosa pine, Douglas-fir, and western larch. Downed logs could become quite thick, making travel through the forest very difficult even on foot. Downed logs would typically be thickest in streams, both intermittent and perennial. This old growth stand type is known as Late Seral Tolerant Multistory and appeared more frequently and in larger stands in Boulder and Clear subwatersheds.

North aspects along perennial streams were different from south aspects and uplands. Stands were generally denser, with more closed canopies, and a greater number of species more typical of the Crest Zone. Intermittent streams were probably slighter denser than the adjacent uplands and more likely to contain species such as Engelmann spruce, grand fir, and western hemlock.

Disturbances such as fire and insect outbreaks occasionally created larger openings of several tens to several hundred acres (Stand Initiation). These large openings provided greater landscape diversity to the Transition Zone as a whole and created large snag patches that favored certain bats and cavity nesters. These openings appear to not be very common at any one point in time. Further, the disturbance was of a type that effectively "ignored" riparian areas as barriers to spread. Thus, small drainages could be entirely converted to Early Seral. Species such as ponderosa pine, Douglas-fir, western larch, and other species generally intolerant of shade would establish dominance quickly in Early Seral openings. If a fire burned particularly "hot" (moderate to high severity), brush species such as snowbrush ceanothus could dominate the new opening for several years to over a decade. In general, there was low to moderate contrast between the edges of Early Seral and the adjacent stand type.
The Riparian Hardwood stand type was found only on the eastern fringe of the Transition Zone. Instead most riparian areas had a strong conifer component in virtually all early seral stands. Evidence today strongly suggests that riparian hardwood trees were present in most early seral riparian stands, particularly black cottonwood in all subwatersheds, and quaking aspen in segments of Clear subwatershed. The Riparian Conifer stand type dominated the riparian areas and the successional stages were very similar to those of the uplands. Engelmann spruce, western hemlock, western redcedar, and Pacific yew were important riparian associates.

Eastside Zone: Three basic stand types dominated the Eastside zone on National Forest lands. Open, park-like stands of ponderosa pine and Oregon white oak covered the uplands, intermittent streams, and south aspects of perennial streams. Overall, the structure was multicohort consisting of single cohort patches of varying sizes. Tree size ranged from large ponderosa pines averaging over 24 inches DBH to dense or relatively dense patches of pine and oak regeneration. The understory was primarily native bunchgrasses and forbs with scattered shrubs. Downed woody fuel loadings
were very light and consisted mostly of widely scattered large logs, approximately 1-2 per acre. Evidence of low-intensity fire was everywhere. We named this stand type Open Park-like.

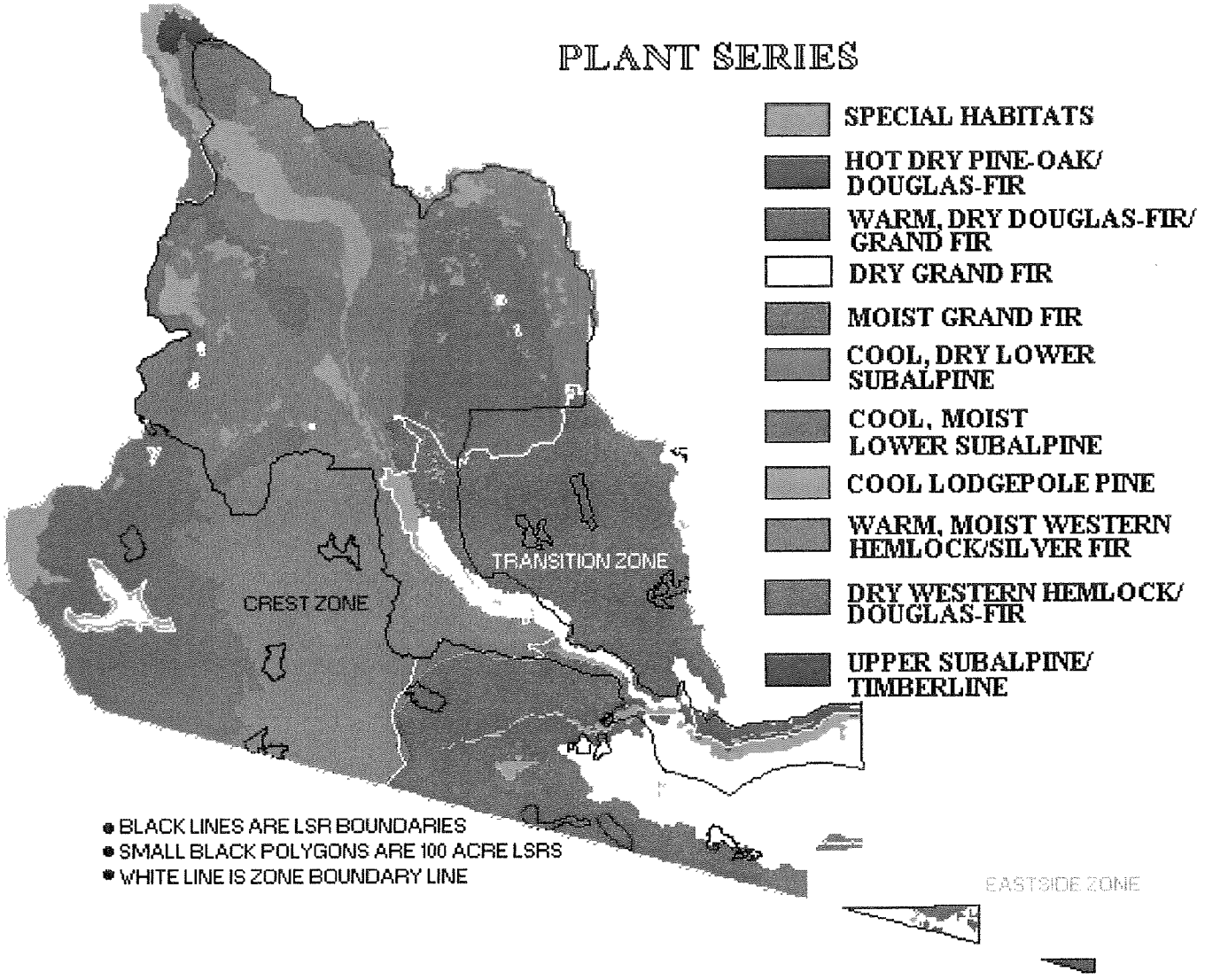
More closed to closed canopy stands dominated by large ponderosa pine and Douglas-fir dominated the north aspects along perennial streams. The even-aged patches were larger and often of a size readily mapped as individual stands, rather than just patches. Older stands tended to dominate due to frequent underburning. The understory was much more shrubby, consisting of species like hazel, ceanothus, oceanspray, and so forth. Downed woody loadings were still generally light, but heavier than on the adjacent uplands. The more moist conditions associated with these sites allowed for less frequent underburning than the adjacent uplands. In turn, the north aspects probably had more large

logs present. We call this stand type Cathedral. Edge contrast was very low between Cathedral and Open Park-like.

The third major stand type was riparian associates. The riparian areas showed mostly influence by seasonal flooding and beaver ponding with some influence by fire and insects. Stands tended to be more even-aged but were structurally and biologically the most diverse stands in the Zone. Three main types appear to occur. The first type is hardwood dominated. These stands differ from the typical hardwood stand described for most forests within the range of the spotted owl in that they were dominated by hardwood trees rather than hardwood brush. Black cottonwood was the largest tree and probably the most common species, followed by various species of willow and alder. Conifers were present in these stands, but hardwood trees dominated. This appears to be an early seral stand type in the riparian zone. We believe beaver ponding was a significant factor in allowing hardwood dominated stands to persist longer that we might otherwise expect.
A second riparian stand type was more mid-seral. The typical disturbance types were not sufficient to keep conifers limited. In the mid-seral stage, hardwood trees and conifers were co-dominant; neither appeared to be more prominent than the other. The third riparian stand was conifer dominated and a late successional stage. Hardwood trees were still present, mostly black cottonwood, but not dominant. Typical conifers in the riparian zone were Douglas-fir, ponderosa pine, western larch, and western redcedar. The early seral stage is called Riparian Hardwood and the third stage Riparian Conifer.

In all stand types, hardwood brush dominated much of the understory. Riparian Conifer stands could be dominated by forbs or lack much of an understory if the canopy closure exceeded 70%. Edge contrast was low between the riparian stand types and Cathedral but relatively high between riparian stands and Open Park-like.

Other stand types were also present, though they did not cover a large percentage of the landscape. Some south aspects and very dry ridges supported only oak woodlands. Oak woodlands were very open stands of short, scrubby Oregon white oak with a grass and forb understory. Shrubs were rare in that stand type. Occasionally an area of Open Park-like escaped burning for an extended period of time. Additional conifer regeneration would establish and stand densities would become quite high. If no additional disturbance occurred, these Pine-Oak high density patches could stagnate. Early Seral patches were scattered throughout the zone. These areas dominated by new regeneration were often too small to map as individual stands. Early Seral patches could be large enough to map as distinct stands on north aspects within a Cathedral stand.


PLANT SERIES
SPECIAL HABITATS
HOT DRY PINE-OAK/ DOUGLAS-FIR
WARM, DRY DOUGLAS-FIR/ GRAND FIR
DRY GRAND FIR
MOIST GRAND FIR
COOL, DRY LOWER SUBALPINE
COOL, MOIST LOWER SUBALPINE
COOL LODGEPOLE PINE
WARM, MOIST WESTERN HEMLOCK/SILVER FIR
DRY WESTERN HEMLOCK/ DOUGLAS-FIR
UPPER SUBALPINE/ TIMBERLINE
TRANSITION ZONE
CREST ZONE
EASTSIDE ZONE
BLACK LINES ARE LSR BOUNDARIES
SMALL BLACK POLYGONS ARE 100 ACRE LSRS
WHITE LINE IS ZONE BOUNDARY LINE

DISTURBANCE PROCESSES

In order to meet the Late Successional Reserve (LSR) objectives we need to understand, as best as we can, the disturbance regimes that shaped the vegetation, terrain, and habitat features on the landscape before Euro-American settlement (defined here as before 1855). While somewhat arbitrary, the time before 1855 is generally accepted as the time when our landscapes were "healthy", fully functional, and providing sufficient habitat to meet the needs of the fish and wildlife species that inhabited the area. We also need to better understand how land use and management activities since 1855 have altered these disturbance regimes. Much of the information on disturbance processes considered typical to White River LSR is found in Appendix A of the White River Subbasin Watershed Analysis. This section summarizes that Appendix and adds to it. We have attempted to provide more detail based on ground verification and additional information learned since we prepared the Watershed Analysis. It also attempts to better describe the interactions between certain disturbance types.

MAJOR DISTURBANCE PROCESSES BEFORE 1855

In this discussion, burning and other land management activities by American Indians are considered part of the "natural" regime. Humans used the White River subbasin for thousands of years before Euro-American settlement. These various peoples significantly affected the landscape patterns and plant communities found by the Euro-American settlers.

Some disturbance types operating within the LSRs are too irregular to effectively evaluate. Others occur only on a small scale as best we know. In these events, our land uses have not changed the frequency, intensity, or severity of the disturbance. There is little evidence that we have significantly affected the outcomes of these events. The primary examples include:

- Events related to the eruption of Mt. Hood (lateral blasts, pyroclastic flows, ashfall, etc.),
- Geologic erosion events (landslides, mass wasting, rockfalls, dry ravel, soil creep, etc.), and
- Avalanches.

We can discuss several other natural disturbance events in some level of detail. Land management since 1855 has altered the frequency, severity, and intensity of some events and changed the probable outcomes of several. In most cases, the current outcomes pose either a significant risk to infrastructure and facilities, such as roads, trails, campgrounds, and so forth, or the outcome is socially unacceptable. We focus our discussion on:

- Fire,
- Insect outbreaks,
- Disease (primarily dwarf mistletoe and root diseases),
- Wind,
- Floods,
- Mudflows/Debris torrents (White River floodplain only), and
- Beaver ponding.

Of these disturbance processes, fire, insects, disease, and wind primarily affect the uplands while floods, mudflows/debris torrents, and beaver ponding primarily affect the streams and riparian areas. The upland disturbance processes can affect the riparian areas yet the riparian area disturbance processes rarely affect the uplands.

Upland Disturbance Processes

Fire: Fire Regimes

Fire Ecology Groups, or Fire Groups, have been developed for the Mt. Hood National Forest (Evers et al., In Press). We mapped the Fire Groups within White River subbasin and used these to depict the fire ecology and regimes of the area based on plant associations and typical pre-1855 conditions.

Fire Group Zero: Miscellaneous Special Habitats. This Fire Group consists of areas that are not coniferous forest within a forest matrix. Most examples of Fire Group Zero consist of rock outcrops and scree (or talus), forested rock, wet and dry meadows, and recent volcanic deposits (White River floodplain). Patches of Fire Group Zero burn at highly irregular intervals and generally with a return frequency similar to the surrounding Fire Group. Fire Group Zero occurs throughout the LSRs, generally in small patches. Some areas are large enough to serve as fuel breaks for low and moderate intensity fires, but rarely are large enough to slow or stop high intensity fires.

Fire Group One: Hot, Dry Pine-Oak and Douglas-fir. Fire Group One occurs in two small areas. The largest patch lies along the south aspect of White River canyon from the Forest boundary to approximately two miles upriver, from the canyon rim and a long cliff area down to the river. The other patch is the smallest triangle to the east along the border with the Warm Springs Reservation. Fire Group One typically underburned frequently with an estimated return interval of 5-10 years.

Fire Group Two: Warm, Dry Douglas-fir and Grand Fir. Fire Group Two occupies three small areas. The largest patch is found along the south aspect of White River canyon from approximately 3/4 mile upriver of the Forest boundary to Boulder Creek and below the canyon rim. Patches of this Fire Group also occur scattered throughout the Byzandine Gulch area. Underburning was the typical landscape level event in Fire Group Two with an estimated return interval of about 15-25 years.

Fire Group Three: Dry Grand Fir. Fire Group Three lies in the eastern edge of the area, both north and south of White River. South of the river, it stretches from around Camas Creek to the Forest boundary and is intermingled with Fire Group Two in the Byzandine Gulch area. North of the river, it occupies the area above the canyon rim north of Fire Groups One and Two and along the south aspect of the river from Boulder Creek to just above White River Station Campground. Fire Group Three frequently underburned, but occasionally experienced stand-replacing fire. The fire return interval was highly variable, probably averaging around 30-60 years but with an estimated range of 15-100 years between events.

Fire Group Four: Moist Grand Fir. North of White River Fire Group Four occurs north of Fire Group Three on the gentler terrain above the canyon. South of the river, it is found in only two small patches. One patch surrounds Camas Prairie. Most landscape level fires were stand-replacing, with some underburning. It resembles Fire Group Eight, although the average fire return interval was probably between 150-250 years.

Fire Group Five: Cool, Dry Lower Subalpine. Fire Group Five is a minor Fire Group along the eastern edge of Boulder Creek. It lies primarily along the ridge that separates the north-south flowing Boulder Creek from several east-west flowing creeks with headwaters along this dividing ridge. This Group is similar to Fire Group Six, but with a fire return interval similar to Fire Group Four.

Fire Group Six: Cool, Moist Lower Subalpine. Fire Group Six occupies most of the higher ridgetops south of White River in the Crest Zone. North of the river, it occurs west of Boulder Creek and north of Section 16. Stand-replacing fire is the characteristic landscape level fire event, with little underburning except along the edges of the burn area. The return interval is typically long, often exceeding 250 years.

Fire Group Seven: Cool Associations Often Dominated by Lodgepole Pine.

Fire Group Seven occurs primarily in three areas. The first area is in the upper White River floodplain. However, periodic mudflows are a more important disturbance type in these lodgepole dominated stands than is fire. The second area lies in the headwaters of Palmateer Creek, in a large basin. In both places, the stands are nearly pure lodgepole pine, an unusual situation on the eastside of the Mt. Hood National Forest. The third area is the Abbott Burn west of Clear Lake. This patch contains less lodgepole pine than the other two patches and a greater diversity of other tree species. Stand replacing fire is the typical landscape scale event in Fire Group Seven, but the return interval is much shorter than in Fire Groups Six and Eight. Fire Group Seven, especially in the Palmateer basin, burns approximately every 100-125 years and probably did not allow late successional forest to develop.

Fire Group Eight: Warm, Moist Western Hemlock and Pacific Silver Fir. Fire Group Eight occupies most of the Crest Zone below Fire Group Six. The fire regime is very similar to Group Six with a similar return interval. Since this Fire Group is located mostly on midslopes and along stream bottoms, the average return interval was probably longer than Fire Group Six, but we lack sufficient information to know how different the average return intervals may have been.

Fire Group Nine: Dry Western Hemlock and Westside Douglas-Fir. Fire Group Nine lies in the Transition Zone south of White River, between Fire Groups Three and Eight. It does not occur north of the river. Underburning was the typical landscape level event with a limited amount of stand replacing fire. As with Group Three, average fire return interval was highly variable and may have been somewhat longer than Group Three since this group occurs at a higher elevation. Before 1855, we believe that American Indians deliberately set fires in drier Fire Groups which often burned into areas of Fire Groups Three and Nine. Both Groups often lent themselves to underburning to maintain travelways, since both are fairly dry and can burn in most years by August.

We used Fire Groups as a coarse divider between the climate zones for White River. Fire Groups One and Two lie in the Eastside Zone. Fire Groups Three, Four, and Nine lie within the Transition Zone. Fire Groups Five, Six, Seven, and Eight lie within the Crest Zone. Fire Group Zero occurs in all zones. Fire Groups Three, Four, Six, Eight, and Nine are the most common in the analysis area. Groups Three and Nine mostly underburned with some stand-replacing fire. Groups Four, Six, and Eight mostly had stand-replacing fires with some underburning.

Even though Fire Groups Four, Five, Six, Seven, and Eight typically burn in stand replacing fires that cover several hundred to several thousand acres, lower intensity fires can occur between these events. Low intensity fires typically burn only a single tree or very small patch. These events create snags and downed wood, but the fire occurrence rate is so low that other agents, such as insects and disease, are more important providers of these habitat elements.

Moderate intensity fires involve a mix of stand-replacing fire and a limited amount of underburning. These fires can occur in younger stands that contain relatively low fuel loadings. Moderate intensity fires depend on the presence of "jackpots" of heavier fuel loadings in an otherwise lightly loaded area, at least a moderate lichen load in the overstory trees, and moderate to high winds (generally greater than 10 mph). Wind is needed in increase fire intensity and the lichens serve as a fuel ladder into the tree crowns. The fire spreads primarily by crowning through the needles and lichens and some short-range spotting. In the absence of wind, fire may spread slowly through what surface downed woody material exists and along older rotten logs. The pattern produced in the understory is one of small burned out patches and linear burned out strips ("cigarette" burns) where logs are consumed. The duff is usually too densely

packed and just moist enough to not burn well away from the jackpots and dry logs. Moderate intensity burns cannot occur every year but can occur in many years. These fires usually burn between 50-300 acres. When the winds die down, these fires also die down and usually will not "kick up" again in the absence of another wind event.

FIRE HISTORY

Pre-1900. In general, we believe that the local tribal groups burned the area frequently for a variety of purposes, such as maintaining travelways and promoting the growth and abundance of culturally important plants. Nothing specific has been documented in White River subbasin, but it has been alluded to in settler's diaries and early letters from the Forest Service. In addition, this type of activity has been documented throughout the western United States and we can find no reason why it would not have occurred here. It appears that huckleberry burning may have occurred in the Camp Windy-Badger Butte area. This area shows as burned in a 1901 vegetation map, the earliest documentation of fire occurrence on the Mt. Hood. Unlike other areas depicted on this map, the Camp Windy-Badger Butte area remains sparsely forested with little or no duff and downed log loading. Huckleberry production is still high. Diaries and letters allude to early settlers copying many of the American Indian burning practices, particularly to maintain travelways and pasturage. Sam Barlow burned a path down to White River from its northern rim in 1845 while blazing the Barlow Road. Family accounts state that portions of the Barlow Road were burned regularly to maintain the travel route. We believe that much of this burning occurred north of the LSR, but the north side of White River canyon could also have been burned frequently. Sheepherders burned the upper elevations to maintain pasturage. While the areas burned are not specified in any document we have been able to find, we suspect they would have continued burning any existing brushfields of huckleberries.

1900-1970. Some records exist of fire history for this era, although records are scattered and difficult to locate. As part of the formation of the Cascade Range Forest Reserve, grazing was restricted in the area north of White River, in part to reduce the large fire occurrence. This ban was only somewhat effective as trespass, mostly by cattle, continued. Shortly after formation of the National Forests in 1906, effective fire control began in the Eastside Zone and much of the Transition Zone. A 1939 letter from the Dufur District Ranger boasts of the generally successful nature of the fire control efforts and the resulting increase in conifer regeneration. Associated documents from this time period also discuss the loss of grazing lands due to tree regeneration.

We believe fire control in the Crest Zone did not become very effective until after the 1930s, primarily due to lack of access for people and equipment. Much of the Crest Zone burned between about 1890 and 1930. We can still find many of the fire boundaries from this era by locating sharp differences in adjacent stands. Some of these sharp edges are likely due to reburns. The area around Bonney Meadows initially burned around 1900 and portions of it reburned in 1915 and 1917. A large fire long and narrow in shape burned between Barlow Butte and the Pacific Crest Trail before 1900, reburned and enlarged in 1917, and reburned and enlarged yet again sometime in the 1920s. Since 1930, no fires have reached a size comparable to these early burns, although several fires larger than 1 acre have burned.

1970 to Present. Beginning in 1970, fire occurrence records have been stored in the National Fire Occurrence Data Library, currently housed in Kansas City. Data from these fires as well as associated weather records are used by the National Fire Management Analysis System (NFMAS), specifically the Initial Attack Activity (IAA) module to model the fire suppression organization needed to handle the documented fire occurrence.

These records, along with information of fire regimes and fuel loadings, are used to evaluate the existing fire risk.

Insects: Watershed analysis identified five insect pest species that can reach epidemic proportions. Epidemic outbreaks were more typical of the Crest Zone and upper Transition Zone, with endemic levels of insect pests elsewhere. Since insect epidemics typically occur when trees are stressed and host tree species are common, insect outbreaks often occurred more frequently than major fires. In relatively young to "middle-aged" stands, these outbreaks served to thin the stands, reducing moisture and nutrient stress and reducing the numbers of host trees. The outbreaks caused individual tree death and scattered patches of mortality, creating snags and, eventually, downed logs and jackpots of fuel that would support moderate intensity fires. Before 1855, epidemics of spruce budworm (*Choristoneura occidentalis*), mountain pine beetle (*Dendroctonus ponderosae*), and Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) were likely typical. We are not certain if epidemic levels of fir engraver beetle (*Scolytus ventralis*) occurred. While possible, epidemic levels of western pine beetle (*Dendroctonus brevicomis*) were probably rare, since this species specializes on large diameter ponderosa pine. Before 1855, stands in the Eastside Zone and lower Transition Zone were open enough to limit moisture stress and ponderosa pine was more of a minor stand component in the upper Transition Zone and Crest Zone. In both cases, western pine beetle would occasionally kill individual trees and small groups, but probably operated more at an endemic level than an epidemic level.

Disease: Watershed analysis identified six diseases present in the area, of which five are predominant. One disease, white pine blister rust (*Cronartium ribicola*), was introduced in the 1930s and appears to have significantly reduced western white pine in the Crest Zone. Before that time, root diseases and dwarf mistletoe (*Arceuthobium* spp.) were the primary diseases affecting stand structures and tree mortality. We found little evidence that root diseases occurred at epidemic levels in the Transition and Eastside zones, affecting large areas. Evidence for past disease levels in the Crest Zone is unclear. The three major root diseases present today have always been present, but probably tended to act more at endemic levels, causing tree death in small to medium sized patches. As with insect outbreaks in younger stands, root disease created snag patches, downed logs, and jackpots of fuels that would support moderate intensity fires.

Levels of dwarf mistletoe probably varied quite a bit through time, occasionally reaching high levels in the upper Transition and Crest zones. We do not have enough information to estimate how much tree mortality actually resulted from this disease level. We suspect that dwarf mistletoe more contributed to poor growth and high fuel loadings, particularly near the end of a stand's so-called biological rotation. Stands with extensive dwarf mistletoe created high surface fuel loadings from downed limbs with numerous fine branches, ladder fuels since mistletoe affected limbs do not shed as easily, and crown fires.

Wind: Available evidence suggests that wind was not a significant factor in tree death in continuous forest before 1855. Wind, particularly strong west winds under warm, wet conditions, could have resulted in patches of blowdown along the edges of large stand-replacing fires. Otherwise, it appears than wind would blow down scattered individual trees weakened by root disease.

Riparian and Aquatic Disturbance Processes

Floods: Floods of certain magnitudes are related to precipitation events. Before 1855, floods were regular events but caused relatively little damage as considered by today's standards. Large events, such as 100-year floods, significantly rearranged stream bedload, existing wood, amount of eroded sediment, and scoured banks. Scoured stream

banks and/or sediment deposition are helpful to cottonwood regeneration from seed. Events of various magnitudes created and filled pools, created log jams and small log dams, undermined banks, and toppled trees into the stream.

Mudflows/Debris Torrents: Available evidence suggests that debris torrents are virtually unknown in all perennial streams in this area, with the exception of White River. The White River subbasin is very stable geologically, with very few oversteepened slopes or areas prone to mass wasting. Small landslides can and do occur in conjunction with avalanches, channel migration, large fires that burn off all vegetation and most duff, and very high intensity rainstorms. Rain-on-snow events often cause flooding and can result in debris flows. Almost all events of this nature are associated with Mt. Hood and White River. White River originates from a glacier on the south side of Mt. Hood. The uppermost slopes have little or no vegetation and consist of unconsolidated coarse ash (sand). Because of the lack of vegetation in the originating area, we have dubbed these events as mudflows. As the event moves towards Highway 35, it begins to incorporate the sparse riparian vegetation. Logs and other organic debris generally does not get incorporated into the flow until it moves into the broad upper floodplain.

Two main types of triggering mechanisms appear to operate in these events:

- Occasionally an avalanche in this unvegetated zone creates a dam below the glacier and traps meltwater. If the avalanche melts rapidly, most likely due to a rain-on-snow event, the dam breaks, releasing a wall of water that picks up high levels of the sandy ash.
- The other triggering mechanism could be a very high intensity rainstorm in summer that causes rapid melting of the glacier and remaining snowpack and a landslide in the unvegetated zone.

Most mudflows in White River run out in the broad upper floodplain and can cause the river channel to shift east or west as much as a mile. Because of these events, White River will capture the lower reaches of either Iron Creek or Mineral Creek. Vegetation in the floodplain often becomes buried deep enough to die. Revegetation in this run-out zone is slow, due to the harsh conditions (cold and excessively drained with little or no organic material in the upper soil layers), and rarely becomes dense. Before 1855, the largest events would reach well into the White River Canyon and occasionally reach the Deschutes River. White River glacier has been retreating since the end of the "Little Ice Age" (about 1855).

Beaver Ponding: Before 1855, beavers were relatively common in several streams in White River subbasin. Extensive trapping before 1855 reduced beaver populations east of the Cascade crest. This trapping supposedly occurred as the Hudson's Bay Fur Company attempted to create a "fur desert" to discourage American trappers from moving into the Cascades and western Oregon and Washington. Beaver managed to hang on, however. Beaver ponding served to alter stream channel morphology and riparian species compositions. The higher water table created by the pond limited establishment by conifers and tended to maintain hardwoods, such as alder and cottonwood. Suitable stream gradients for long-lasting beaver dams are limited in the analysis area, so we suspect that beaver ponding was primarily limited to White River and the lower reaches of its tributaries. Beavers evidently populated most of Clear Creek, Barlow Creek, and the upper reaches of Boulder Creek, based on old and current evidence of beaver activity today. We do not know the actual extent of beavers in White River stewardship area before 1855.

Effects of Disturbance Processes on Fish and Amphibians

Disturbance processes were allowed to function over the landscape, sometimes impacting several drainages at once or small in scale, impacting an acre or less. This led to a large number of acres in the LSR at various seral stages, which provided diverse habitat for fish and wildlife. An example is a large disturbance such as an insect epidemic, which consequently killed whole stands that ultimately provided large woody debris (LWD) and small woody debris (SWD) to the riparian area and stream channel. During these natural disturbances, fish and amphibians likely migrated to other areas within or adjacent to the LSR until the structure and habitat in the previously disturbed area had returned to sustainable standards. Connectivity was only limited to previous disturbance patterns over the landscape. If streams were severly impacted, killing all or part of their inhabitants, fish and amphibians from other areas would slowly migrate into the habitat as the stream recovered through natural processes. Water quality was generally good, limited only to site specific changes such as open canopies (from a disturbance) or areas of limited sediment introduction. Precipitation was intercepted by vegetation and percolated into the soil, rechanging the soil and watertable, providing water to streams during the summer.

Native redband/inland trout populations were strong and resilient throughout their range , having cold water temperatures throught most of the year (see map page IV-11). However, there were occasional high summer water temperatures, sometimes reaching 25 degrees Celsius. Within the mainstem of White River, during summer flow of glacial till, trout and amphibians likely migrated to other niches within their range until favorable conditions returned. Large and small wood entered the systems, being transported from the higher gradient reaches (> 4%) to the lower gradient transitional and depositional reaches (< 4%), while providing diverse habitat, feeding and hiding lanes, velocity stratifiers and sediment catchment. Debris torrents in the upper White River occationally scoured down through the valley until hitting the lower gradient reaches where they deposited silt, wood and other organic material. It is believed that White River's outstandingly remarkable water quality may have triggered anadromous runs, adult summer steelhead and spring chinook, in the Deschutes River (WRWSRP, WRWA).

HUMAN USE

Human use within the White River subbasin can be broken into two periods--prehistoric and historic. The prehistoric period covers uses by American Indians before Euro-American settlement. The historic period covers early contact between American Indians and Euro-Americans and Euro-American uses. Cultural resource sites located within the subbasin reflect the various uses during these eras.

Prehistoric (American Indian): The Mt. Hood National Forest is a meeting place for the Columbia Plateau, Northwest Coast, and Great Basin culture areas. Although characteristics of all three cultural areas are likely visible in White River, the subbasin probably fits best with the Columbia Plateau culture area. Prehistoric sites in the subbasin reflect the various aspects and types of culture use and include probable seasonal camps, lithic scatters, large dart points, small and delicate arrow points, peeled cedar trees, and berry hearths.

Although there were not many people in the area, humans probably used the White River subbasin as early as 10,000 to 6,050 BC. During this time the climate in the area was cool and moist, and people probably practiced a mobile lifestyle emphasizing big-game hunting and foraging for the various resources available throughout the year at different elevations. Only one possible paleoindian projectile point base (Windust Phase) has been found in the subbasin, so little evidence of early human use has been located.

People practiced a seasonal round of resource gathering which differed by elevation. Important resources included plants and animals for food, medicinal, and material purposes. In spring, some people moved to seasonal camps in the foothills to hunt, while others went to fishing stations for the salmon run in March and April. In summer, families would often go upland to gather roots and hunt, returning to the fishing stations for the second salmon run in June and July. Late summer and early fall were often spent gathering plants, drying meat and berries, and gathering supplies for winter. Berry fields were also occasionally burned in the fall to maintain production. In late fall people began to move back to winter villages, and during the winter many people would repair or make material objects.

In the Northwest, contact between American Indians and Euro-Americans began primarily in the 1700s. The horse was reintroduced shortly after 1700 and provided a probable ease and increase in long distance and regional trade and travel. In the late 1700s contact was made with Europeans along the coast, with contact from overland Euro-American explorers following in the early 1800s. Although American Indians in the White River subbasin may not at first have had direct contact, influence was felt through the exchange of trade items and through depopulation resulting from the introduction of diseases, such as smallpox and measles, from which they had no immunity. These combined factors led to a change in the American Indian lifestyle and a partial return to a mobile existence. The American Indian lifestyle and mobility conflicted with Euro-American ideals and settlement. A treaty in 1855 between the United States government and the Deschutes, Wasco, and Walla Walla tribes resulted in the creation of the Warm Springs Reservation and the moving of American Indians to that area.

Historic (Euro-American): Early Euro-American emphasis in the Northwest was based on exploration and fur trade. The Lewis and Clark expedition passed along the Columbia River in 1805, with other explorers and fur traders following shortly thereafter. However, there was little Euro-American use of the subbasin before the 1840s.

Emigration started around 1840, with the greatest number of people coming to the west and passing over the Oregon Trail in 1843. In the Northwest, the emigrants were primarily bound for the Willamette Valley, and their activities as they passed through the area were usually limited to those related to survival, such as hunting. These activities left little trace on the land. In 1845, Samuel K. Barlow explored and blazed the Barlow Road route which passed through the White River subbasin. The first significant Euro-American presence in the LSR came in October, 1845 when the first Oregon Trail emigrants sought a land route over Mt. Hood to the Willamette Valley. Joel Palmer and Samuel Barlow led a party of about 20 wagons from Tygh Valley to the confluence of Barlow Creek with the White River. Forced by impending winter weather to cache the wagons and their belongs, the settlers walked over the Cascade Crest and on to Oregon City. Barlow returned the following year, with authority from the Provisional government, to construct and operate a tollroad which became the final overland route of the Oregon Trail. An estimated 300,000 emigrants traveled this route between 1846-1860. In 1846 the Barlow Road route was improved and became a toll road, and over the next few years thousands of people and their animals and belongings passed over the road.

The Barlow Road evolved into a farm to market road for central Oregon farmers taking produce to valley markets and a route for valley pioneers to move back to the drier country of Wasco County. As better roads were developed in the 1880's, the Barlow route became used primarily by local settlers, Indians and livestock grazers - eventually the Forest Service utilized the road for a forest route and Forest Service telephone line insulators are still visible. The route is still primitive and does not attract heavy use given the conditions. In the White River subbasin much of the Barlow Road follows along the edge of the White River. During the 1850s emigration began to slow down. In 1854 and 1855, Lt. Abbot completed an exploration and survey for a possible railroad route through the subbasin. Sites for this era include the Barlow Road, which is a National Historic District, and associated sites such as theWhite River Station.

The roads in the White River area determined its early use as a transition area and helped establish early settlement patterns. The upland forest was a rough area and generally not used as it was steep, rocky, and difficult to clear for crops. There was, however, limited grazing use for sheep and cattle, and a few cabins were built by trappers and prospectors.

By 1860 there was movement back and forth across the National Forest as people continued to move to the west and some of the early emigrants moved back to the east to settle in the more arid regions of eastern Oregon and Idaho. The Donation Land Act of 1850, the Homestead Act of 1863, and the Railroad Land Grants of 1868 provided legal ownership of land to the people. As had the American Indians before them, Euro-Americans first settled and built towns in the valleys as they provided milder weather and easier access to necessary resources. As lower elevation lands were taken, though, people began to move into the foothills, and use of the upland areas increased.

Timber was first used for houses and fences, and close-by areas fulfilled needs. Commercial timber was also kept to a small scale as transportation difficulties for the product made large-scale production uneconomical. Small, portable five-man milling operations and small-scale permanent mills were present in the lower elevations and foothills of the subbasin.

In the 1880s the Northwest was still fairly isolated, with most contact coming from the sea. However, the coming of trains opened up transportation and eased problems in shipping goods, and more people began to move to the

interior to practice agriculture such as wheat farming. With easier movement over the rails, sheep and cattle grazing also increased.

By the 1890s large logging companies had formed and bought or controlled land in the subbasin, and the small logging operators in the lowlands and foothills could not compete and began to shut down. The National Forest area of the subbasin was originally under the jurisdiction of the General Land Office. However, Forest Reserves were established in 1891 and this restricted use of the upland timber areas and controlled logging activity.

In 1905 the Forest Service was created as part of the Department of Agriculture, and the Cascade Range Forest Reserve became the Cascade Forest Reserve in 1907. In 1908 the area was renamed the Oregon National Forest, and in 1924 was finally named as the Mt. Hood National Forest.

To preserve timber and other resources, fire suppression was also a large part of the early rangers' duties. Both natural and human-caused fires were suppressed, and Forest Service policy at the time was to discourage and prevent the seasonal burning which had been practiced by American Indians and early settlers to maintain travel routes and some food and resource areas.

In 1915 the Barlow Road became a free travel route, and in 1919 the Highway Commission modernized it for auto traffic. The Mt. Hood Loop Highway opened in 1925, allowing much easier access to the National Forest and to the higher elevations of the White River subbasin.

By the 1920s and '30s additional roads, telephone lines, ranger stations, and lookouts were being constructed in the National Forest and in the White River subbasin. Grazing of both sheep and cattle was intensive during this time, and many tin-can dumps of the herders are found in the subbasin. World War I brought about an increase in the demand for wheat and lumber for war industries, but throughout the war, the Depression, and the following stabilization of the economy, timber harvest remained a minor activity in the Forest as lower elevations and private lands provided enough wood. After World War II the demand for timber increased, but logging was still not a dominant factor in the Forest.

The CCC and other work groups were present in the White River area in the 1930s and '40s and helped string telephone lines, plant trees, fight fires, stock fish in lakes and streams, and build trails, various structures, and campgrounds. In an effort to prevent vandalism, possible injury, and other resource damage, the Forest Service in the 1950s and early '60s destroyed many unused cabins, lookouts, and structures within the Forest.

By the 1960s grazing in the area was much reduced. Lowland timber could no longer meet demands, especially for non-local markets, and intensive logging activities began to move into the upland National Forest portion of the White River subbasin. Until the mid-1980s, timber harvest was a dominant feature of National Forest activities, and as a consequence much road building took place. Also during this era there was a large change in American lifestyles and activities such as hiking, camping, hunting, and fishing, (necessary for the survival of the American Indians and early emigrants) were more frequently done for recreation purposes. Additional recreation activities such as mountain biking and cross-country skiing are also now enjoyed in the subbasin. There is a strong emphasis in the National Forest on maintaining trails, roads, and recreation facilities, and many users of the subbasin are from non-local areas.

Although there has always been controversy over the various uses of the Forest, during the 1980s the rise of

"environmentalism" brought about changes in Forest procedures and management. Commodity extraction is still a primary concern, but experiential use has become an important factor to be considered in National Forest management. Timber harvest has slowed; roads are being closed rather than constructed; more emphasis has been placed upon resources such as wildlife, botany, fisheries, heritage resources, and scenery; and commodities such as firewood and mushrooms have become more regulated as demand increases. These changes have affected the local communities, as well as the National Forest. Two examples are the closing of the Tygh Valley and Maupin mills and the rise in use of the National Forest by Asian Americans for mushroom picking. (White River WA, 1995).

SUMMARY OF MAJOR FINDINGS

The following conclusionary items were the most important ones brought forward from the search for the range of natural conditions (RNC). They provide the context, reference and inspiration to the description of the Desired Conditions according to current management direction as outlined in **Part III**.

Landscape Elements: The table below summarizes our research on the range of natural conditions for upland and riparian vegetation before burning by American Indians and early settlers was discouraged around 1855.

STAND TYPE	ZONE	%OF ZONE RNC
Stand Initiation	CREST	10-25
Stem Exclusion Mature Stem Exclusion	CREST	10-20 20-30
Cathedral	CREST	20-30
Late Seral Tolerant Multi-Story	CREST	10-20
Riparian Hardwood	CREST	25-50
Riparian Conifer	CREST	70-90
Stand Intitiation	TRANS	5-15
Stem Exclusion Mature Stem Exclusion	TRANS	5-15
Cathedral	TRANS	30-50
Late Seral Tolerant Multi-Story	TRANS	5-15
Open Park-Like/ Open Intolerant Multi-Story	TRANS	10-20 15-35
Riparian Hardwood	TRANS	10-20
Riparian Conifer	TRANS	70-90
Stand Initiation	EAST	1-10
Stem Exclusion	EAST	1-5
Cathedral	EAST	1-15
Open Park-Like	EAST	75-95
Riparian Hardwood	EAST	30-80
Riparian Conifer	EAST	5-30

Disturbance Processes

- Of the disturbance processes, **fire, insects, and disease,** are of greatest import to maintenance of the upland values within the LSR while the current relative absence of **beaver ponding** primarily affect the streams and riparian areas. The upland disturbance processes can affect the riparian areas yet the riparian area disturbance processes rarely affect the uplands.

- In 1908 the area was renamed the Oregon National Forest, and in 1924 was finally named as the Mt. Hood National Forest. Both natural and human-caused fires were suppressed, and Forest Service policy at the time was to discourage and prevent the seasonal burning which had been practiced by American Indians and early settlers to maintain travel routes and some food and resource areas.

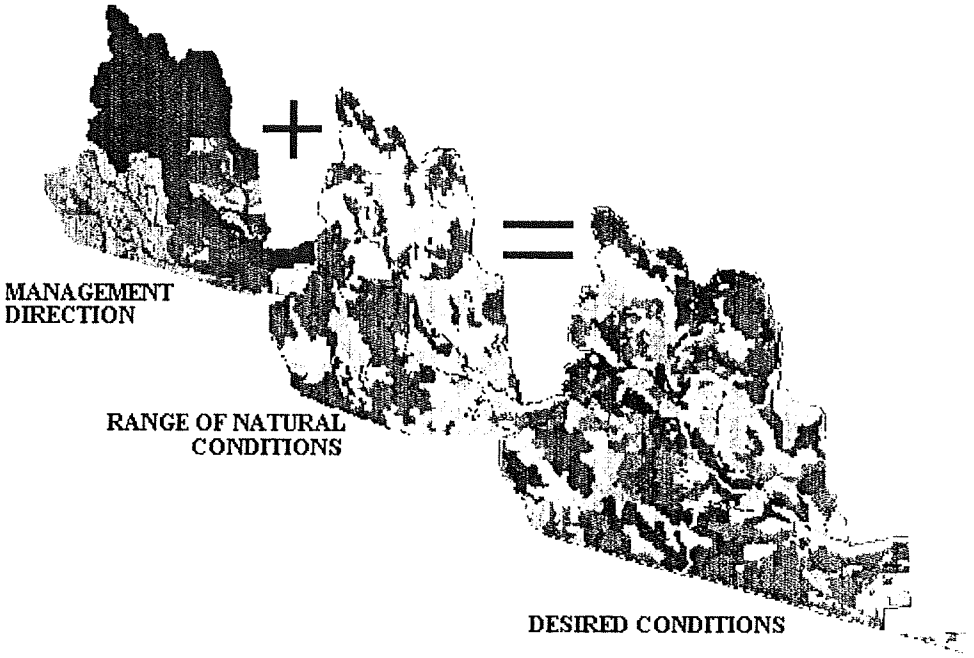
Human Use:

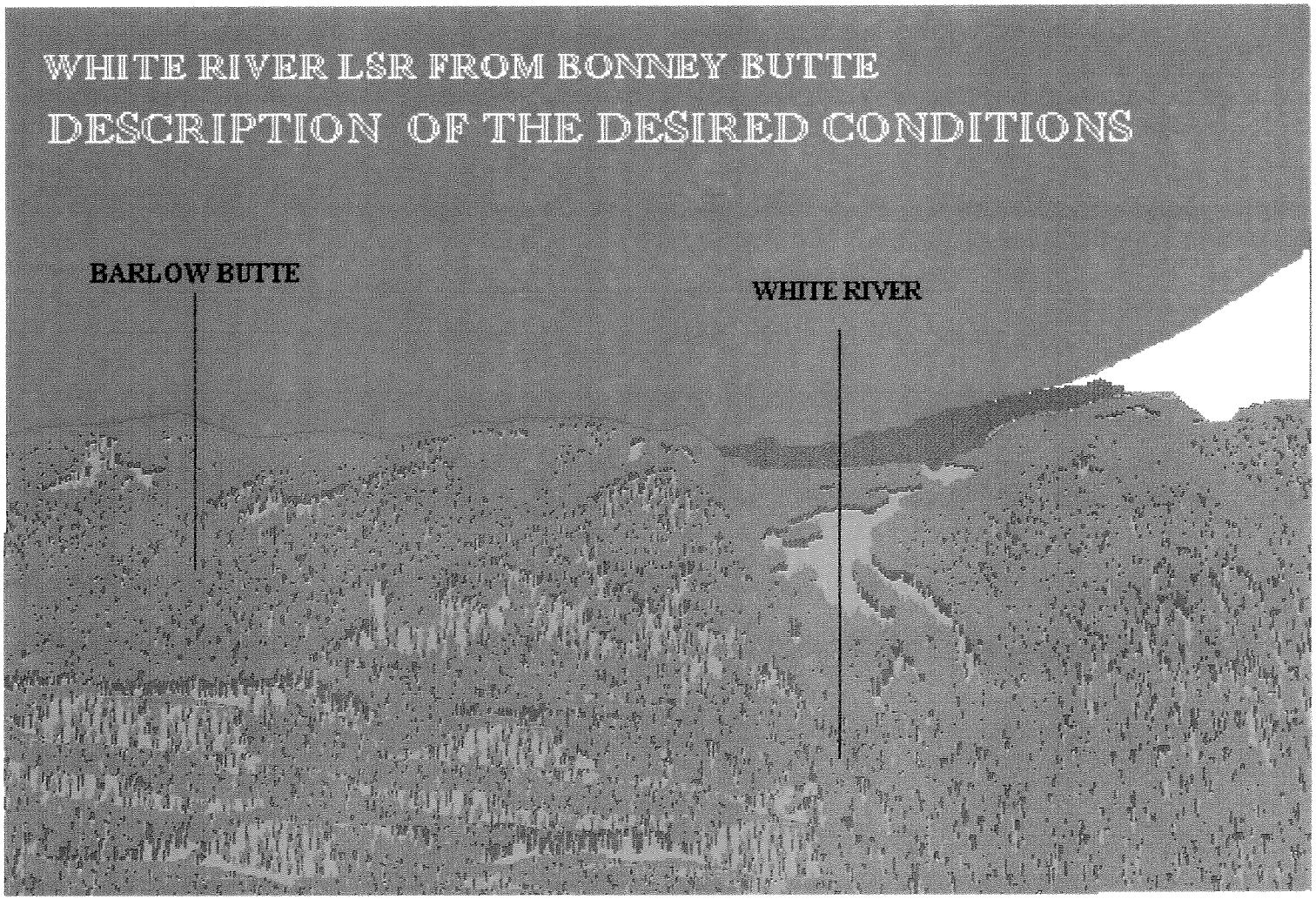
- The White River corridor was culturally significant to members of the Confederated Tribes of Warm Springs now residing on the Warm Springs Reservation.

- The White River was an important travel corridor between Mt. Hood and the Deschutes River before Euro-American settlement and the establishment of the reservation in 1855. The area is also important for the traditional uses of hunting and gathering -- berries, game animals, medicinal plants. It is significant to Native Americans for its physical and spiritual purity. Several pre-historic and historic sites have been recorded within the LSR.
- Important factors for European Americans have been range, agriculture, timber and other forest products, recreation, and experiential use.

- There is a strong emphasis in the National Forest on maintaining trails, roads, and recreation facilities, and many users of the subbasin are from non-local areas.

- The Barlow Road is a National Historic District.




WHITE RIVER LSR FROM BONNEY BUTTE
DESCRIPTION OF THE DESIRED CONDITIONS
BARLOW BUTTE
WHITE RIVER

PART III

A DESCRIPTION OF THE DESIRED FUTURE CONDITIONS

Desired Conditions = Goals + Management Direction + RNC

Late-Succession Reserves are to be managed to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl. (NWFP ROD,1994).

Meeting a specified set of goals and objectives requires:

- Knowledge of applicable law and policy (Management Direction).
- Knowledge of where objectives can potentially be met with reasonable success (Range of Natural Conditions).
- Knowledge of where the objectives are currently being met or not being met (Existing Conditions).
- Whether any movement can be made towards those goals through management (Projects).

When the Desired Conditions are described in terms of landscape elements rather than as a set of standards and guidelines, they become part of a design or "master plan" for a particular place. The design itself is a set of recommendations visually suggesting, in part, how we can meet the overlapping and sometimes conflicting overlays of direction.

When creating a set of plans for a house, we cannot just say we need 15% of the space in bathrooms. We must know where the bathrooms are going to be in order to place the bedrooms in the right place. We also must also have some idea of the zoning laws and the needs of the prospective buyer intending to live in the house. To take this analogy just a step further, we need some idea, or vision, of the style of house which will attract the type of buyers needed and whether it fits the neighborhood or the climate. A flat roof in Government Camp is not a viable vision.....Here is ours:

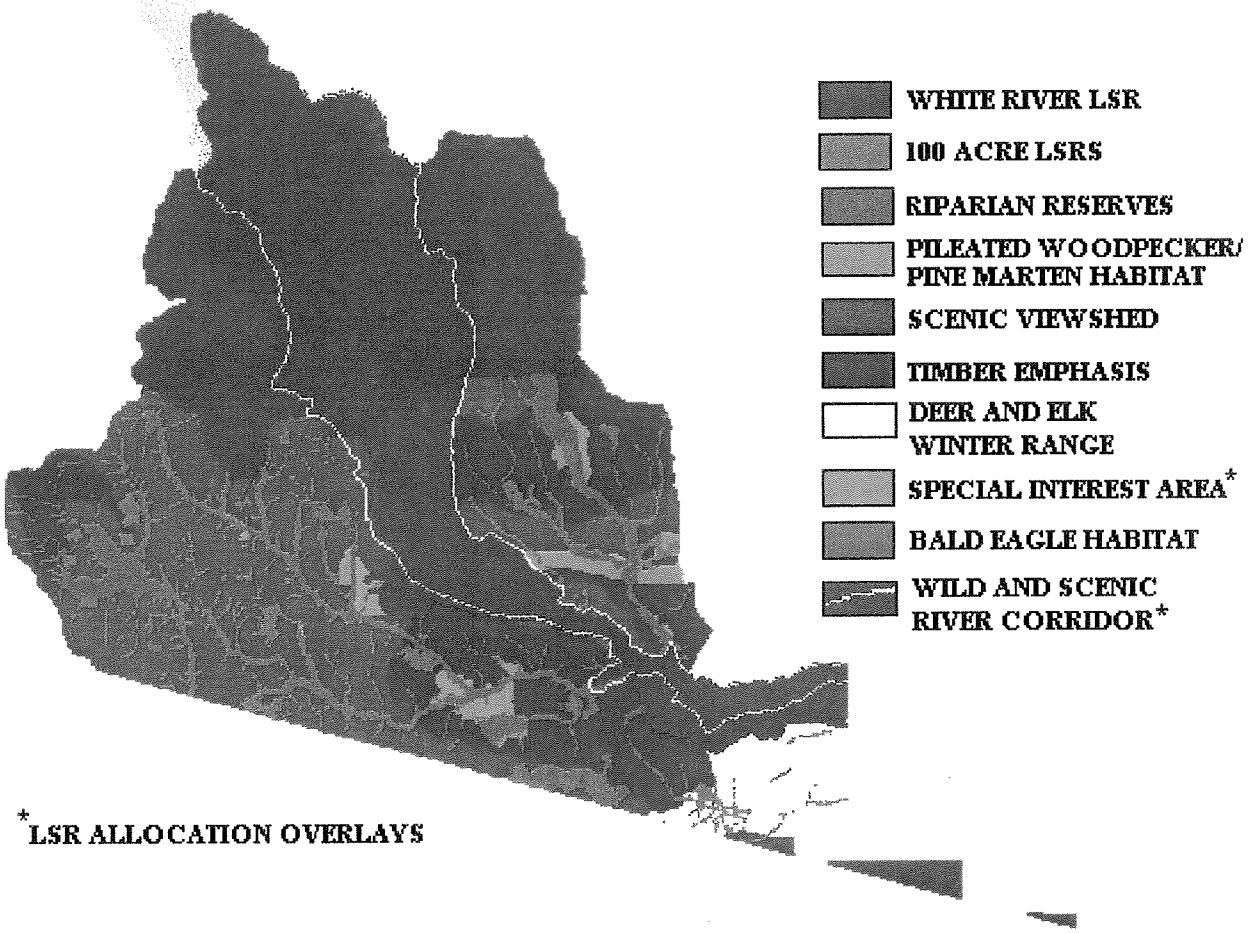
DESIRED LANDSCAPE ELEMENTS AND DISTURBANCE PROCESSES

The process of using the RNC for inspiration for the Desired Future Conditions (DFC) in conjunction with management direction reveals important "red flag" differences. Some of these differences between RNC and DFC represent trade-offs for current needs versus future possibilities. Some will probably be permanent because of changes in the environment and modern social demands:

- There will be refugia within the Transition Zone for late-successional dependent species which we will endeavor to maintain through time. This will cause an eventual increase in Late Seral Tolerant Multi-story of about 10% over estimated RNC levels.
- The Transition and Eastside Zone desired stand structures of Open Park-like, Cathedral and Open Intolerant Multi-story will have to be maintained over time by planned ignition underburning. Funding realities may never allow the full development of these types. Some areas of the LSR are inaccessible to practical management and too dangerous to allow prescribed natural fire. The historic fire regime is unlikely to occur again.

- The amount of Stand Initiation in the stewardship area is designed to be within the "cycling" areas where large tree character is ecologically difficult to achieve or where land allocations emphasize timber production. Outside of the LSR, these areas are envisioned to be managed. Inside the LSR , we do not foresee planned "cycling" among Stand Initiation, Stem Exclusion and Mature Stem Exclusion at this time.

MANAGEMENT DIRECTION



*LSR ALLOCATION OVERLAYS

- Stand Initiation within the Crest Zone of the White River LSR may become deficient eventually. We delineated stands as "cycling" which we think do not have the potential for developing into Cathedral or Late Seral Tolerant Multi-story structures. We believe that it may be possible to use prescribed natural fire in the Crest Zone to continue this process in the future . This will ensure some "natural" level of Stand Initiation and provide habitat for species such as the lynx that are dependent on prey which occupy earlier successional patches.

During Landscape Analysis and Design, we refined our vision of the transition from the Warm/Dry Douglas-fir to Dry Grand Fir and Moist Grand Fir plant series. We concluded that the Cathedral stand type could be maintained at about 60-80% canopy closure in the Transition Zone. The more open range of canopy closure identified by watershed analysis for Cathedral (from 40-60%) would more likely be of uneven-age structure similar to Open Park-like with a similar dominance of Ponderosa pine but with more Douglas-fir. We described this as the structure type Open Intolerant Multi-story. (See Table of Vegetation Structure Definitions, p.II-4).

Riparian Vegetation Structures And Patterns: Streams are dynamic systems, expressing actions and processes that occur within their watersheds, always trying to reach a state of equilibrium by constantly adjusting to changing conditions. Since these systems are so dynamic, putting an exact figure on quantitative properties, such as pieces of existing wood or pools per mile, is next to impossible. Using an understanding of the range of natural conditions rather than a specific number for DFC's, we are able to accommodate for variations over space and time. In future management within the LSR and its surrounding landscape, we envision the landscape regaining processes and functions similar to those previous to 1855. Following are brief statements of desired riparian processes and landscape elements:

- Stands grow and die in various cycles throughout the riparian areas and provide LWD/SWD throughout the length of a drainage.

- Existing down wood in Riparian Areas have differing amounts and types of structure, depending on what type of channel is occurring; depositional, transitional or transportal, and where it is within the drainage.

- Vegetation structure and pattern vary in seral stage, but always provide minimal canopy cover to the streams, providing superior water quality for aquatic dependent species.

- Vegetation species composition is within RNC for the climatic zone, elevation, aspect and fire cycle.

- Natural fires are allowed to burn into riparian areas in the Crest Zone, if fuels are within their RNC prior to ignition.

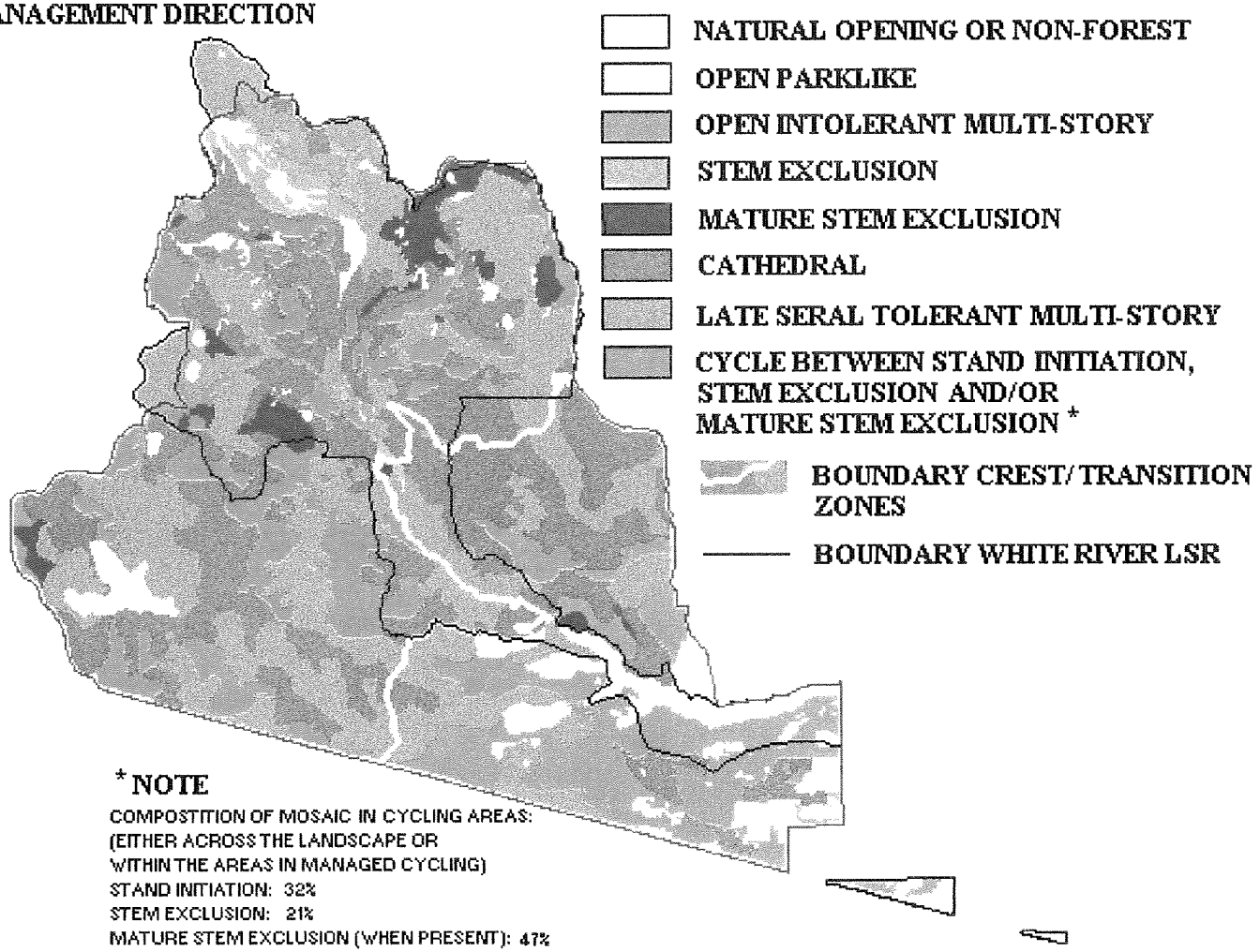
- Redband/inland trout are able to reside and flourish throughout their range with minimal impacts by non-native trout.

- Road densities are low enough per mile to minimize road related problems such as subsurface interception of water or allowing LWD and sediment to flush through the system by eliminating undersized culverts or bridges.

- Sediment levels are low enough that suspended sediment and bedload can be moved by winter and spring high channel maintenance flows.

DESIRED LANDSCAPE PATTERN AND STRUCTURE

BASED ON ECOLOGICAL POTENTIAL AND MANAGEMENT DIRECTION



*** NOTE**

COMPOSTITION OF MOSAIC IN CYCLING AREAS:
(EITHER ACROSS THE LANDSCAPE OR
WITHIN THE AREAS IN MANAGED CYCLING)
STAND INITIATION: 32%
STEM EXCLUSION: 21%
MATURE STEM EXCLUSION (WHEN PRESENT): 47%

Large Tree Potential: The table below displays acres of LSR plant series with the potential for developing large tree character as expressed in the Cathedral, Late Seral Tolerant Multi-story, Open Park-like and Open Intolerant Multi-story stand structure types.

TABLE OF LARGE TREE POTENTIAL WITHIN THE WHITE RIVER LSR (>20")

STAND TYPE *	PLANT SERIES	ACRES IN LSR
LSTMS, CA	Cool Lodgepole	515
CA, LSTMS	Cool/Dry Lsubalp	1,786.50
CA, LSTMS	Cool/Mst Lsubalp	6,195.00
OP,OM,CA	Dry Grand Fir	2,171.00
CA, OM, LSTMS	Dry Wh/Df	104.5
CA, OP	Hot/Dry Pine/Oak	224.5
CA, OM, LSTMS	Moist Grand Fir	1,292.00
OP	Warm/Dry Df/Gf	540
CA, LSTMS	Warm/Mst Wh/Sf	9,473.00
TOTAL ACRES IN LSR PER CENT OF LSR		**22,301.15 65%**

* Refer to page II-4 for abbreviations and definitions.

Canopy Closure Potential:

TABLE OF CANOPY CLOSURE GREATER THAN 60% POTENTIAL WITHIN THE WHITE RIVER LSR

STAND TYPE	PLANT SERIES	ACRES IN LSR
SE, CA, LSTMS	Cool Lodgepole	1,724.50
SE, CA, LSTMS, MSE	Cool/Dry Lsubalpine	2,521.00
SE, CA, LSTMS, MSE	Cool/Mst Lsubalpine	8,172
MSE,CA	Dry Grand Fir	1,654
SE, CA, LSTMS, MSE	Moist Grand Fir	1,209.00
SE, CA, LSTMS, MSE	Warm/Mst Wh/Sf	11,907
CA	Dry Wh/Df	127.5
TOTAL ACRES IN LSR PER CENT OF LSR		**27,314.5 80%**

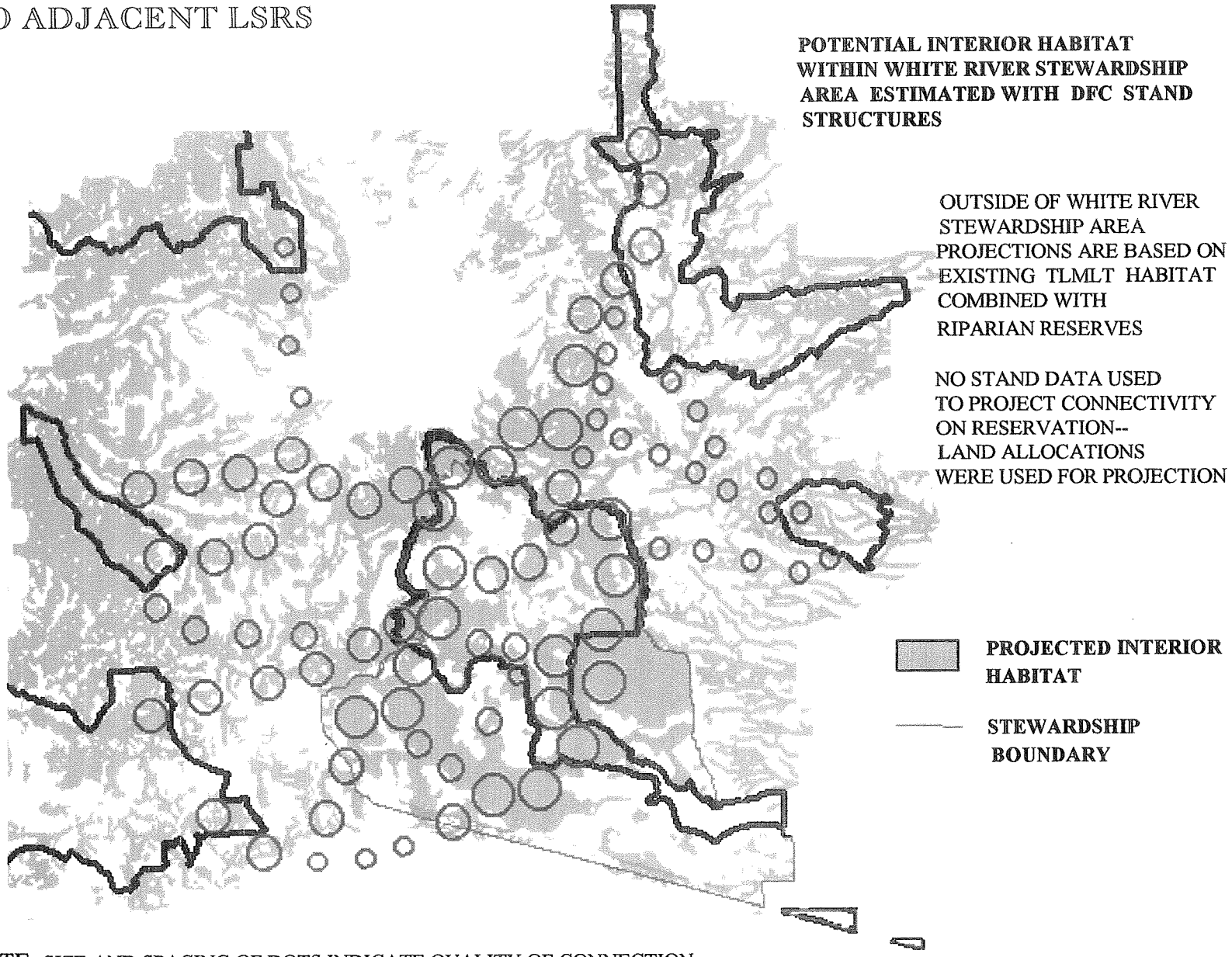
Connectivity: The White River LSR has the potential for 50% of its area to become interior mature forest habitat. The rest of the Stewardship area also has the potential for 50% interior habitat. However, how the habitat is connected is as important as the amounts. The desired condition is to strengthen existing corridor continuity at all existing connections, to widen the area of the connections, and where possible create new connections through the stewardship area to other late-successional reserves and between the 100 acre LSRs.

Large Woody Material and Snags: The table below lists acres of high, medium or low levels of snags or large woody material > 16" DBH by plant series. This is the amount of material expected to be within the range of natural conditions.

TABLE OF POTENTIAL LWM AND SNAGS WITHIN THE WR LSR

HI-8-10 MED-4-7 LOW-0-3	SNAGS PER ACRE AC HIGH	AC MED	AC LOW	LWM PER ACRE AC HIGH	AC MED	AC LOW
Cool Lodgp	380	899		997	232	
Cool/Dr Lsubalp	1,217	1,496		1,789	798	
Cool/M Lsubalp	4,121	4,530		6,300	2,835	
Dry Gf	674	160	2,317	826		1,992
Dry Wh/Df			1,497			118
Hot/Dry Pine/O			224			224
Mst Gf	293	930		1,205	14	
Wrm/D Df/Gf			536			536
Wrm/M Wh/Sf	5,375	7,141		10,008	2,107	
TOTAL	**12,060**	**15,156**	**4,350**	**21,125**	**5,986**	**2,870**
% LSR	**35%**	**44%**	**13%**	**61%**	**17%**	**8%**

ESTIMATED POTENTIAL CONNECTIVITY TO ADJACENT LSRS



NOTE: SIZE AND SPACING OF DOTS INDICATE QUALITY OF CONNECTION
LARGER AND CLOSER SPACING HIGHEST QUALITY, SMALLER AND WIDER SPACING INDICATE PROBLEMS OR AREAS OF CONCERN

DESIRED DISTURBANCE PROCESSES:

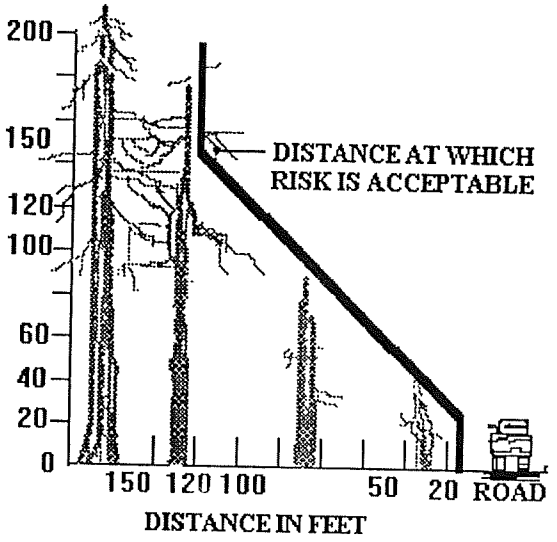
The desired condition with respect to disturbance processes is to allow all of them to operate within the LSR as closely to the pre-1855 regimes as is possible.

The "red-flag" section at the beginning of this chapter has discussed the major deviance from the RNC that our description of desired conditions must recognize. We will manage the fire regime at all times but a greater emphasis on natural ignition may be possible over time. See the Fire Management Plan for further discussion.

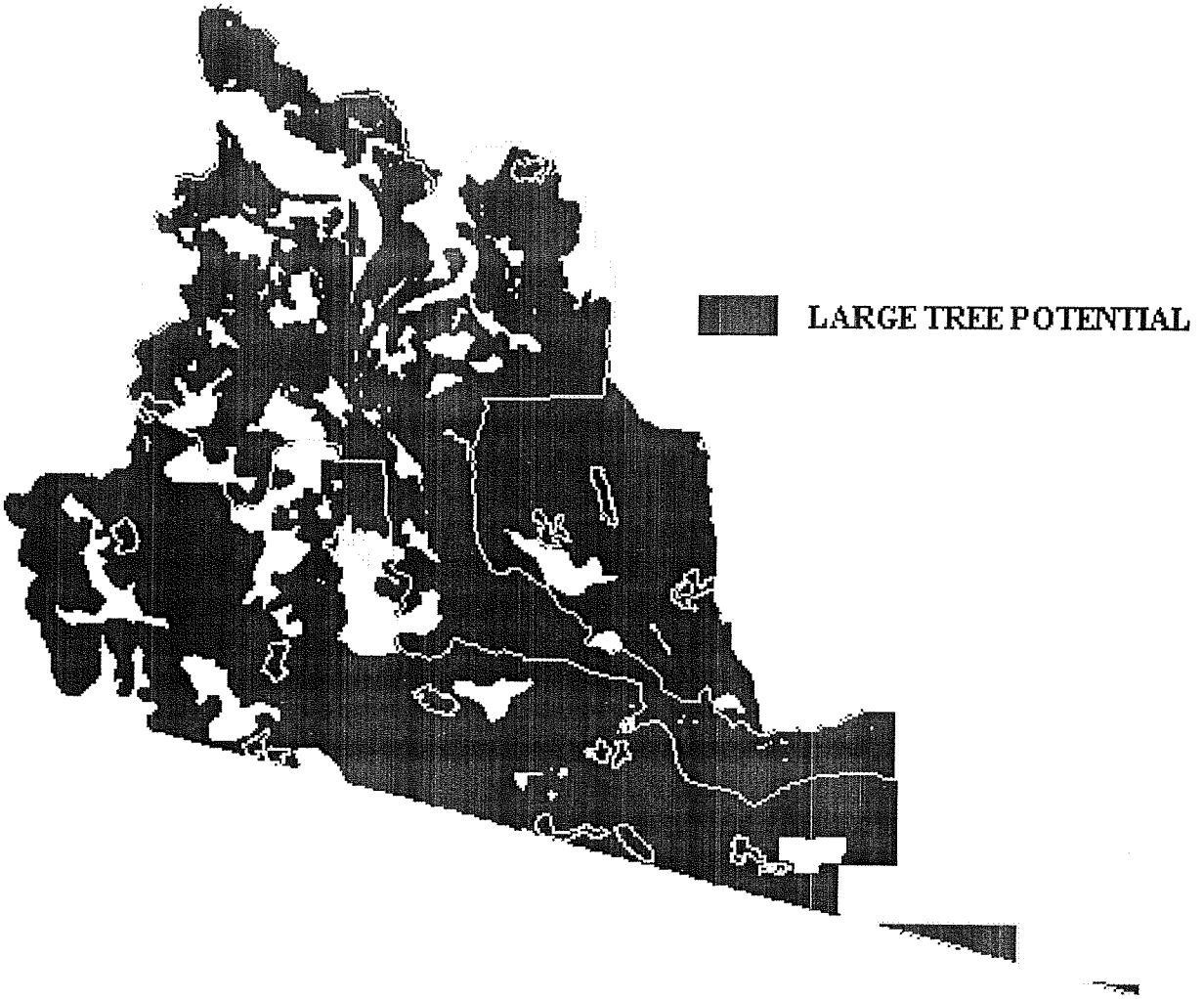
Insects and disease are a part of the ecosystem. They produce small canopy openings, snags, large woody debris, and habitat for other species. They thin stands threatened by long-term droughts, and pave the way for a stand-replacing fire to "clean things up". It is this last item that becomes problematic with an altered landscape where late-successional values are dependent on static conditions in specific and relatively small patches. The desired condition, therefore, is to maintain as much as possible, through management, stands which exhibit levels of insect and disease that contribute to the functioning of an LSR but do not endanger its continued existence:

- **The Crest Zone:** 300-500 acres is the largest scale high mortality (greater than 25%) event considered "absorbable" without reassessment at the landscape level.
- **The Transition Zone and Eastside Zones:** Insect and disease and the resultant mortality should occur on a much smaller scale in these zones. The desired condition is to have the greatest number of acres in the desired stand structures; 10-20 acres of high mortality with significant risk of catastrophic loss to desired late-successional habitat would be a red flag for these zones.

DFC FOR SNAGS WITHIN 150 FEET FROM OPEN ROADS



POTENTIAL FOR LARGE TREE STRUCTURES WHITE RIVER LSR, 100 ACRE LSRs, and STEWARDSHIP AREA



HUMAN USE

Most existing recreation infrastructure within the LSR is either along the Barlow Road and White River, or at Sno-Parks on Highways 35 and 26. The Mt. Hood Forest Plan directs that the Sno-Parks and related dispersed winter recreation trails be maintained to serve the growing needs of the urban national forest while meeting ROS class of roaded natural. Several paved main roads in the area were originally constructed for timber harvest activity and have become significant travel routes for the visiting public. Those roads and other graveled roads are desired for future management and public use while others are being closed, reconstructed or obliterated to meet various resource objectives including open road densities.

The White River Wild and Scenic River Plan amends the Mt. Hood Forest Plan for the lands within the designated river corridor. The most pertinent direction for infrastructure and human use in the corridor is:

- Protect culturally significant resources; e.g. Barlow Road wayside exhibits and features.
- Provide a wide range of recreation opportunities based on the Recreation Opportunity Spectrum (ROS) guidelines for roaded natural or semi-primitive motorized areas of the western end, and semi-primitive, non-motorized zones in the east end. These all result in fairly rustic, primitive facilities without the conveniences of drinking water and trash removal.
- Achieve the Visual Quality Objective of Retention, foreground and Partial Retention middleground and background from White River, Bonney Butte, Frog Lake Buttes, and Keep's Mill Campground and overlook.
- Achieve the Visual Quality Objective of Partial Retention from all distance zones from Timberline Lodge, Mt. Hood Meadows, and Highway 35 sno-parks.
- Achieve the Visual Quality Objective of Partial Retention in the foreground of developed recreation areas.
- Consider the economic development needs of local rural communities such as encouraging outfitter-guide permits which might utilize trails and roads in the forest, and who might install temporary structures like tents or yurts.
- Use existing trails to accommodate current use. No new trails below Keeps Mill. Nordic ski trails are limited to ungroomed, minimum development.
- Build no new campgrounds.
- Reconstruct, remove or relocate campgrounds that do not meet Aquatic Conservation Strategies of the NW Forest Plan.
- Build no new roads in White River W&S corridor.
- Open road density of the W&S corridor not to exceed 1.5 miles per square mile.
- Keeps Mill road is to be maintained at Maintenance Level II (high clearance).
- Barlow Road is a National Historic District listed on the National Register of Historic Places. It is also part of the Oregon National Historic Trail. It is to be of native surface and minimal modern engineering is to be applied to it other than to protect resources. It is open to licensed motorized

vehicles , bicycles, horses and pedestrians.

TABLE OF DESIRED ROAD DENSITY		
	MILES OF ROAD PROPOSED FOR CLOSURE	**DFC ROAD DENSITY**
WHITE RIVER LSR	36	1.5 MI/MI²
WHITE RIVER STEWARDSHIP OUTSIDE OF LSR	114	2.7 MI/MI²

- Any applications to FERC for dams or reservoirs in the W&S corridor will receive recommendation of denial from the Forest Service.

The Wild & Scenic River Plan and the Northwest Forest Plan both direct that recreation facilities (existing or new) meet the Aquatic Conservation Strategies of the NW Forest Plan. Since no new trails, campgrounds or other developments are planned, only the existing facilities are a concern. The exceptions to this statement are the development proposals for Mt. Hood Meadows Ski Resort. The Northwest Forest Plan (ROD) directs that new developments in an LSR must be neutral or beneficial to the biological function of the LSR. The effects can be approved (case by case) if they can be minimized and mitigated. The same section (ROD C-17) states that new developments must provide a significant public benefit. In the ski area case, significance of public benefit must be determined through the NEPA process for both the access road improvement and for new downhill skiing facilities.

In keeping with the Wild & Scenic River plan and for protection of aquatic and riparian habitats, many roads have been obliterated and/or closed and others are proposed for the same treatment. This work will assure that open road density is 1.5 miles of road per square mile, or less. Where road closure is not recommended, the White River watershed analysis did prescribe reconstruction, drainage improvements or surfacing for many miles of road in the LSR.

The assessment team used the NWFP ROD as a guide to judge site specific social uses either occurring now or possible in the future. **Compatible** uses in the ROD include existing rock pits, existing campgrounds, and most dispersed recreation uses. The team also felt that Hawkwatch is a compatible use according to criteria in the ROD.

Neutral Uses:

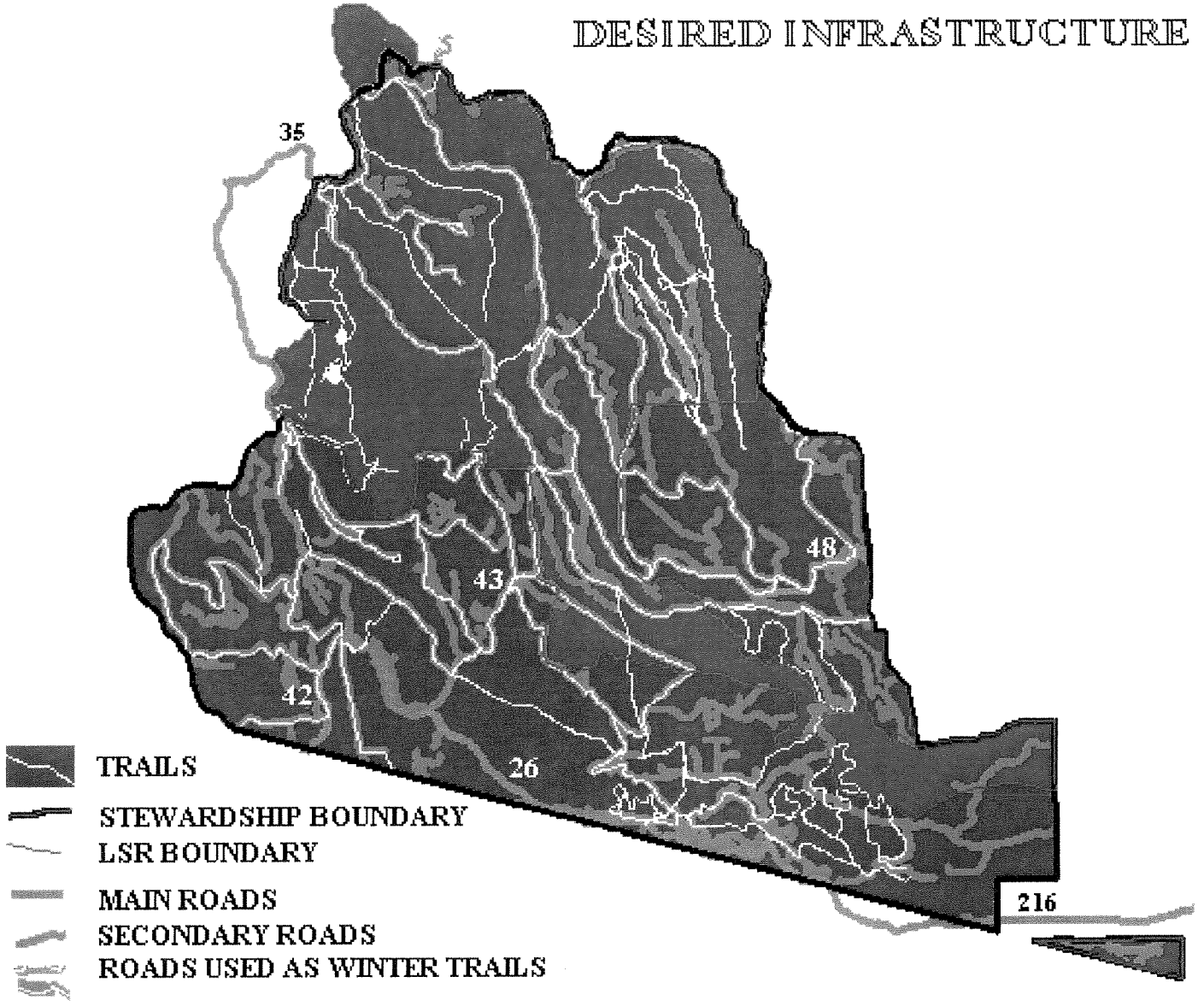
- American Indian treaty rights uses.
- OHV crossing over White River.
- Frog Lake Sno-park expansion
- Hawkwatch access improvements to Bonney Butte.
- New trails above the confluence of White River and Deep Creek.
- Existing grazing in White River. and Grasshopper Allottments.
- Post, poles, rails, and shakes. **(In conjunction with an approved silvicultural project meeting LSR objectives only).**
- Seed cone collections
- Personal use collection of mushroom species associated with open stands.
- Personal use huckleberry collection
- Personal use collection of root species associated with open stands.
- Shrubs, grass and beargrass collection (above-ground parts only,commercial and personal use).
- Personnal use Christmas Trees.
- Hardwood collection (branches only) outside of Riparian Reserves.
- Upland-oriented outfitter/guide services (horses, mt. biking,etc.).

Incompatible Uses:

- New roads.
- Road re-alignments.
- Fuelwood gathering.**(Exceptions: Hazard Tree removal, blowdown in open-road prisms)**
- Large scale burning for huckleberries.
- New rock pits.
- Expansion of Maxine Pit.
- Mt. Hood Meadows Ski Area Expansion.
- Barlow Road native surface. **(overriding social value already established).**
- Land trades involving the Byzandine or Triangle Landscape units.
- Visual rehabilitation of existing clear-cuts involving removal of additional trees.
- Construction of livestock corrals and fences.
- Collection of plants involving rootball or bare-root transplanting.
- Commercial collection of Christmas Trees, Yew bark, most other special forest products.
- Commercial collection of vertebrate or invertebrate species.
- Collection of roots of species associated with closed canopy stands.
- Collection of fungi associated with closed canopy stands.
- Gathering of hardwood branches, mosses, lichens or ferns in Riparian Reserves.
- Dispersed campsites in Riparian Reserves.
- Irrigation ditches **(overriding social value already established).**
- Anadromous fish introduction above White River Falls.
- Re-introduction of Rio Grande race of wild turkey.
- Kayaking and canoeing in White River above Keeps Mill.
- Outfitter/guide fishing services.

Incompatible Uses Requiring Further Analysis of Possible Overriding Social Value:

- Road re-alignments.
- Mt. Hood Meadows Ski Area Expansion.
- New Roads.
- Visual Rehabilitation of existing clear-cuts involving removal of additional trees.
- Construction of livestock corrals and fences.
- Anadromous fish introduction above White River Falls.
- Re-introduction of Rio Grande race of wild turkey.


DESIRED INFRASTRUCTURE
35
48
43
42
26
216
TRAILS
STEWARDSHIP BOUNDARY
LSR BOUNDARY
MAIN ROADS
SECONDARY ROADS
ROADS USED AS WINTER TRAILS

CRITERIA BROUGHT FORWARD FOR COMPARISON WITH EXISTING CONDITIONS

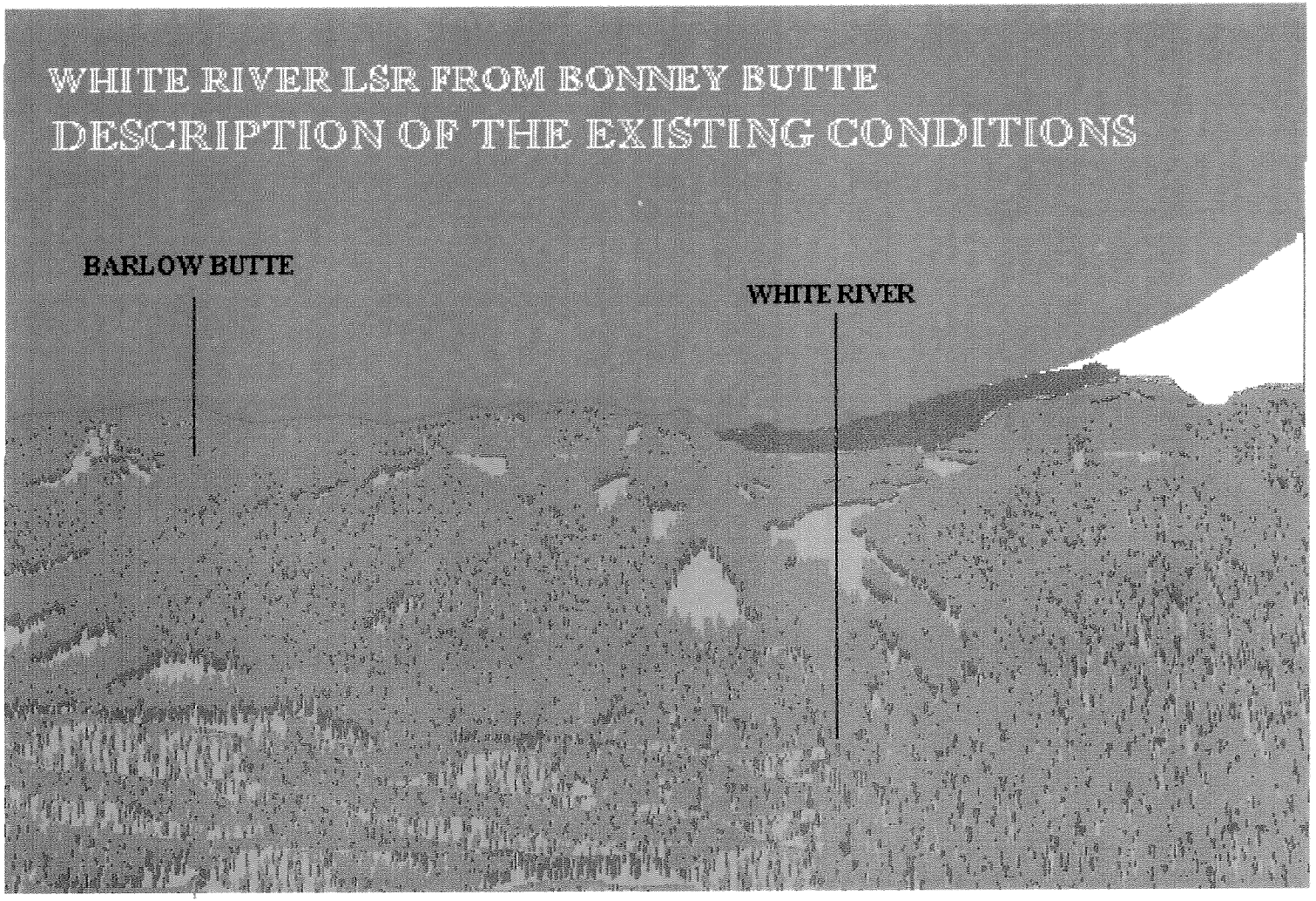
The assessment team used the following criteria from knowledge of the landscape's potential in conjunction with management direction. *They will be used to compare with existing conditions in order to judge the qualities of ecosystem resiliency and functioning to meet the goals of a late-successional reserve:*

Landscape Elements and Disturbance Processes:

- Levels of Riparian LWD
- Riparian Canopy Closure
- Stream Sediment Loading
- Road Densities
- Acres of Desired Stand Structure and Species Composition
- Acres of Interior Mature Forest Habitat
- Levels of LWM, Snags and Canopy Closure >60%
- Connectivity of interior habitat to adjacent LSRs
- Connectivity between 100 acre LSRs.

Human Use:

- Numbers of incompatible uses in the LSR (mostly dispersed recreation in riparian reserves).
- Number of recreation sites with restoration needs.


WHITE RIVER LSR FROM BONNEY BUTTE
DESCRIPTION OF THE EXISTING CONDITIONS
BARLOW BUTTE
WHITE RIVER

PART IV

EXISTING CONDITIONS

The objective of the following analysis is two-fold: 1) to see where, why and to what extent the LSR and surrounding landscape is functioning to meet NWFP goals within the framework of the desired conditions, and 2) to see if there is any potential for management to improve problems found.

LANDSCAPE ELEMENTS

Large Tree Character:

TABLE OF EXISTING ACRES
LARGE TREE CHARACTER
WHITE RIVER LSR (>20")
Without Desired Species Mix/Structure = *

STAND TYPE#	PLANT SERIES	ACRES IN LSR
LSTMS, CA	Cool Lodgepole	219
CA, LSTMS	Cool/Dry Lsubalp	1,156
CA, LSTMS	Cool/Mst Lsubalp	3,124
FEM, OM	Dry Grand Fir	1,874 *
CA, OM, LSTMS, FEM	Dry Wh/Df	100 *
CA, OP, FEM	Hot/Dry Pine/Oak	9 *
CA, OM, LSTMS, FEM	Moist Grand Fir	316 *
OP, FEM	Warm/Dry Df/Gf	120 *
CA, LSTMS	Warm/Mst Wh/Sf	4,247
TOTAL ACRES IN LSR		**11,165**
PER CENT OF LSR		**32%**
# Refer To Page I I-4 For Definitions		Pot.=65%

Existing Canopy Closure:

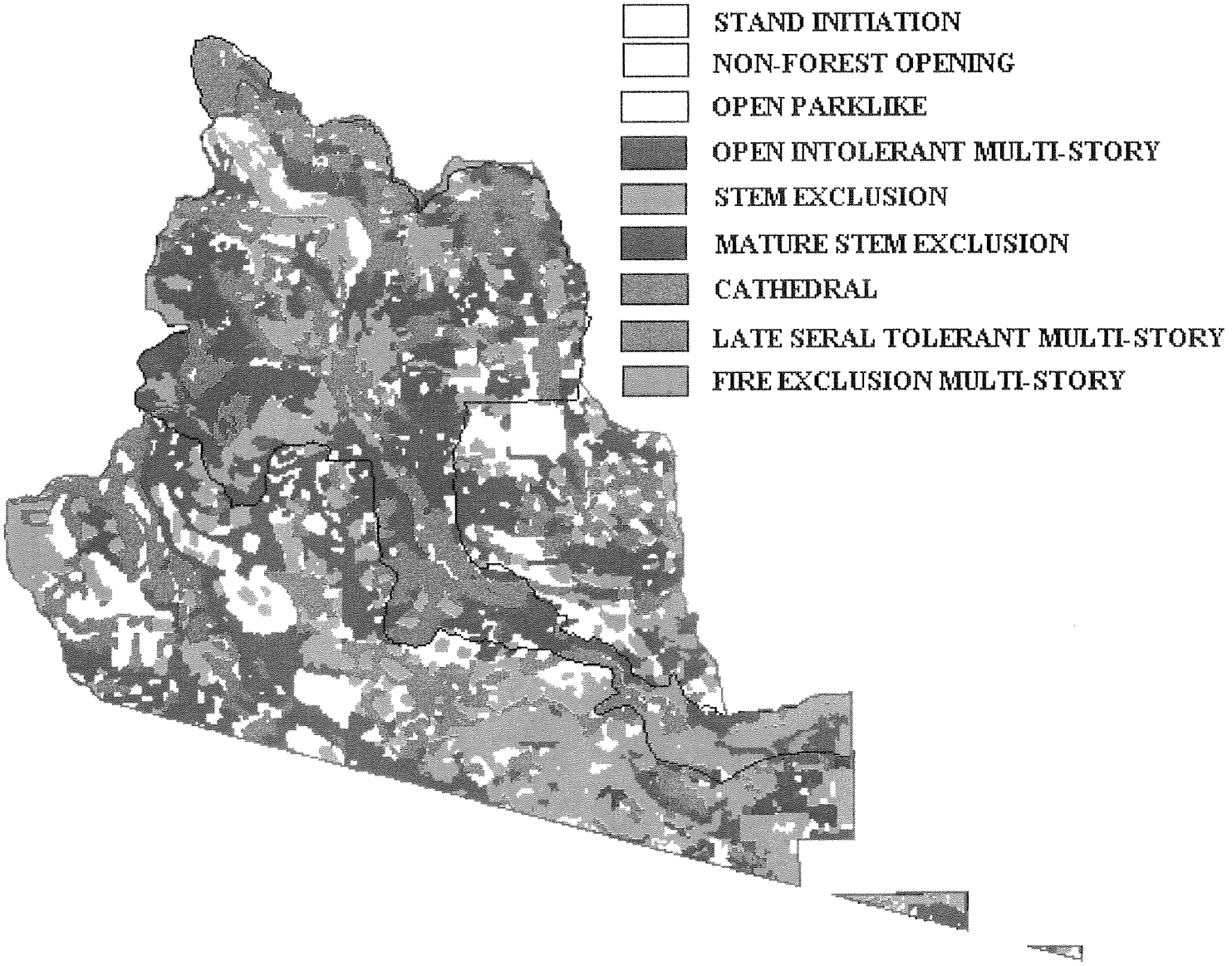
TABLE OF CANOPY CLOSURE
GREATER THAN 60%
IN THE WHITE RIVER LSR
Without Desired Species Mix/Structure = *

STAND TYPE #	PLANT SERIES	ACRES IN LSR
SE, CA, LSTMS	Cool Lodgepole	1,338
SE, CA, LSTMS, MSE	Cool/Dry Lsubalpine	2,426
SE, CA, LSTMS, MSE	Cool/Mst Lsubalpine	7,637
MSE, CA, FEM	Dry Grand Fir	2,507*
SE, CA, FEM LSTMS, MSE	Moist Grand Fir	1,088*
SE, CA, LSTMS, MSE	Warm/Mst Wh/Sf	11,814
FEM	Hot/Dry P/O	179*
FEM	Warm/Dry Df/Gf	445*
CA, FEM	Dry Wh/Df	109*
TOTAL ACRES IN LSR		**27,543**
PER CENT OF LSR		**80%**
# Refer To Pg. I I-4 For Definitions		Pot.=80%

Conclusions from the previous two tables:

- **Cool Lodgepole** is reasonably close to DFC conditions for the elements large tree character and canopy closure.
- **Cool/Dry Lower Subalpine** is deficient by about a third on large tree character.
- **Cool/Moist Lower Subalpine** is deficient in closed canopy stands by 13% and 50% deficient in large tree character.
- **Dry Grand Fir** is deficient in desired species/structure. It has more closed canopy stands than DFC by 50% and is deficient in large tree character by 15%.
- **Moist Grand Fir** is deficient in closed canopy stands by 10% and large tree character by 75%.
- **Warm/Moist Western Hemlock/ Silver Fir** is deficient in large tree character by 50%.
- **Hot/Dry Pine/Oak** is deficient in desired species/structure. It has more closed canopy stands than DFC by over 90% and is deficient in large tree character by over 90%.
- **Warm/Dry Douglas-Fir/Grand Fir** is deficient in desired species/structure. It has more closed canopy stands than DFC by 90% and is deficient in large tree character by 77%.
- **Dry Western Hemlock/ Douglas-Fir** is deficient in desired species/structure. It has more closed canopy stands than DFC by 14% and is deficient in large tree character by 4%.

EXISTING VEGETATION STRUCTURE AND PATTERN



Large Woody Material and Snags: We estimate that no plant series falls into the high category for LWM/snags; the majority of the LSR is in the low category with some medium levels in areas containing the stand structures Understory Reinitiation, Cathedral and Late Seral Tolerant Multi-story.

Connectivity: The White River LSR has the potential for 50% and currently has 32% of its area in interior mature forest habitat. The rest of the Stewardship area also has the potential for 50% interior habitat but currently is at 17%. However, how the habitat is connected is as important as the amounts.

See the section on page IV-37 for species-specific discussion on connectivity of habitats.

Landscape Units

Plant Series are distributed throughout the landscape in association with elevation bands. In order to become more site-specific and to develop treatment/project areas, the White River Stewardship Team stratified the landscape into smaller units based on an integration of the following criteria:

- Climate Zone.
- Plant Series.
- Subwatersheds.
- Social Significance.
- LSR Boundary.
- Desired Vegetation Structure.
- Ability to locate on the ground.

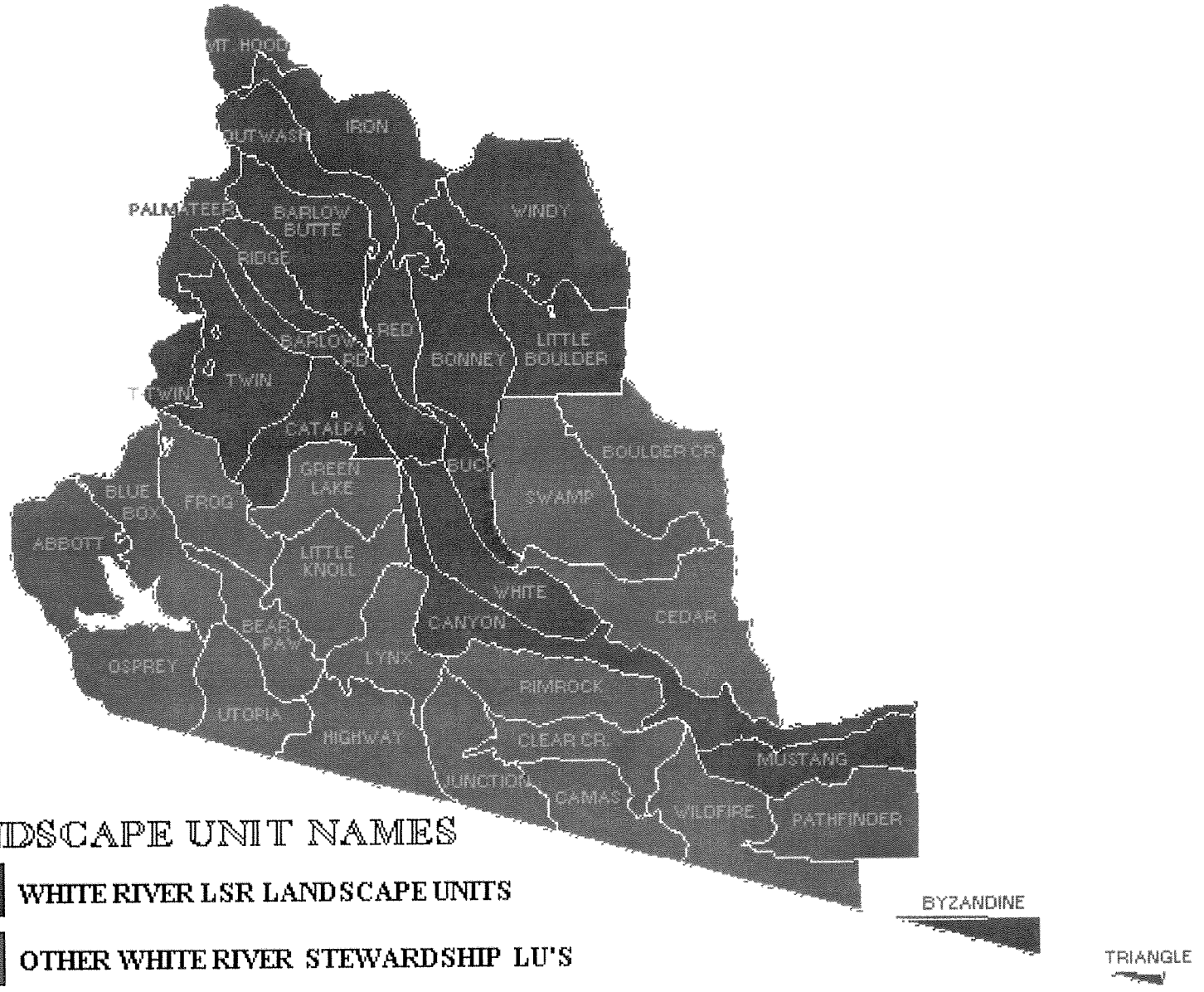
WHITE RIVER LSR LANDSCAPE UNITS		
LANDSCAPE UNIT / LSR NAME OR NUMBER		DOMINANT PLANT SERIES
Outwash	White	Cool Lp
Barlow Butte	White	Cool/Dry Lsubalp
Bonney	White	Cool/Mst Lsubalp
Little Boulder	White	Cool/Mst Lsubalp
Mt.Hood	White	Cool/Mst Lsubalp
Palmateer	White	Cool/Mst Lsubalp
Windy	White	Cool/Mst Lsubalp
Byzandine	White	Dry Gf
Mustang	White	Dry Gf
Triangle	White	Hot/Dry P/ O
Buck	White	Moist Gf
Barlow Road	White	Warm/Mst Wh/Sf
Canyon	White	Warm/Mst Wh/Sf Dry Gf
Catalpa	White	Warm/Mst Wh/Sf
Iron	White	Warm/Mst Wh/Sf
Red	White	Warm/Mst Wh/Sf
Ridge	White	Warm/Mst Wh/Sf
T-Twin	White	Warm/Mst Wh/Sf
Twin	White	Warm/Mst Wh/Sf
White	White	Warm/Mst Wh/Sf Dry Gf
NON-LSR LANDSCAPE UNITS		
Abbott	No Lsr	Cool/Mst Lsubalp
Osprey	No Lsr	Cool/Mst Lsubalp
Rimrock	No Lsr	Dry Wh/Df
Frog	No Lsr	Warm/Mst Wh/Sf
Green Lake	No Lsr	Warm/Mst Wh/Sf
Little Knoll	No Lsr	Warm/Mst Wh/Sf
Lynx	No Lsr	Warm/Mst Wh/Sf

LANDSCAPE UNITS W/ 100-AC LSR		
Junction	2156	Dry Wh/Df
Bearpaw	2135	Warm/Mst Wh/Sf
Utopia	2128	Cool/Mst Lsubalp
Pathfinder	2104	Dry Gf
Wildfire	2104	Dry Gf
Highway	2077	Warm/Mst Wh/Sf
Bluebox	2060	Cool/Mst Lsubalp Warm/Mst Wh/Sf
Camas	2037-38	Dry Wh/Df
Clear Cr.	2161	Dry Wh/Df
Boulder Cr.	1129	Moist Gf
Cedar	1118	Moist Gf
Swamp	1111	Moist Gf

The Forest Service has been stratifying the landscape for treatment areas for a long time. The idea is not new. What is new is the way they are being used:

- The landscape units are a result of large-scale, landscape level analysis. They are not considered an island for planning purposes and they are largely based on ecological criteria.
- They allow the operation of the ecosystem management ideal of concentrating areas of treatment rather than some "shot-gun" approaches which can be out of the range of natural conditions for disturbance processes.

We will use landscape units by name in this assessment to further describe current conditions, to prescribe treatments and to schedule projects and monitoring.



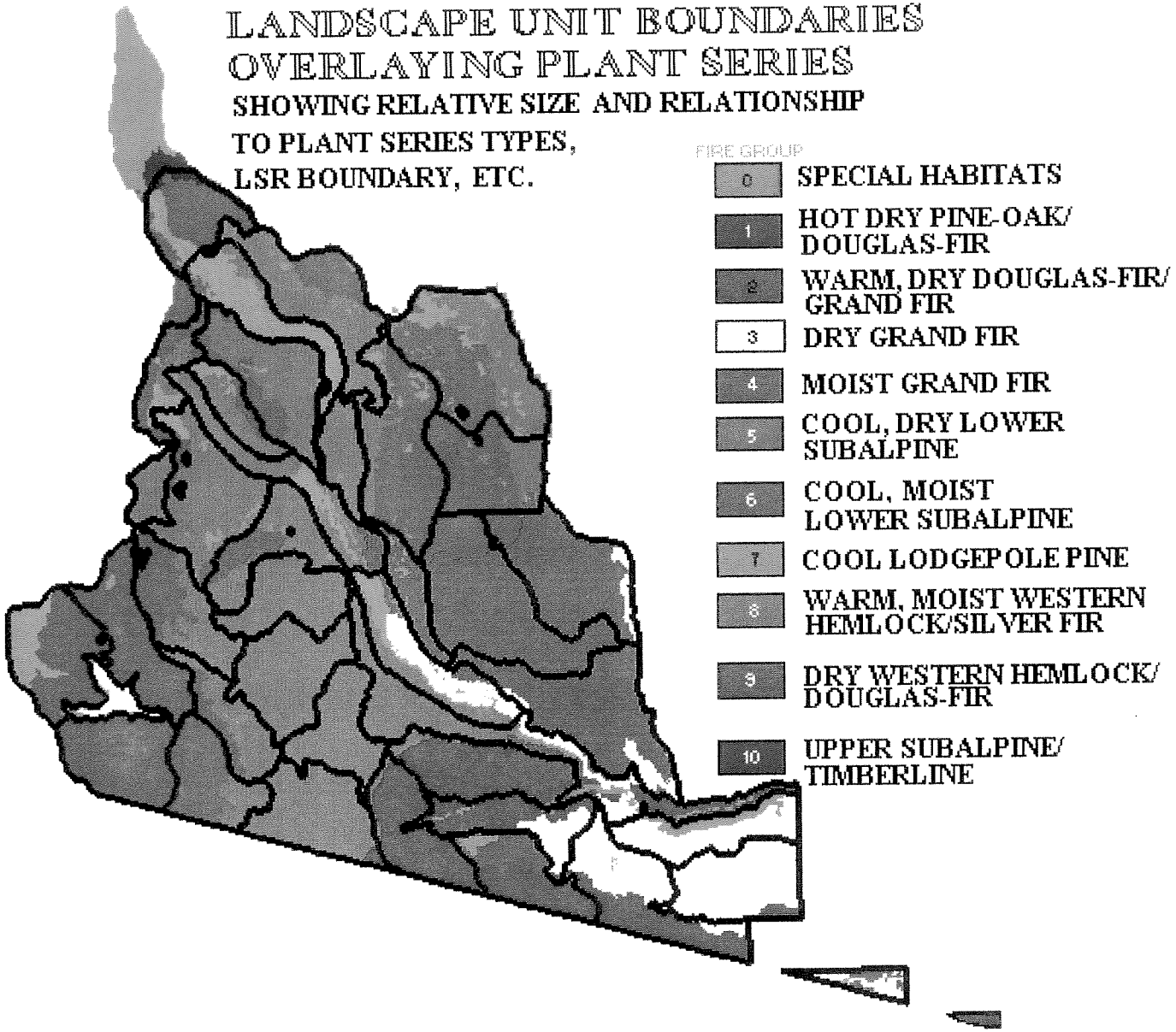
LANDSCAPE UNIT NAMES

WHITE RIVER LSR LANDSCAPE UNITS

OTHER WHITE RIVER STEWARDSHIP LU'S

LANDSCAPE UNIT BOUNDARIES OVERLAYING PLANT SERIES

SHOWING RELATIVE SIZE AND RELATIONSHIP TO PLANT SERIES TYPES, LSR BOUNDARY, ETC.



AGENTS OF RISK

Existing Disturbance Risk Factors To Current Stands:

This section discusses the current risks of various disturbances within White River stewardship area. The focus is on how the pre-1855 disturbance processes have changed and what might be the possible consequences. In addition, we introduce some "new" disturbance processes and discuss what risks they may pose to meeting LSR objectives. One of the primary management objectives within LSRs is to reduce the risk of major stand-replacing disturbances. *Fire risk is discussed in the Fire Management Plan in Part V of this document.*

Insect Risk: The risk for epidemic levels of insect attack and mortality is moderate in the Crest Zone and upper Transition Zone. The spruce budworm epidemic in the early 1990s resulted in some small and moderate sized patches of extensive mortality, scattered individual tree death, and top-kill. The top killed trees show signs of recovery, although some may still succumb to pathogens or another insect. Prolonged drought could trigger another spruce budworm outbreak, even in young stands dominated by host species. Douglas-fir is not a major host in the Crest Zone since it tends to break bud after the true firs. The risk of epidemic levels of mountain pine beetle is considered low. As the lodgepole pine in the areas of Fire Group Seven approaches age 100, the risk will increase significantly. We expect this will occur first in Abbott Burn. Epidemic levels of Douglas-fir bark beetle or western pine beetle are not expected (see map on the facing page for locations of Firegroups). The risk for epidemic levels of insect attack and mortality is moderate to high in the lower Transition Zone and Eastside Zone due to overstocking and predominance of true firs. Fire Group Three is at the highest risk. Insects likely to reach epidemic levels include spruce budworm, Douglas-fir bark beetle, and fir engraver beetle. Before 1855 epidemic levels of these insects were probably unlikely due to wider tree spacing and lack of hosts. We are unsure of the susceptibility of Douglas-fir to western spruce budworm before 1855. Douglas-fir bark beetle often follows western spruce budworm and is often the actual agent of tree death.

Western pine beetle is a special case in the lower Transition and Eastside zones. Few stands remain with high levels of ponderosa pine such that an epidemic seems unlikely. In the 1960s and early 1970s, drought and overstocking triggered an epidemic outbreak of western pine beetle north of White River. The large diameter ponderosa pine was salvaged. Further, ponderosa pine has been a preferred timber species in the lower elevations since 1855. Large pine trees are comparatively rare throughout the eastside of the Mt. Hood National Forest. Overstocking has significantly increased moisture stress, leaving most remaining large ponderosa pine at high risk of successful attack. Western pine beetle has been successfully attacking scattered individual trees for several years both north and south of White River.

Disease Risk: The root disease risk is similar to the insect risk discussed above. The risk is unnaturally high (outside the estimated range of natural conditions) in the lower Transition Zone due to changes in stocking levels and species compositions. Dwarf mistletoe is probably more widespread now than in the past. Smoke tends to reduce the viability of dwarf mistletoe seed, as well as fungi spores, and fire tended to burn off heavily infected lower limbs and trees. White pine blister rust has significantly reduced western white pine in the Crest Zone. The alternative hosts (*Ribes* spp.) are widespread and able to maintain the presence of the disease. Since much of the Crest Zone is unharvested and unroaded, no rust resistant trees have been planted. Western white pine apparently persists primarily as isolated individuals and small clumps. We do not know if the remaining trees have some genetic

resistance naturally. Western white pine maintains enough of a presence to regenerate in created openings. Blister rust may not be as much as a concern in the Transition Zone. The alternative hosts are not as widespread and dry conditions during sporing periods may reduce spore viability and disease spread.

Wind Risk: In the past, we believe that wind was not a source of major disturbances. It remains more of a minor disturbance, but roading and regeneration cutting have increased the incidence of blowdown. Both roads and past regeneration harvests create solid "walls" along their edges of trees using to deriving some support from the surrounding trees. Remove some of that support without providing some buffering mechanism and more trees blow down. Stands with high levels of root and stem disease are highly susceptible to blowdown and "snap off" (tree snaps above ground level). Not all roads are equally susceptible, however. The most susceptible road edges are those that parallel the prevailing winds. Most blowdown tends to occur under warm, wet conditions, such as occurs under a Pineapple Express (see discussion under Flood Risk), thus tends to occur from late fall to early spring.

Flood Risk: The risk of major floods is essentially unchanged since 1855. Hydrological models suggest that current harvest and road levels are sufficient to increase the number of smaller flood events. However, as the event size increases, the effects of harvest and roading on the flood event decrease. The outcomes of even small events have changed, however, due to human activities and infrastructure. We now have several roads and trails and most campgrounds in floodplains. Few, if any, culverts can pass the water associated with a 100 year flood event, much less the associated bedload and debris. The last major flood event known to have caused extensive damage was in 1964. Another fairly large flood event occurred in the 1970s, but we are uncertain if the damage was significant on National Forest lands.

Most major floods occur from rain-on-snow events and several rain-on-snow events occur in association with the event known as the "Pineapple Express". The Pineapple Express happens with warm, moist tropical air collides with cool, moist Arctic air. The Express triggers rising temperatures, heavy rainfall, and high winds. The magnitude of flooding depends on the duration of the Express and the amount of existing snowpack when the Express comes onshore. The most recent Pineapple Express occurred in November 1995 and lasted for one week. Rainfall was heavy, but snowpack was light. Peakflows on the Hood River and Clackamas River were considered the equivalent of a five year event, but high flows lasted several days, causing relatively high levels of damage. However, White River subbasin did not suffer nearly as much damage from landslides, slumps, and flooding as did Clackamas River or Hood River. We were not able to find estimates of the probability of a Pineapple Express occurring in any given year, but we know they do not occur every year. We also do not have descriptors of other synoptic weather that can trigger flooding.

Mudflow/Debris Torrent Risk: As with flooding, the risk of these events remains unchanged to the best of our knowledge. We know that White River Glacier is receding, but do not know at what size the glacier will be insufficient to trigger mudflows and debris torrents. As with flooding, we have mostly changed the consequences of these events. For example, State Highway 35 is a major travel route around Mt. Hood and it crosses White River about 3 miles below White River Glacier. Past mudflows have severely damaged or destroyed this bridge. We believe it can happen again. When washed out completely, the downstream damage levels to both the channel and facilities probably increases due to the presence of pieces of the bridge.

Beaver Ponding Risk: The risk to riparian areas from beaver ponding has decreased significantly due to the current low population of beaver. Beaver

populations within the National Forest boundary are low due to the lack of sufficient food sources. Beaver ponding did not and does not cause significant landscape level damage, even considering just the riparian landscape. Instead, beaver ponding can be an important agent of plant community diversity at the landscape level. It also serves as an agent of streamflow stability by storing water and raising the water table in the floodplain. Consecutive beaver ponds can reduce the changes in stream channel morphology resulting from smaller flood events as well as provide excellent fish habitat.

Land Management and Use Related Disturbance Risk: Modern human uses (i.e. primarily since 1900) have resulted in several new disturbance factors within the analysis area. Added disturbances related to human uses include grazing, roading, timber harvesting, and various recreational activities such as hiking, camping, skiing, mountain biking, and off-road vehicle use. Roading and timber harvesting have resulted in the most significant changes at the landscape level.

Grazing. The disturbances related to grazing probably peaked early in the century and have been declining since. In some cases of identified damage, we may be dealing with past impacts from overgrazing that still have not recovered or fully recovered. Sheep grazing was concentrated in the Crest Zone and areas were burned to retain pasturage, usually as brushfields. We have not been able to positively identify any persistent brushfields created by this activity within the stewardship area. Cattle grazing occurred and continues throughout the stewardship area, but at significantly lower numbers than before 1950.

No permitted grazing occurs in the Triangle or Byzandine LUs. In general, the White River LSR provides only transitory range, or grazing opportunities created by timber harvesting. Most meadows in the Crest Zone, such as Bonney and Palmateer Meadows are not grazed. In general, the grazing of cattle does not appear to pose a significant disturbance risk at the landscape level. There are localized problems in riparian areas related to trampling and streambank damage and Devil's Half Acre is heavily grazed at times. As the landscape moves toward the desired conditions, less and less transitory range will be available. We expect that cattle grazing will eventually become uneconomical and end in the absence of transitory range created by a major fire.

Recreation Uses. If the expansion of the Mt. Hood Meadows Ski Resort is approved, approximately 90 acres of high quality existing late-successional habitat within the northwestern tip of the LSR will be lost and the remaining interior habitat within the 200 acres of expansion into the White River LSR will be fragmented, including a major late-successional corridor between adjacent LSRs. A similar risk exists for about 25 acres of late-successional habitat if the Mt. Hood Meadows access road realignment is approved.

Most other disturbances related to recreation use affect riparian areas and animal use patterns. As recreational use levels increase, certain species tend to leave the area. High levels of recreation use, for example, will decrease deer and elk use and species such as wolverine will simply abandon the area. Wheeled vehicles, such as mountain bikes and off-road vehicles, tend to increase trail erosion since they lay down continuous tracks and most trails are not designed for these uses. An off-road vehicle planning effort is underway to identify a trail system and bring the routes up to standards that can support this use with minimal environmental effects. In addition, McCubbins Gulch OHV Area Plan includes the need to reconstruct trails to standards for this use. Trail construction and reconstruction efforts have already begun.

In terms of vegetation patterns, high use levels related to camping can result in the loss of certain species and reduction in others through trampling and compaction of sites. Downed wood and snag levels also tend to decrease significantly

due to removal for camp wood or as safety hazards. In general, the area affected includes the camping area and a radius of about one tree height around the area. If camping is uncontrolled through the use of design elements, the area affected tends to grow as use levels increase or campers spread out more to gain privacy or screening. Almost all developed and dispersed campsites are associated with water and riparian areas. Byzandine and Triangle LUs have no such sites and camping is limited by both this lack and the small size of the two triangles included. Instead, Byzandine LU suffers more for its use as an illegal firewood source and dump site than as a recreation site. Most recreation use in White River LSR occurs within the Wild and Scenic River boundary. Both the Wild and Scenic River Plan and White River Watershed Analysis identified several projects aimed at reducing the impacts associated with recreational use.

Roading. Roading causes a significant level of disturbance to riparian and aquatic ecosystems primarily due to the associated erosion. Allowable road densities within the Wild and Scenic River boundary, which incorporates much of White River LSR, have been set at 1.5 miles per square mile, a reduction from the levels originally allowed in the Mt. Hood Forest Plan. In addition, much of the Crest Zone within White River LSR is roadless. Outside of the wild and scenic corridor in the Transition Zone, Byzandine LU has few roads and Triangle LU in the Eastside Zone has no roads. Little or no new road construction is anticipated in the future. Instead, most efforts are expected to focus on road reconstruction to reduce impacts, and on road closure and obliteration. (See the table on page III-10 for a projection of future road densities based on desired infrastructure).

One exception is the Barlow Road National Historic District. Under the Historic District Plan Barlow Road will remain a primitive native surface road. Erosion will continue to be a problem in the foreseeable future in the steeper stretches. A seasonal CFR road closure during the winter and spring months was designed to reduce rutting from driving on the road surface when saturated. Compliance with the closure has been good so far. Rutting and erosion problems can still develop during wet years, such as 1995, since the road surface becomes saturated before the closure takes effect and/or remains saturated after the closure is ended in spring.

Potentially of greater concern to aquatic and riparian ecosystems from roads is culvert size and road maintenance. No culverts currently meet the 100-year flood requirement, although most meet the previous 50-year requirement. Culvert replacement has not begun. Since White River subbasin is a Tier 2 Key Watershed, it ranks below all Tier 1 Key Watersheds in receiving restoration funding. No funding is anticipated before FY98.

In addition, road maintenance funding has declined dramatically with the drop in timber sales. Funding is currently inadequate to maintain the existing road network including the drainage structures. Sediment reaching the riparian zone and streams is expected in increase over time as individual roads are not maintained. In addition, we can expect culverts to begin filling with sediment. The problem is most acute in the Crest Zone and somewhat acute in the upper Transition Zone. Culvert plugging does not appear to be very significant in the lower Transition Zone and Eastside Zone. Culvert plugging in the entire area is a lower risk than culvert plugging in other areas of the Mt. Hood National Forest, such as Hood River or Clackamas River basins.

Timber Harvesting. This activity has had the greatest impact on both upland and riparian areas by changing species compositions and landscape patterns. The typical landscape pattern before 1855 was one of large areas of similar species and structure interspersed with small areas of different species or structure. The National Forest Management Act (NFMA) was passed, in part, to address concerns over harvest unit size. This act generally restricts harvest unit

size to 40 acres in most areas. Although exceptions to size limitations were possible through the Regional Forester, unit size effectively has been restricted to 40 acres or less since the mid-1970s. The result is a fragmented landscape that is atypical of the characteristic landscape. The fragmentation has also caused serious problems in use and population levels of several late-successional and old growth dependent species since many of these species evolved under a landscape pattern of large, unfragmented blocks. In addition to fragmentation, many harvest units were planted to only one or two species, usually early seral species. This planting scheme is appropriate in the Eastside and lower Transition Zones since these areas have few tree species. The upper Transition Zone and Crest Zone, however, are naturally very diverse, with the exception of White River floodplain and Palmateer basin. Certain species; such as arthropods, fungi, and lichens; may prefer either a mixed conifer forest or certain species not selected for planting. Further, some plantations were planted with species atypical of the area. The effects of this change in tree species composition on soil organisms is unknown.

Prior to the mid-1980s, riparian buffers were very small to non-existent in clearcuts and shelterwoods. No riparian buffers were provided on intermittent streams. Since the mid-1980s riparian buffers have been provided on perennial streams, though the buffer widths varied and were less than the Riparian Reserve widths. White River Wild and Scenic River Plan closed the area within its boundary to programmed timber harvest. Much of the remaining area in White River LSR was also administratively withdrawn from harvest. The Forest Plan designated Triangle LU as a Special Old Growth Area (A7), withdrawn from programmed harvest. Byzandine LU was included in the programmed timber harvest calculations, but at reduced levels since it was designated as Deer and Elk Winter Range (B10). Most harvest activity has been concentrated in the Crest Zone of White River LSR north of White River.

LATE SUCCESSIONAL SPECIES ASSOCIATED WITH THE WHITE RIVER LSR

Amphibians, Macroinvertibrates and Fish:

Ninety-nine per cent of theWhite River LSR occurs within the White River sub basin, a Tier 2 Key Watershed (FEMAT). The subbasin originates from White River Glacier on Mt Hood, draining mostly east to south east, terminating at the confluence with the Deschutes River. This sub basin was recentlyanalyzed in White River Watershed Analysis (WRWA), August 1995, and is covered by the Northwest Forest Plan. White River LSR covers one fifth field watershed. Forty-three percent of the LSR is in Riparian Reserve designation, which mandates that in these areas management direction must also meet Aquatic Conservation Strategy objectives. Other documents that have significant direction for the LSR include; Columbia River Policy Implementation Guide (PIG), Mt. Hood National Forest Land and Resource Management Plan (LRMP) and White River Wild and Scenic River Plan (WRWSRP). Located within the WRWA report is site specific aquatic data that has been collected over several years by the Forest Service and other agencies, as well as interested publics. This document specifically addressed aquatic issues and analyzed them on current known data. The reader should use this assessment as a guide to management within the LSR, but consult the WRWA for site specific data. Below is a list of fish, macroinvertebrates and amphibians that inhabit or are thought to inhabit the LSR and their status:

SPECIES/DEPEND ON LSR?		NATIVE/Known In LSR?		STATUS
FISH				
Oncorhynchus mykiss gairdneri	No	Yes	Yes	Fs Sens., Or Sens.
Cottus spp.	No	Yes	Yes	
Salvelinus fontinalis	No	No	Yes	
Oncorhynchus mykiss spp.	No	No	Yes	
MACROINVERTEBRATES				
Apatania tavala	No	Yes	Yes	Fs Sens.
Eobrachycentrus gelidae	No	Yes	Yes	Fs Sens.
Rhyacophila unipunctata	No	Yes	Yes	Fs Sens.
Farula jewetti	No	Yes	Yes	Fs Sens.
AMPHIBIANS				
Dicamptodon copei	No	Yes	Yes	Or Sens.
Rana aurora	No	Yes	Yes	Or Sens.
Rana pretios	No	Yes	Yes	Fed Cand, Or Sens.
Rana cascadae	No	Yes	Yes	Fed Cand, Or Sens.
Ascaphus truei	No	Yes	Yes	Fed Cand, Or Sens.

Riparian Condition:

Current conditions of the riparian areas of the LSR show various signs of human impacts. These conditions have been exacerbated by recentdrought that have ultimately caused alterations to pattern, amount and distribution of riparian conditions.

Current human impacts to the riparian areas in the LSR and surrounding landscape are logging (both upslope and in riparian reserves), grazing, water withdraws for irrigation, lake use in various forms, OHV use, camping (dispersed and formal), existing roads, trails and hiking.

Within the LSR there are no C-3 (FEMAT) or TES (FWS) aquatic species known to exist. Redband/inland trout are indigenous to the LSR and watershed, are genetically distinct from those in the Deschutes River and are unique among other redband/inland populations east of the Cascades (Currens et al. 1990). They are also a Forest Service Region 6 and State of Oregon Sensitive Species. Brook trout and other non-native rainbow that were released within the basin are thought to be competing with native redband/inland trout for food and various habitat components, possibly displacing or eliminating them from stream reaches. It is also believed there is little refugia that is left within the LSR for

pure redband/inland trout populations. Within the LSR, there are four sensitive and Federal Candidate caddisflies occurring in the Iron Creek drainage. They may inhabit other drainages in that area of the subbasin, however data is limited. It is believed that amphibians potentially occur within all of the drainages of the LSR. This also includes perennial meadows, ponds lakes and springs/seeps. In general, amphibians require good water quality and sediment levels within the range of natural variability combined with some form or amount of feeding and hiding cover. However, there are no current amphibian surveys to identify existing range or population numbers. Current direction is to identify survey protocol to bridge this data gap (See Part V, Monitoring; (see table 18, Appendix C, pg. 41, White River Watershed Analysis for documented sightings).

By identifying specific riparian indicators, measuring them and relating them to historic levels, we can identify possible areas of restoration and possible areas of important refugia that can provide insight to resiliency and function. These indicators, or triggers, are:

- Sediment,
- Instream LWD and SWD,
- Stream temperature and
- Canopy closure.

We are not trying to simplify dynamic processes and systems but trying to look at a few indicators that will provide a framework that highlights possible hotspots. Once an area has been identified, further analysis will be warranted to see if these systems are truly operating within their natural ranges. Proposed future work within Riparian Reserves must met all eight standards and guides for both the ACS and LSR management.

Triggers for Management Action

- ***Sediment:*** Excessive instream sediment can be assessed from two different points; *bank stability* and *amount and size of bed load particles present in riffles.* Size and percent composition thresholds came from WRWA and were recommendations for amendments to the LRMP; bank stability of equal to or greater than 95 percent over the streams entire length and Wolman pebble counts in riffle areas that are equal to or less than 20 percent particle size of six millimeter or less during the breeding season. Redband/inland trout spawn in the spring and their fry are out of the gravel before glacial till increases stream turbidity.
- ***Temperature:*** This is important in that excessive temperature limits trout and amphibian production and survival. We do not have enough current data to judge if current conditions are outside the RNC. *We postulate that if we keep canopy closure within the RNC and do not significantly alter the hydraulic pattern of a drainage that the temperature will be within its natural range.* This may be difficult due to the amount of water that is taken for irrigation purposes. The White River system is thought to have significantly low temperatures due to the amount of spring water and the glacial source. Consequently, we can not use this as a trigger at the time this document is written but it may be used in the future once baseline monitoring is complete.
- ***Existing large and small wood within the stream channel and floodplains:*** Large wood is characterized by having minimum diameter of 20 inches and 35 feet long, while small wood having a diameter of 12 inches to 20 inches and a minimum length of 35 feet. The identified RNC within the LSR is:
  - LWD 38-103 pieces/mile, ave. 57.
  - SWD 58-284 pieces/mile, ave. 180.

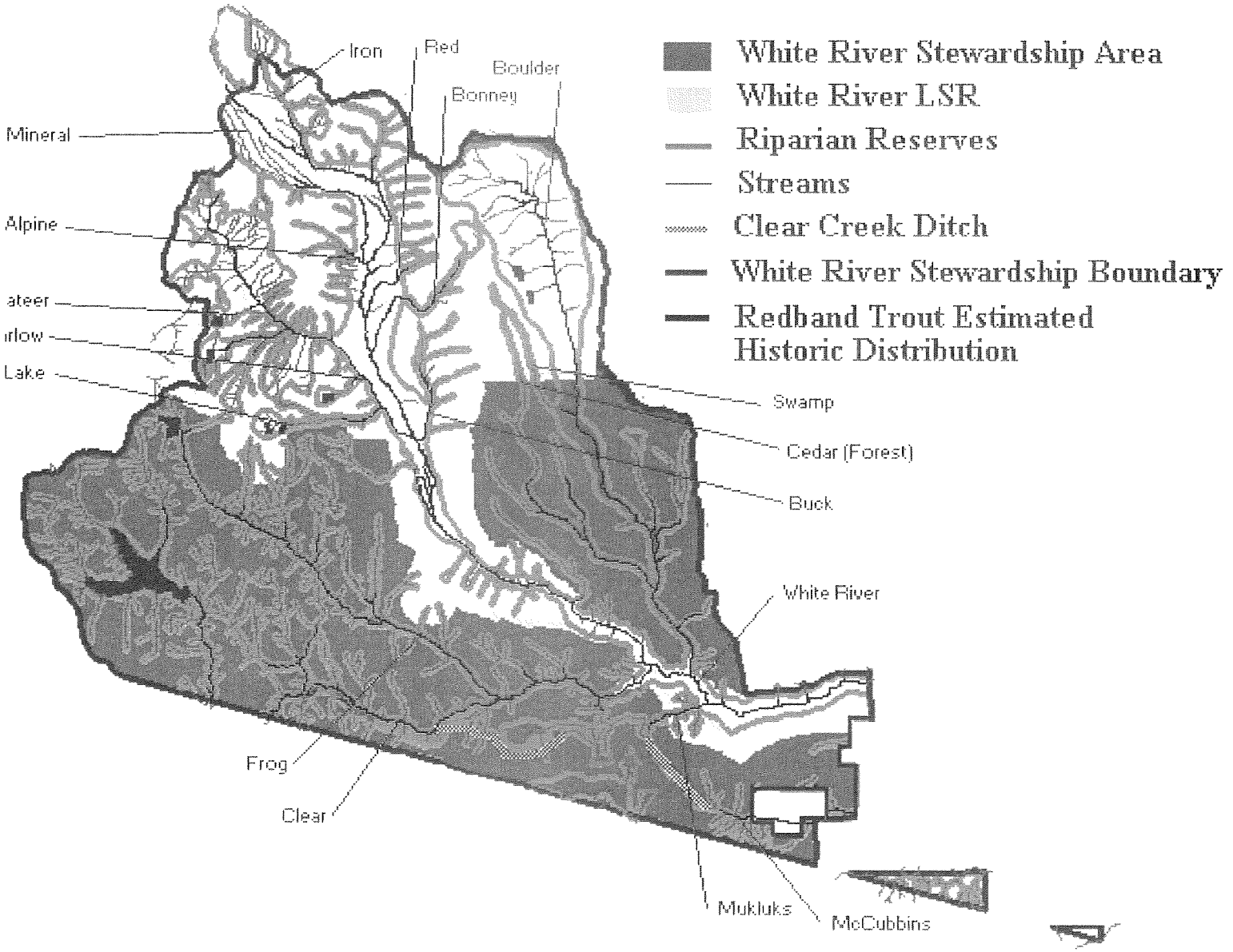
The RNC for the LSR came out of White River Watershed Analysis. Data from streams within the Badger Wilderness were analyzed for existing LWD and SWD. It was noted that these numbers may be excessive because the stand conditions within the wilderness are outside the RNC because of fire suppression and other management. Comparing these ranges with reaches of streams with minimal human impacts (such as selected reaches of Barlow Creek or upper reaches of Boulder Creek) shows that in fact they do fall within the identified range. These numbers are relevant for all the streams in the LSR except White River mainstem, due to its glacial origins. In these reaches, debris torrents dominated the landscape, removing most existing wood for varying amounts of time.

- ***Riparian canopy closure:*** Meeting minimum canopy closure standards will limit stream heating during high summer ambient temperatures and provide food and leaf litter for terrestrial and aquatic primary production. This is most important in stands that have a high amount of cottonwood present, providing large amounts of seasonal litter. The following are the minimums as suggested in the WRWA:

- 50% Canopy closure in riparian areas in the Eastside Zone.
- 70% Canopy closure in riparian areas in the Transition and Crest Zones.

When projects are to be planned in riparian reserves, goals and objectives must reflect the importance of retaining or improving stand and habitat conditions within these areas. There should be no measures taken that degrade habitat unless such measures can improve habitats in the long term and are mitigated in the short term.

STREAMS AND RIPARIAN RESERVES



Plants:
Vascular plant species closely associated with old-growth forests are listed in the table on the next two pages. The majority of these species are common and typically wide spread in the habitat conditions listed They have been reported in a large number of surveys and do not warrant a detailed discussion. However those species that have an * in the criteria column have been infrequently reported and are discussed below.

Old-growth species that are not currently of management concern that have been infrequently reported from the White River LSR are:

- **Western maiden-hair fern** has been reported once from a seepage area along the Catalpa trail on the lower slope of Barlow Butte and also in the steep gorge area near the forest's eastern border. It is common, westside , on warmer and more moist sites than are typical here. It is probably growing in a few more locations within the LSR.

- **Alaskan yellow cedar** was found in a flat wet area on the Bonney Butte side of the river below highway 35, west of forest road 48. This tree is more common north of here but is found in clumps elsewhere on the forest much like Engleman spruce. The nearest known site is at Government Camp with other clumps along the south fork of the Clackamas River. The tree here may be no more than a single stray occurrence. However the area has not been widely surveyed so more trees may be present.

- **Gnome plant** grows underground and is associated with mycorrizal fungi. It is only apparent when it flowers which means it is identifiable for a short time and is likely more common, though uncommonly seen. Habitat descriptions for the plant say it grows in deep duff so it is probably more common on the lower slopes in older stands.

- **Fringed pinesap**, is related to and grows like gnome plant, it is also smaller and often barely protrudes from the duff and is therefore, like gnome plant, probably more common. This species is on concern lists elsewhere but not in Oregon or Region 6. It has been found in the vicinityof Klinger's camp.

- **Yerba buena** was not recorded but based on memory, was found in a western hemlock area above forest Road 48 near Highway 35. In personal conversation, the Barlow botanist remembers seeing the species several times on the Barlow district, but a search of survey records from Bear Springs did not find any reports by any of the botanists.

- **Red huckleberry** is rather uncommon here, probably because it is not very cold hardy relative to the prevailing climate. However it was found along Catalpa trail on the lower slope of Barlow Butte and along the White River ski trail.

TABLE OF VASCULAR PLANT SPECIES ASSOCIATED WITH OLD GROWTH FORESTS

SPECIES	COMMON NAME	HABITAT	CRITERIA	FOREST	ONHP STATUS
Achlys triphylla	Vanilla Leaf	Moist	1		
Adenocaulon bicolor	Trail Plant	Mesic	1		
Adiantum pedatum	Western Maidenhair Fern	Wet	1*		
Anemone deltoidea	Threeleaf Anemone	Moist	1		
Arnica latifolia	Mountain Arnica	Cool	1		
Asarum caudatum	Wild Ginger	Moist	1		
Botrychium minganense	Victorin's Grape Fern	Moist, Wet	2*	S	2
Botrychium montanum	Mountain Grape Fern	Moist, Wet	3*	S	2
Calypso bulbosa	Fairy-Slipper Orchid	Mesic	1		
Chamaecyparis nootkatensis	Alaska Yellow Cedar	Cold, Wet	1*		
Chimophila umbellata	Common Pipsissiwa	Mesic, Dry	1		
Clintonia uniflora	Queen's Cup Beadlilly	Cool, Moist	1		
Corallorhiza maculata	Pacific Coral Root	Mesic, Dry	1		
Disporum hookeri	Fairy Bell	Moist	1		
Erythronium montanum	Avalanche Lilly	Cold, Deep Snow	1		
Gaultheria ovatifolia	Oregon Wintergreen	Cool, Mesic	1		
Goodyeara oblongifolia	Rattlesnake Plantain	Moist To Dry	1		
Gymnocarpium dryopteris	Oak Fern	Moist	1		
Habenaria saccata	Slender Bog Orchid	Wet	1		
Habenaria unalascensis	Alaska Rein-Orchid	Dry	1		
Hemitomes congestum	Gnome Plant	Moist, Deep Humus	2*		
Hypopitys monotropa	Pinesap	Moist	1		
Listera convallarioides	Broad-Lipped Twayblade	Moist	1		
Listera cordata	Twayblade	Moist	1		
Lysichiton americanum	Skunk Cabbage	Wet	1		
Menziesia ferruginea	Fool's Huckleberry	Cool	1		
Mitella breweri	Brewer's Mitrewort	Moist	1		

SPECIES	COMMON NAME	HABITAT	CRITERIA	FOREST	ONHP STATUS
Monotropa uniflora	Indian Pipe	Moist	1		
Pleuricospora fimbriolata	Fimbriate Pinsap	Moist	3*		
Pterospora andromedea	Woodland Pinesap	Moist ,Dry	1		
Pyrola asarifolia	Alpine Pyrola	Moist, Dry	1		
Pyrola picta	White Vein Pyrola	Moist, Dry	1		
Pyrola secunda	One-Sided Pyrola	Cool, Dry	1		
Pyrola uniflora	Single Flowered Pyrola	Moist	1*		
Rubus lasiococcus	Dwarf Bramble	Cool	1		
Rubus pedatus	Fiveleaved Bramble	Cool	1		
Satureja douglasii	Yerba Buena	Moist, Dry	1*		
Smilacena racemosa	Solomon's Seal	Moist	1		
Smilacena stellata	Star-Flowered Solomon's Seal	Moist	1		
Streptoptus amplexifolius	Clasping Leaved Twisted-Stalk	Moist	1		
Taxus brevifolia	Pacific Yew	Moist	1		
Thuja plicata	Western Red Cedar	Moist	1		
Tiarella trifoliata & unifoliata	Coolwort Foam Flower	Moist	1		
Trillium ovatum	Wake-Robin	Moist, Mesic	1		
Vaccinium membranecum	Thin-Leaved Huckleberry	Cool, Cold	1		
Vaccinium ovalifolium	Oval-Leaved Huckleberry	Cool	1		
Vaccinium parvifolium	Red Huckleberry	Moist, Warm	1*		
Vancouveria hexandra	Inside-Out Flower	Moist, Warm	1		

SAT criteria: From The Report of the Scientific Analysis Team , table 5A, and appendix 5B. Criterion 1; species which are statistically significantly more abundant in old growth forests than in pole or mature stands, in any part of their range.

* Designates a species infrequently reported from this LSR. Criterion 2; species which show an association with old-growth forest but not necessarily significantly so. Criterion 3, species associated with old-growth forest and are on a state, federal, or Region 5 or 6 list. For full description of criteria see page 256 of SAT report.

S= Mt. Hood and Region 6 sensitive plant.

2= Oregon Heritage Program list 2 species. Threatened or endangered in Oregon but more common elsewhere.

Habitat: Site conditions commonly associated with these species.

Plant Species of management concern or special interest:

Grape ferns are the only species of management concern found in the White River LSR that were also listed as associated with old-growth. Victorin's grape fern is a doubtful occurrence and is probably a misidentified mountain grape fern. This a taxonomically difficult group. They have been located along tributaries along the middle section of the White River, above the gorge, associated with cedar and deep shade. While there are several other occurrences just north of here on the Barlow district the sensitive species of grape fern have not been on found on any other part of Bear Springs district despite intensive searches by several botanists.

Sierra onion and **Cascade rock crest** grow near the top of an open area near the crest of Barlow Butte. The habitats are not likely to be disturbed by management actions due to the steep ground and marginal site conditions. They are both inventory species and are not protected. They are distant from other populations and are probably genetically isolated.

Steer's head, cut-leaved daisy, Lewis's monkey flower, spiny gooseberry, American sawwort, and **buttercup-leaved suksdorfia** all are associated with the same openings as the **Sierra onion** and **Cascade rockcress** grow a little lower down as part of the meadow community. This seems to be a refugia for several species that are uncommon in this area. Except for Lewis's monkey flower in riparian areas these plants do not normally grow under a forest canopy. Lewis's monkey flower is an uncommon pink flowered population and the cut-leaved daisy is an uncommon rayless variety that might qualify as a separate taxon in future studies. The steer's head flowers at the edge of retreating snowbanks in early spring. None of these species is on a concern list for Oregon or region 6 but they do demonstrate that these openings are unique habitats, uncommon in this area. Another plant uncommonly reported on the forest, *Eupatoriumn occidentale* , boneset or western eupatorium was found just over the ridge from this area in a very rocky site.

Fir clubmoss and **stiff club moss** are both dispersed by spores and are found in a couple of wet sites along the White River. While both are uncommon east of the Cascade crest they are probably here as a result of the special conditions resulting from the landform that channels weather down the drainage. These populations probably do not interact with the west side populations but are a result of wind dispersal of the very light spores.

Creamy stick-seed was found on the south side of the White River canyon near the east boundary of the forest. The identification is tentative as the fruits of the plant were not mature enough to make a positive determination. It was growing in a rocky area with a rather open conifer overstory within the wild and scenic river corridor.

Rock onion and **umbellate spring beauty** were found in the small triangle on very east edge of the forest. Rock onion grows in shallow rocky soil on a north slope on the very north edge of the area and is common in similar contiguous habitat but uncommon elsewhere. Umbellate spring beauty grows in loose rock with little soil, just above a little ravine in the point of the triangle. It is also known from the Steen's mountains. These both appear to be naturally isolated populations. The only known populations on the forest of *Lewisia rediviva* (bitter root) and *Artemisia tripartita* (cut-leaf sage) are found in this area.

TABLE OF VASCULAR PLANTS NOT ON OLD GROWTH LIST BUT WITH OTHER SPECIAL STATUS OR CONCERN				
SPECIES	**COMMON NAME**	**FOREST STATUS**	**ONHP STATUS**	**OTHER**
Allium campanulatum	Sierra Onion	I	4	
Allium macrum	Rock Onion	I	4	
Arabis furcata	Cascade Rockcress	I	4	
Claytonia umbellata	Umbellate Spring Beauty	I	4	
Dicentra uniflora	Steer's Head			U
Erigeron compositus var. compositus	Cut-Leaved Daisy			U
Hackelia diffusa var. cottonii	Creamy Stickseed	I	4	
Huperzia occidentalis	Fir Club-Moss	S	2	
Ligusticum canbyi	Canby's Lovage			U
Lycopodium annotinum	Stiff Club-Moss	I	4	
Mimulus lewisii	Lewis's Monkey Flower			U
Ribes watsonianum	Spiny Gooseberry			U
Saussurea americana	American Sawwort			U
Suksdorfia ranunculifolia	Buttercup-Leaved Suksdorfia			U

Forest status: I= Inventory. No protection or mitigation is required for "inventory list" species; they are reported to the Oregon Heritage Data Base. S= Sensitive. These are species on the Region 6 sensitive species list and are accorded protection and mitigation.

ONHP status: Oregon Heritage Program status as of August 1993. 2= List 2 contains species which are threatened, endangered or possibly extirpated from Oregon, but are more common or stable elsewhere. 4= List 4 contains taxa which are not currently threatened or endangered. It includes taxa which are very rare but are currently secure, as well as taxa declining in numbers but are too common to be proposed as threatened or endangered. This is equivalent to the Watch List of previous editions.

Other: These are species of local or special interest and but which have no special status.

Table C-3 Plant Species
(From NWFP Record of Decision standards and guides):

The fungus, noble polypore, *Oxyporus nobilissimus,* listed as rare and endangered and survey strategies 1,2 and 3 in table C-3 of the Record of Decision Standards and Guidelines page C-54, was found just west of the White River drainage near highway 35. There is good reason to expect it in the LSR on old living or dead noble fir. Since the species is almost always found on noble fir and noble fir is an early successional species that does not reproduce under a canopy, there needs to be some disturbance to maintain noble polypore in the ecosystem. If the existing plantations, near highway 35 and in other areas suitable for noble fir, have a high proportion of noble fir, the need will be met for at least a couple hundred years.

A rare gilled mushroom, *Cortinarius wiebeae* was found outside the LSR near the Camas Prairie corral. The species may occur in the LSR but would be difficult to find as it grows under the forest litter and may not be visible without scrapping back some of the litter, provided that it is producing mushrooms at the time of search.

There are no known sites of C-3 lichens, bryophytes or vascular plants documented within this LSR. A report based on the 1994 ROD C-3 fungi, bryophytes, lichens and vascular plants is included in the analysis file. It addresses the potential for these species to occur in this as well other eastside watersheds.

There do not appear to be any late successional plant, lichen or fungi species that have been extirpated from this LSR.

The White River LSR is separated from the Badger Wilderness by Bonney Butte and Boulder Creek. Both LSR and the wilderness should function as sources of dispersal and refugia. High ridges may interfere with dispersal that occurs within the specific habitats but distances are short for wind and animal born dispersal. Some dispersal within contiguous habit can occur over the lower saddles and passes as well as around the south end of the ridge where the contours allow connection of similar elevation bands. This is especially important to plants that do not disperse by wind or larger wide ranging animals.

There is also some connection to the west over Barlow Pass and around the lower end of Frog Lake Buttes on the south side. While there has been considerable harvest along this corridor, loosely defined as the route of forest road 43, there is still some connectivity into the Clear Creek area and Salmon River drainage. The crest of the Cascades is rather low in that area which reduces its effect as a barrier to dispersal.

The wind patterns are basically westerly which affects the dispersal of pollen and spores as well as wind distributed seed. However there is proof of surprising seed delivery such as ponderosa pine at 5,000 ft on Barlow ridge.

Animals: The following tables list species known or suspected to use habitat within the White River LSR. They also list those known or suspected to be extripated from habitats within the LSR.

Please refer to the key on this page to help with interpretation of the tables.
See page II-4 for more complete **stand structure definitions** and the map on page IV-4 for **Landscape Unit** locations.
See page IV-23 for the **Terrestrial Guild Key** and IV-26 for the **Aquatic Guild Key**.
We apologize for the complexity of the tables, but without the codes, these tables would become a document in themselves!

Tables Key

- SI=Stand Initiation
- SE=Stem Exclusion
- MSE=Mature Stem Exclusion
- UR=Understory Reinitiation
- CA=Cathedral
- LS=Late Seral Tolerant Multi-story
- OM=Open Intolerant Multi-story
- OP=Open Park-like

- WM=Wet Meadow
- MM=Moist Meadow
- DM=Dry Meadow
- RO=Rock Outcrop
- TA=Talus
- NF=Non-Forest
- ANY=Any structural stage

- **PRESENCE**=Status of the Species within the LSR
- KR=Known Resident
- KV=Known Visitor (use is for more than migration)
- KM=Known Migrant (only)

- SRVL=Suspected Resident very low likelyhood
- SRL=Suspected Resident low likelyhood
- SRM=Suspected Resident moderate likelyhood
- SRH=Suspected Resident High likelyhood
- SMVL=Suspected Migrant very low likelyhood
- SML=Suspected Migrant low likelyhood
- SMM=Suspected Migrant moderate likely-hood
- SMH=Suspected Migrant high likelyhood
- Likely?= likelyhood unknown
- SREXT=Suspected Resident Extirpated

- Guild* = Categorization estimated

Late Successional Associated Species Known or Suspected to Occur in the White River LSR:

SPECIES	COMMON NAME	GUILD	VEGETATION STRUCTURE TYPE	PRESENCE	LS/CLAS	J-2	C3	PROP C3
ACGE	Northern Goshawk	TLMLT	MSE CA OP LS	KR	Y			
AISP	Wood Duck	LKRVARF	LAKE/RIVER	SRM	Y			
AMGR	Northwestern Salamander	TSGG	ANY	SRM	Y			
ANFE	Clouded Salamander	TSGG	ANY	SRM	Y			
ASTR	Tailed Frog	RIVA	RIVER	KR	Y	Y		
BAWR	Oregon Slender Salamander	TSGG	ANY	SRM	Y	Y		
BUAL	Bufflehead	LKRVARG	LAKE/RIVER	SML	Y			
BUIS	Barrow's Goldeneye	LKRVARF	LAKE/RIVER	SML	Y			
CAGU	Hermit Thrush	TSGG	ANY	KR	Y			
CEAM	Brown Creeper	TSGSL	MSE LS CA OM OP	SRM	Y			
CHVA	Vaux's Swift	TSGG	ANY	KR	Y			
CLCA	Western Red-Backed Vole	TSGSL	SE MSE LS CA OM OP	SRM	Y			
COAU	Northern Flicker	TMGG	ANY	KR	Y			
DICO	Cope's Giant Salamander	LKRVA	LAKE/RIVER	KR	Y	Y		
DITE	Pacific Giant Salamander	LKRVARF	LAKE/RIVER	KR	Y			
DRPI	Pileated Woodpecker	TLMLT	MSE LS CA OM OP	KR	Y			
EMHA	Hammond's Flycatcher	TSGG	ANY	KR	Y			
EPFU	Big Brown Bat	TMC	ANY	SRM	Y			
GLGN	Northern Pigmy-Owl	TSGG	ANY	KR	Y			
GLSA	Northern Flying Squirrel	TSPLT	MSE LS CA OM OP	KR	Y			
HALE	Bald Eagle	LKRVARG	LAKE/RIVER	KV, KM	Y			
HIHI	Harlequin Duck	RIVARF	RIVER	KR	Y			
LACI	Hoary Bat	TMGG	ANY	SRM	Y	Y		
LANO	Silver-Haired Bat	TMC	ANY	SRM	Y	Y		Y
LOPCU	Hooded Merganser	LKRVARF	LAKE/RIVER	SMM	Y			
LOXCU	Red Crossbill	TSGG	ANY	KR	Y			
MAAM	Marten	TLMLT	MSE LS CA OM	KR	Y	Y		
MAPE	Fisher	TLMLT	MSE LS CA OM OP	KR	Y	Y		
MERME	Common Merganser	LKRVARF	LAKE/RIVER	KR	Y	Y		
MYEV	Long-Eared Myotis	TMGG	ANY	SRM	Y	Y		Y
MYOCA	California Myotis	TMC	ANY	SRM	Y			
MYOCI	Western Small-Footed Myotis	SPCL	TA NF RO	SRL	Y			
MYVO	Long-Legged Myotis	TMGG	ANY	SRM	Y	Y		Y
MYYU	Yuma Myotis	TMGG	ANY	SRM	Y			
NEGI	Shrew-Mole	TSPLT	MSE LS CA OM	SRH	Y			
OTFL	Flammulated Owl	TSC	ANY	SRM	Y			
PARU	Chestnut-Backed Chickadee	TSGG	ANY	KR	Y			

SPECIES	COMMON NAME	GUILD	VEGETATION STRUCTURE TYPE	PRESENCE	LS/CLAS	J-2	C3	PROP C3
PEMA	Deer Mouse	TSGG	ANY	KR	Y			
PHELO	Red Tree Vole	TSPLT	MSE LS CA OM OP	SRL	Y	Y	Y	
PIAL	White-Headed Woodpecker	TMGG	ANY	SRM	Y			
PIAR	Black-Backed Woodpecker	TMMLT	MSE LS CA OM	KR	Y	Y		
PITR	Three-Toed Woodpecker	TMMLT	MSE LS CA OM OP	SRH	Y			
PIVI	Hairy Woodpecker	TSGG	ANY	KR	Y			
RESA	Golden-Crowned Kinglet	TSGG	ANY	SRM	Y			
SICAN	Red-Breasted Nuthatch	TSGG	ANY	KR	Y			
SICAR	White-Breasted Nuthatch	TSGG	ANY	KR	Y			
SIPY	Pygmy Nuthatch	TSGG	ANY	KR	Y			
SPHTH	Williamson's Sapsucker	TSGSL	SE MSE LS CA OM	KR	Y			
SPRU	Red-Breasted Sapsucker	TSGG	ANY	KR	Y			
STOCCA	Northern Spotted Owl	TLMLT	MSE LS CA OM	KR	Y			
STRNE	Great Gray Owl	TLC	ANY	KV, SRH	Y	N		Y
STVA	Barred Owl	TLMLT	MSE LS CA OM	KR	Y			
TADO	Douglas' Squirrel	TSGG	ANY	KR	Y			
TAGR	Rough-Skinned Newt	TSGG	ANY	KR	Y			
TATO	Townsend's Chipmunk	TSGG	ANY	KR	Y			
TRTR	Winter Wren	TSGG	ANY	SRH	Y			
VIGI	Warbling Vireo	TSGG	ANY	KR	Y			
WIPU	Wilson's Warbler	TSGG	ANY	KR	Y			

Note: Species listed as occupying OP or OM (Open Park-like or Open Multi-story) stands **and** species listed as occupying LS (Late Seral Tolerant Multi-story) stands are also likely to be found in FEM structures (Fire Exclusion Multi-story). Habitat is in rapid decline for all the above species in FEM stands but currently it is more suitable for the species NOT dependent on **open** Ponderosa pine or Douglas-fir dominated stands.

Terrestrial Guilds	Patch Configuration	Home Range	Structural Stage	Guild	Patch Configuration	Home Range	Structure Stage
TSPO	Patch	Small	Open	TMPO	Patch	Medium	Open
TSPST	Patch	Small	Small Tree	TMMO	Mosaic	Medium	Open
TSPLT	Patch	Small	Large Tree	TMMLT	Mosaic	Medium	Large Tree
TSMO	Mosaic	Small	Open	TMGG	Generalist	Medium	All
TSMST	Mosaic	Small	Small Tree	TLMO	Mosaic	Large	Open
TSGOS	Mosaic	Small	Open/Small Tree	TLMLT	Generalist	Large	Large Tree
TSGSL	Generalist	Small	Small/Large Tree	TLGG	Contrast	Large	All
TSGG	Generalist	Small	All	TSC	Contrast	Small	Contrast
TLC	Contrast	Large	Contrast	TMC	Contrast	Mosaic	Contrast

LOCATIONS OF LATE SUCCESSIONAL SPECIES WITHIN THE WHITE RIVER LSR

Species	Common Name	Presence	LUs Observed	LUs Habitat	Vegetation Type
ACGE	Northern Goshawk	KR	Canyon	All Except Outwash	MSE CA LS OP
AISP	Wood Duck	SRM		Outwash, White, Red, Canyon,	LAKE/RIVER
				Little Boulder, Catalpa, Twin,	
				Windy, Mustang	
AMGR	Northwestern Salamander	SRM	Windy, Catalpa	Barlow Bt., Bonney, Buck, Little	ANY
				Boulder, Mt. Hood, Outwash, Twin,	
				T-Twin, Barlow Rd, Ridge, Iron,	
				Red, White, Palmateer	
ANFE	Clouded Salamander	SRM		All Except Byzandine And Triangle	ANY
ASTR	Tailed Frog	KR	Barlow Bt., Bonney, Buck,	Catalpa, Palmateer, Red, Ridge, T-	RIVER
			Little Boulder, Mt. Hood, Outwash	Twin, Twin, Windy, Iron, Mt. Hood	
BAWR	Oregon Slender Salamander	SRM		All Except Triangle And Byzandine	ANY
BUAL	Bufflehead	SML		Outwash, White, Red, Canyon,	LAKE/RIVER
				Catalpa, Twin, Windy, Mustang	
				Little Boulder	
BUIS	Barrow's Goldeneye	SML		Outwash, White, Red, Canyon,	LAKE/RIVER
				Catalpa, Twin, Windy, Mustang	
				Little Boulder	
CAGU	Hermit Thrush	KR		All	ANY
CEAM	Brown Creeper	SRM		Mustang, Canyon, White, Byzandine,	MSE CA LS OM OP
				Triangle	
CHVA	Vaux's Swift	KR		All Except Byzandine And Triangle	ANY
CLCA	Western Red-Backed Vole	SRM		All Except Byzandine And Triangle	SE MSE CA LS OM
COAU	Northern Flicker	KR		All	ANY
DICO	Cope's Giant Salamander	KR	Barlow Butte, Barlow Rd, Bonney,	Catalpa, Palmateer, Ridge, T-Twin,	LAKE/RIVER
			Buck, Iron, Little Boulder, Outwash	Twin, Windy	
			Red		
DITE	Pacific Giant Salamander	KR	Barlow Rd, Bonney, Iron, Outwash,	Catalpa, Palmateer, Red, Ridge,	LAKE/RIVER
			Red, T-Twin	Windy, Barlow Butte, Buck, Twin	
DRPI	Pileated Woodpecker	KR	Nonrecorded Sightings Common	All Except Outwash	MSE CA LS OM OP
EMHA	Hammond's Flycatcher	KR		All Except Byzandine And Triangle	ANY
EPFU	Big Brown Bat	SRM		All	ANY
GLGN	Northern Pigmy-Owl	KR		All Except Outwash	ANY
GLSA	Northern Flying Squirrel	KR	Barlow Butte	All	MSE CA LS OM
HALE	Bald Eagle	KV, KM		Outwash, White, Red, Canyon,	LAKE/RIVER

Species	Common Name	Presence	LUs Observed	LUs Habitat	Vegetation Type
HALE	Bald Eagle (Cont.)			Catalpa, Twin, Mustang,	
				Windy, Little Boulder	
HIHI	Harlequin Duck	KR	Barlow Rd, White, Red	Outwash	RIVER
LACI	Hoary Bat	SRM		All	ANY
LANO	Silver-Haired Bat	SRM		All	ANY
LOPCU	Hooded Merganser	SMM		Outwash, Red, Barlow Rd, White,	LAKE/RIVER
				Mustang, Canyon	
LOXCU	Red Crossbill	KR		All	ANY
MAAM	Marten	KR		All Except Triangle	MSE CA LS OM
MAPE	Fisher	KR		All Except Triangle	MSE CA LS OM OP
MERME	Common Merganser	KR		Outwash, Red, Barlow Rd, White,	LAKE/RIVER
				Mustang, Canyon	
MYEV	Long-Eared Myotis	SRM		All Except Byzandine And Triangle	ANY
MYOCA	California Myotis	SRM		All	ANY
MYOCI	Western Small-Footed Myotis	SRL		All	TA NF RO
MYVO	Long-Legged Myotis	SRM		All Except Byzandine And Triangle	ANY
MYYU	Yuma Myotis	SRM		All	ANY
NEGI	Shrew-Mole	SRH		All Except Byzandine And Triangle	MSE CA LS OM
OTFL	Flammulated Owl	SRM		Canyon And Mustang	ANY
PARU	Chestnut-Backed Chickadee	KR		All	ANY
PEMA	Deer Mouse	KR		All	ANY
PHELO	Red Tree Vole	SRL		T-Twin, Twin, Palmateer, Barlow Rd,	MSE CA LS OM
				Ridge, Catalpa, Barlow Butte, Iron,	
				Mt. Hood, Bonney, Windy	
PIAL	White-Headed Woodpecker	SRM		Canyon, Mustang, Byzandine,	ANY
				Triangle	
PIAR	Black-Backed Woodpecker	KR		T-Twin, Twin, Palmateer, Barlow Rd,	MSE CA LS OM
				Ridge, Catalpa, Barlow Butte, Iron,	
				Bonney, Windy	
PITR	Three-Toed Woodpecker	SRH		T-Twin, Twin, Palmateer, Barlow Rd,	MSE CA LS OM OP
				Ridge, Catalpa, Barlow Butte, Iron,	
				Bonney, Windy	
PIVI	Hairy Woodpecker	KR		All	ANY
RESA	Golden-Crowned Kinglet	SRM		All Except Triangle, Byzandine,	ANY
				Mustang	
SICAN	Red-Breasted Nuthatch	KR		All	ANY
SICAR	White-Breasted Nuthatch	KR		All Except Triangle, Byzandine,	ANY
				Mustang	
SIPY	Pygmy Nuthatch	KR		Canyon, Mustang, Byzandine,	ANY

Species	Common Name	Presence	LUs Observed	LUs Habitat	Vegetation Type
				Triangle	
SPHTH	Williamson's Sapsucker	KR		All Except Triangle, Byzandine,	SE MSE CA LS OM
				Mustang	
SPRU	Red-Breasted Sapsucker	KR		All	ANY
STOCCA	Northern Spotted Owl	KR	Barlow Butte, Barlow Rd, Bonney,	All Others Except Triangle And	MSE CA LS OM
			Iron, Little Boulder, Mustang,	Byzandine	
			Canyon, Palmateer, White, Windy,		
			Catalpa		
STRNE	Great Gray Owl	KV, SRH		All Except Mt. Hood, Iron, Twin	ANY
				T-Twin	
STVA	Barred Owl	KR		All Except Triangle And Byzandine	MSE CA LS OM
TADO	Douglas' Squirrel	KR	Sightings Common But Unrecorded	All	ANY
TAGR	Rough-Skinned Newt	KR	Catalpa, Twin, Sightings Common	All Except Triangle, Byzandine,	ANY
			But Usually Unrecorded	Mustang	
TATO	Townsend's Chipmunk	KR		All	ANY
TRTR	Winter Wren	SRH		All Except Triangle, Byzandine	ANY
VIGI	Warbling Vireo	KR		All Except Triangle, Byzandine,	ANY
				Mustang	
WIPU	Wilson's Warbler	KR		All Except Triangle, Byzandine,	ANY
				Mustang	

Riparian Guilds	Habitat	Guild	Habitat
LAKEA	Aquatic Habitat Of Lakes	RIVA	Aquatic Habitats Of Rivers
LAKEARO	Aquatic And Terrestrial Open Habitats Of Lakes	RIVARF	Aquatic And Terrestrial Forested Habitats Of Rivers
LAKERO	Riparian Open Habitats Of Lakes	RIVARG	All Stages Of Aquatic And Terrestrial Habitat Of Rivers
LKRVA	Aquatic Habitats Of Lakes And Rivers	RIVRO	Terrestrial Open Habitats Of Rivers
LKRVARO	Aquatic And Terrestrial Open Habitats Of Lakes And Rivers	RIVRF	Terrestrial Forested Habitats Of Rivers
LKRVARF	Aquatic And Terrestrial Forested Habitats Of Lakes / Rivers		
LKRVARG	All Stages Of Aquatic And Terrestrial Habitat Of Lakes/Rivers	SPCL	Require Specific Special Habitats
LKRVRO	Terrestrial Open Habitats Of Lakes And Rivers		
LKRVRG	All Stages Of Terrestrial Habitats Of Lakes And Rivers		

ALL WHITE RIVER LSR SPECIES								
SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
ACCCO	Cooper's Hawk	TMGG					ANY	KR
ACGE	Northern Goshawk	TLMLT	Y				MSE CA LS OP	KR
ACMA	Spotted Sandpiper	LKRVRO					LAKE/RIVER	SMVL
ACST	Sharp-Shinned Hawk	TMGG					ANY	KR
AEAC	Northern Saw-Whet Owl	TMGG					ANY	SRM
AECL	Clark's Grebe	LAKEA					LAKE	SML
AEOC	Western Grebe	LAKEA					LAKE	SML
AGPH	Red-Winged Blackbird	LKRVRO					LAKE/RIVER	KR
AISP	Wood Duck	LKRVARF	Y				LAKE/RIVER	SRM
AMGR	Northwestern Salamander	TSGG	Y				ANY	SRM
AMMA	Long-Toed Salamander	TSGG					ANY	SRH
ANAAM	American Widgeon	LAKEA					LAKE	SMM
ANAC	Northern Pintail	LKRVA					LAKE/RIVER	SMM
ANCL	Northern Shoveler	LKRVA					LAKE/RIVER	SMM
ANCR	Green-Winged Teal	LKRVA					LAKE/RIVER	SMM
ANCY	Cinnamon Teal	LKRVARO					LAKE/RIVER	SML
ANDI	Blue-Winged Teal	LKRVA					LAKE/RIVER	SMM
ANFE	Clouded Salamander	TSGG	Y				ANY	SRM
ANPL	Mallard	LKRVARO					LAKE/RIVER	SMM
ANSPI	American Pipit (Water Pipit)	TSPO					NF ALPINE	SMM
ANST	Gadwall	LKRVA					LAKE/RIVER	SMM
APCO	Scrub Jay	TSMO					SI NF TA	KR
APRU	Mountain Beaver	TSGG					ANY	KR
AQCH	Golden Eagle	TLC					ANY	KV, SRM
ARHE	Great Blue Heron	LKRVARG					LAKE/RIVER	SRM
ASOT	Long-Eared Owl	TMGG					ANY	SRH
ASTR	Tailed Frog	RIVA	Y	Y			RIVER	KR
AYAF	Lesser Scaup	LKRVA					LAKE/RIVER	SMVL
AYCO	Ring-Necked Duck	LKRVARG					LAKE/RIVER	SMVL
BAWR	Oregon Slender Salamander	TSGG	Y	Y			ANY	SRM
BOCE	Cedar Waxwing	TSGG					ANY	KM
BOLE	American Bittern	LAKERO					LAKE	SMVL
BOUM	Ruffed Grouse	TSGG					ANY	KR
BRCA	Canada Goose	LKRVARO					LAKE/RIVER	SML
BUAL	Bufflehead	LKRVARG	Y				LAKE/RIVER	SML
BUBO	Western Toad	TSGG					ANY	SRM
BUCL	Common Goldeneye	LKRVA					LAKE/RIVER	SML

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
BUIS	Barrow's Goldeneye	LKRVARF	Y				LAKE/RIVER	SML
BUJA	Red-Tailed Hawk	TLC					ANY	KR
BULA	Rough-Legged Hawk	TLMO					SI NF TA	KR
BUST	Green-Backed Heron	RIVARG					RIVER	SML
BUVI	Great Horned Owl	TLC					ANY	KR
CACAL	California Quail	TSMO					SI NF TA	SRL
CACAS	Cassin's Finch	TSC					ANY	SRM
CAGU	Hermit Thrush	TSGG	Y				ANY	KR
CALMA	Western Sandpiper	LAKERO					LAKE	SML
CANLA	Coyote	TLGG					ANY	KR
CANLU	Wolf	TLGG					ANY	SREXT
CARPI	Pine Siskin	TSGG					ANY	KR
CARPU	Purple Finch	TSGG					ANY	KR
CASCA	Beaver	LKRVARG					LAKE/RIVER	KR
CATAU	Turkey Vulture	TLC					ANY	KV, SRM
CATME	Canyon Wren	SPCL					TA NF RO	SRH
CATR	American Goldfinch	TSMO					SI NF TA	SRM
CAUS	Swainson's Thrush	TSGG					ANY	SRL
CEAL	Belted Kingfisher	LKRVARF					LAKE/RIVER	KR
CEAM	Brown Creeper	TSGSL	Y				MSE CA LS OM OP	SRM
CEEL	Elk	TLC					ANY	KR
CHBO	Rubber Boa	TSGG					ANY	SRH
CHGR	Lark Sparrow	TSPO					SI NF TA	SMM
CHMI	Common Nighthawk	TMGG					ANY	SRM
CHPI	Painted Turtle	LKRVARO					LAKE/RIVER	SRVL
CHVA	Vaux's Swift	TSGG	Y				ANY	KR
CHVO	Killdeer	LKRVRO					LAKE/RIVER	SRM
CICY	Northern Harrier	SPCL					NF WM MM DM	KR
CIME	American Dipper	RIVARF					RIVER	KR
CIPA	Marsh Wren	SPCL					SW WM	SMVL
CLCA	Western Red-Backed Vole	TSGSL	Y				SE MSE CA LS OM OP	SRM
CLMA	Western Pond Turtle	LKRVARO					LAKE/RIVER	SRVL
COAU	Northern Flicker	TMGG	Y				ANY	KR
COBO	Olive-Sided Flycatcher	TSC					ANY	KR
COBR	American Crow	TLGG					ANY	SRL
COFA	Band-Tailed Pigeon	TSGG					ANY	SML
COLCO	Racer	TSPO					SI NF TA	SRM
CONTE	Sharptail Snake	TSGG					ANY	SRL
CORCO	Common Raven	TLGG					ANY	KR

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
COSO	Western Wood-Pewee	TSGG					ANY	KR
COVE	Evening Grosbeak	TSGG					ANY	KR
CRVI	Western Rattlesnake	TMGG					ANY	KR
CYCO	Tundra Swan	LAKEA					LAKE	SMVL
CYST	Steller's Jay	TSGG					ANY	KR
DENCO	Yellow-Rumped Warbler	TSGG					ANY	SMH
DENI	Black-Throated Gray Warbler	TSGG					NF OP	SRM
DEOB	Blue Grouse	TSGG					ANY	KR
DEOC	Hermit Warbler	TSGSL					SE MSE CA LS OM OP	KR
DEPET	Yellow Warbler	TSGOS					SI NF SX MX UR	SRM
DICO	Cope's Giant Salamander	LKRVA	Y	Y			LAKE/RIVER	KR
DIPU	Ringneck Snake	TSGG					ANY	SRH
DITE	Pacific Giant Salamander	LKRVARF	Y				LAKE/RIVER	KR
DIVI	Virginia Opossum	TMGG					ANY	SRH
DRPI	Pileated Woodpecker	TLMLT	Y				MSE CA LS OM OP	KR
ELCO	Northern Alligator Lizard	TSGG					ANY	SRH
ELMU	Southern Alligator Lizard	TSGG					ANY	SRL
EMDI	Pacific Slope Flycatcher	TSPLT					MSE CA LS OM OP	SRH
EMHA	Hammond's Flycatcher	TSGG	Y				ANY	KR
EMOB	Dusky Flycatcher	TSPO					SI NF TA	KR
EMOC	Cordilleran Flycatcher	TSPLT					MSE CA LS OM OP	SR
ENES	Ensatina	TSGG					ANY	SRM
EPFU	Big Brown Bat	TMC	Y				ANY	SRM
ERAL	Horned Lark	TSPO					SI NF TA	SMM
ERDO	Porcupine	TMGG					ANY	KR
EUCY	Brewer's Blackbird	TSMO					SI NF TA	KM, SRM
EUSK	Western Skink	TSGG					ANY	SRH
FACO	Merlin	TMMO					SI NF TA	KM
FECA	Lynx	TLGSL*		N		Y	SE MSE CA LS OM	SEXTR
FECO	Mountain Lion	TLGG					ANY	KR
FERU	Bobcat	TLGG					ANY	KR
FUAM	American Coot	LKRVARO					LAKE/RIVER	SMM
GAGA	Common Snipe	LKRVRO					LAKE/RIVER	SRH
GAIM	Common Loon	LKRVA					LAKE/RIVER	SML
GETR	Common Yellowthroat	LKRVRO					LAKE/RIVER	SRM
GLGN	Northern Pigmy-Owl	TSGG	Y				ANY	KR
GLSA	Northern Flying Squirrel	TSPLT	Y				MSE CA LS OM	KR
GRCA	Sandhill Crane	SPCL					WM MM DM	SMM
GUGU	Wolverine	TLMLT					LS MSE CA OM OP	KV, SRH

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
HALE	Bald Eagle	LKRVARG	Y				LAKE/RIVER	KV, KM
HIHI	Harlequin Duck	RIVARF	Y				RIVER	KR
HIPY	Cliff Swallow	SPCL					NF TA RO	SRH
SIRU	Barn Swallow	SPCL					NF RO OP	SRL
HYTO	Night Snake	TSPO					SI NF TA	SRL
ICVI	Yellow-Breasted Chat	RIVRO					RIVER	SRL
IXNA	Varied Thrush	TSGG					ANY	KR
JUHY	Dark-Eyed Junco	TSGG					ANY	KR
LAAR	Herring Gull	LKRVA					LAKE/RIVER	SVL
LACI	Hoary Bat	TMGG	Y	Y			ANY	SRM
LADE	Ring-Billed Gull	RIVARG					RIVER	SVH
LAEX	Northern Shrike	TSMO					SI NF TA	SRM
LAGL	Glaucous-Winged Gull	LKRVA					LAKE/RIVER	SVL
LALU	Loggerhead Shrike	TSMO					SI NF TA	SRL
LANO	Silver-Haired Bat	TMC	Y	Y		Y	ANY	SRM
LEAM	Snowshoe Hare	TSGG					ANY	KR
LEUAR	Rosy Finch	TMPO					SI NF TA	SRH
LOPCU	Hooded Merganser	LKRVARF	Y				LAKE/RIVER	SMM
LOXCU	Red Crossbill	TSGG	Y				ANY	KR
LUCA	River Otter	LKRVARG					LAKE/RIVER	KR
MAAM	Marten	TLMLT	Y	Y			MSE CA LS OM	KR
MAFL	Yellow-Bellied Marmot	TSPO					SI NF TA	SRM
MAPE	Fisher	TLMLT	Y	Y			MSE CA LS OM OP	KR
MATA	Striped Whipsnake	TSPO					SI NF TA OP	SRL
MEGA	Wild Turkey	TMGG					ANY	KR
MELE	Lewis' Woodpecker	TSC					ANY	SRH
MELI	Lincoln's Sparrow	TSPO					SI NF TA	SRL
MELME	Song Sparrow	TSGG					ANY	KR
MEPME	Striped Skunk	TMMO					SI NF TA	KR
MERME	Common Merganser	LKRVARF	Y	Y			LAKE/RIVER	KR
MILO	Long-Tailed Vole	TSPO					SI NF TA	SR
MIOR	Creeping Vole	TSGG					ANY	SR
MIRI	Water Vole	LKRVARO					LAKE/RIVER	SR
MITO	Townsend's Vole	TSPO					SI NF TA	SR
MOAT	Brown-Headed Cowbird	TSGG					ANY	KR
MUER	Ermine	TSGG					ANY	KR
MUFR	Long-Tailed Weasel	TMGG					ANY	KR
MUVI	Mink	TMGG					ANY	KR
MYEV	Long-Eared Myotis	TMGG	Y	Y		Y	ANY	SRM

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
MYOCA	California Myotis	TMC	Y				ANY	SRM
MYOCI	Western Small-Footed Myotis	SPCL	Y				TA NF RO	SRL
MYTO	Townsend's Solitaire	TSGG					ANY	KR
MYVO	Long-Legged Myotis	TMGG	Y	Y		Y	ANY	SRM
MYYU	Yuma Myotis	TMGG	Y				ANY	SRM
NECI	Bushy-Tailed Woodrat	SPCL					TA NF RO	KR
NEGI	Shrew-Mole	TSPLT	Y				MSE CA LS OM OP	SRH
NUCO	Clark's Nutcracker	TSGG					ANY	SRH
OCPR	Pika	SPCL					TA RO	KR
ODHE	Black-Tailed & Mule Deer	TMGG					ANY	KR
OPTO	Macgillivray's Warbler	TSPO					SI NF TA	KR
ORPI	Mountain Quail	TSMO					SI NF TA	SRL
OTFL	Flammulated Owl	TSC	Y				ANY	SRM
OTKE	Western Screech-Owl	TSGG					ANY	KR
OXJA	Ruddy Duck	LAKEA					LAKE	SML
PAAT	Black-Capped Chickadee	TSGOS					SI NF SE UR MSE	KR
PAHA	Osprey	LKRVARG					LAKE/RIVER	SVM
PAIL	Fox Sparrow	TSGOS					SI NF SE UR MSE	SRM
PARGA	Mountain Chickadee	TSGG					ANY	KR
PARU	Chestnut-Backed Chickadee	TSGG	Y				ANY	KR
PASA	Savannah Sparrow	TSPO					SI NF TA	SRL
PASAM	Lazuli Bunting	TSPO					SI NF TA	KR
PECA	Gray Jay	TMGG					ANY	KR
PEMA	Deer Mouse	TSGG	Y				ANY	KR
PEPA	Great Basin Pocket Mouse	TSGG					ANY	SRH
PETRU	Pinon Mouse	TSPO					SI NF TA	SRL
PHAU	Double-Crested Cormorant	LKRVARG					LAKE/RIVER	SML
PHCO	Ring-Necked Pheasant	TSPO					SI NF TA	SRL
PHDO	Short-Horned Lizard	TSGG					ANY	SRH
PHELO	Red Tree Vole	TSPLT	Y	Y	Y		MSE CA LS OM	SRL
PHIN	Heather Vole	TSPO					SI NF TA	SR?
PHME	Black-Headed Grosbeak	TSGG					ANY	KR
PHNU	Common Poorwill	TSMO					SI NF TA	SRL
PIAL	White-Headed Woodpecker	TMGG	Y				ANY	SRM
PIAR	Black-Backed Woodpecker	TMMLT	Y	Y			MSE CA LS OM	KR
PICA	Gopher Snake	TSPO					SI NF TA	KR
PICH	Green-Tailed Towhee	TSMO					SI NF TA	KR
PIEN	Pine Grosbeak	TSGG					ANY	KR
PIER	Rufous-Sided Towhee	TSGG					ANY	KR

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
PILU	Western Tanager	TSGG					ANY	KR
PIPI	Black-Billed Magpie	TMPO					SI NF TA	KR
PIPU	Downy Woodpecker	TSGSL					MSE CA LS OM OP	KR
PITR	Three-Toed Woodpecker	TMMLT	Y				MSE CA LS OM OP	SRH
PIVI	Hairy Woodpecker	TSGG	Y				ANY	KR
PLVE	Western Red-Backed Salamander	TSGG					ANY	SRVL
POAU	Horned Grebe	LAKEA					LAKE	SML
POEGR	Vesper Sparrow	TSPO					SI NF TA	KR
POPO	Pied-Billed Grebe	LKRVARG					LAKE/RIVER	SML
PRLO	Raccoon	TSGG					ANY	KR
PSMI	Bushtit	TSMO					SI NF TA	SRL
PSRE	Pacific Treefrog	TSGG					ANY	KR
RAAU	Red-Legged Frog	TSGG					ANY	KR
RACAS	Cascades Frog	TSGG					ANY	KR
RACAT	Bullfrog	LKRVA					LAKE/RIVER	SRL
SAPR	Spotted Frog	LAKEARO					LAKE	SRM
RECA	Ruby-Crowned Kinglet	TSGG					ANY	SRH
RESA	Golden-Crowned Kinglet	TSGG	Y				ANY	SRM
RHYCA	Cascade Torrent Salamander	RIVARF		Y			RIVER	SRL
SAOB	Rock Wren	SPCL					TA RO NF	KR
SAYSA	Say's Phoebe	TSPO					SI NF TA	SRL
SCEGR	Sagebrush Lizard	TSGG					ANY	SRH
SCIGR	Western Gray Squirrel	TSGG					ANY	KR
SCIN	Great Basin Spadefoot Toad	TSGOS					SI NF SE MSE UR OP OM	SRL
SCOC	Western Fence Lizard	TSGG					ANY	KR
SCOR	Coast Mole	TSGG					ANY	SRL
SELRU	Rufous Hummingbird	TSGG					ANY	KR
SICAN	Red-Breasted Nuthatch	TSGG	Y				ANY	KR
SICAR	White-Breasted Nuthatch	TSGG	Y				ANY	KR
SICU	Mountain Bluebird	TSPO					SI NF TA	KR
SIME	Western Bluebird	TSPO					SI NF TA	KR
SIPY	Pygmy Nuthatch	TSGG	Y				ANY	KR
SOBA	Baird's Shrew	TSGG					ANY	SR?
SOBE	Pacific Water Shrew	LKRVARF					LAKE/RIVER	SR?
SOME	Merriam's Shrew	TSPO					SI NF TA	SR?
SOMO	Dusky Shrew	TSGG					ANY	SR?
SOPAL	Water Shrew	LKRVARF					LAKE/RIVER	SR?
SOTR	Trowbridge's Shrew	TSPLT					MSE CA LS OM OP	SR?
SOVA	Vagrant Shrew	TSGG					ANY	KR

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
SPBEE	California Ground Squirrel	TSPO					SI NF TA	SRH
SPGR	Western Spotted Skunk	TMMO					SI NF TA	SRH
SPHTH	Williamson's Sapsucker	TSGSL	Y				SE MSE CA LS OM OP	KR
SPLA	Golden-Mantled Ground Squirrel	TSGG					ANY	KR
SPNU	Red-Naped Sapsucker (Rel Yellow	TSGG					ANY	KR
SPPAS	Chipping Sparrow	TSGG					ANY	KR
SPRU	Red-Breasted Sapsucker	TSGG	Y				ANY	KR
STCAL	Calliope Hummingbird	TSMO					SI NF TA	SRH
STOCCA	Northern Spotted Owl	TLMLT	Y				MSE CA LS OM	KR
STRNE	Great Gray Owl	TLC	Y	N		Y	ANY	KV, SRH
STUNE	Western Meadowlark	TSPO					SI NF TA	KR
STVA	Barred Owl	TLMLT	Y				MSE CA LS OM OP	KR
STVU	European Starling	TMC					ANY	KR
SYBA	Brush Rabbit	TSGG					ANY	KR
SYNU	Mountain (Nuttall's) Cottontail	TMPO					SI NF TA	KR
TAAM	Yellow-Pine Chipmunk	TSGG					ANY	SRH
TABI	Tree Swallow	TSGG					ANY	KR
TADO	Douglas' Squirrel	TSGG	Y				ANY	KR
TAGR	Rough-Skinned Newt	TSGG	Y				ANY	KR
TATA	Badger	TMMO					SI NF TA	KR
TATH	Violet-Green Swallow	TSGG					ANY	SRM
TATO	Townsend's Chipmunk	TSGG	Y				ANY	KR
THBE	Bewick's Wren	TSGOS					SI NF SE MSE UR	KR
THEL	Western Terrestrial Garter Snake	TSPO					SI NF TA	SRH
THMA	Western Pocket Gopher	TSPO					SI NF TA	SRH
THOR	Northwestern Garter Snake	TSPO					SI NF TA	SRL
THSI	Common Carter Snake	TSPO					SI NF TA	SRH
THTA	Northern Pocket Gopher	TSPO					SI NF TA	KR
TRAI	House Wren	TSGOS					SI NF SE MSE UR	KR
TRME	Greater Yellowlegs	LAKEA					LAKE	SRVL
TRTR	Winter Wren	TSGG	Y				ANY	SRH
TUMI	American Robin	TSGG					ANY	KR
TYAL	Barn Owl	TMC					ANY	SRM
TYVE	Western Kingbird	TSMO					SI NF TA	KR
URAR	Grizzly Bear	TLGG*					ANY	SREXT
URAM	Black Bear	TLGG					ANY	KR
URCI	Gray Fox	TLGG					ANY	SRM
UTST	Side-Blotched Lizard	TSPO					SI NF TA	SRL

SPECIES	COMMON NAME	GUILD	LS/CLASS	J-2	C3	PROP C3	VEGETATION STRUCTURE	PRESENCE
VECE	Orange-Crowned Warbler	TSPO					SI NF TA	KR
VERU	Nashville Warbler	TSGG					ANY	KR
VIGI	Warbling Vireo	TSGG	Y				ANY	KR
VISO	Solitary Vireo	TSGG					ANY	KR
VUVU	Red Fox	TSGG					ANY	SRH
WIPU	Wilson's Warbler	TSGG	Y				ANY	KR
ZAPR	Western Jumping Mouse	TSPO					SI NF TA	SRH
SATR	Pacific Jumping Mouse	TSGG					ANY	SR
ZEMA	Mourning Dove	TSGG					ANY	KR
ZOAT	Golden-Crowned Sparrow	TSPO					SI NF TA	SMH
ZOLE	White-Crowned Sparrow	TSPO					SI NF TA	KM, SRH

Note: Species listed as occupying OP or OM (Open Park-like or Open Multi-story) stands **and** species listed as occupying LS (Late Seral Tolerant Multi-story) stands are also likely to be found in FEM structures (Fire Exclusion Multi-story). Habitat is in rapid decline for all the above species in FEM stands but currently it is more suitable for the species NOT dependent on **open** Ponderosa pine or Douglas-fir dominated stands.

Late Successional vertebrate species likely extirpated from the LSR but which could inhabit it under natural conditions: The lynx, wolf and grizzly bear likely inhabited the LSR under natural conditions but are considered extirpated.

Lynx (*Felis canadensis*) probably once inhabited the analysis area and the White River LSR. Although categorized as a late-successional species, the lynx is heavily dependent upon snowshoe hare for survival, tending to occupy higher elevations and deeper snow conditions than the similar but common bobcat. Although the snowshoe hare is a generalist in its use of habitat , the most favorable habitat for snowshoe hare (and therefore lynx) seems to be found in the earlier successional conditions often provided by Stand Initiation, Stem Exclusion and Understory Reinitiation vegetation structural conditions. Within the LSR these conditions would naturally most likely have occurred within the Crest Zone where moderate frequency (50-150 year interval) large scale fires often resulted in regeneration of stands before Cathedral or Late Seral Tolerant Multi-story conditions were achieved. Provision of this type of habitat was probably cyclical in nature, with relatively large blocks (500-2000 acres) of habitat available for 50 to 100 years then little being available for similar periods of time. Currently some of the best habitat in this condition is found in the Palmateer, Twin and Bonney landscape units. On a vast landscape scale (such as the province scale) such habitat was probably relatively constant through time.

In the future, the most likely areas to support lynx within the LSR, are areas with a desired future condition of cycling where stands are allowed to reach the mature stem exclusion stage but are returned to the Stand Initiation or Understory Reinitiation stages through prescribed natural fire or thinning if desireable within the ecosystem. These stands would be allowed to progress back through the Stem Exclusion phase to the Mature Stem Exclusion condition and then be recycled again. Thinning at some level would likely occur within the Stem Exclusion and Mature Stem Exclusion phases but the stem densities would be maintained to provide the highest stem densities consistent with preventing imminent mortality or catastrophic loss of large portions of the landscape. Rapid tree growth in diameter or height would not be the objective for those stands.

Some such habitat is being provided in matrix lands but in a very fragmented way which may not be suitable to the lynx. Also the thinning regime is geared more to improving tree growth than to providing a dense canopy condition. The generally heavy winter recreation use in the LSR and adjacent matrix lands may prevent re-occupancy of otherwise suitable habitat by the lynx.

The gray wolf (*Canis lupus*) was officially extirpated from Oregon in 1946. However, since that date persistent reports of wolf sightings have occurred throughout the Cascade Range. Reports of wolf vocalizations in the mid-1950's within the Three Sisters Wilderness area (personal communications with BLM biologist), sightings in Crater Lake National Park in the 1960's through 1980's by park personnel (review of files of Crater Lake National Park), photographs of individuals in the late 1980's within the Siskiyou Mountains (Rogue River National Forest files), conclusions of presence of wolves on the Rogue River National Forest in the early 1970's (forest supervisors letter in Rogue River National Forest files) as well as numerous other reports of sightings by less reliable sources have occurred up to the present. Actual information within or adjacent to the LSR has been limited to unconfirmed reports of a "wolf" crossing highway 26 near Blue Box Pass and a report of "sighting of a wolf" near Mt. Hood, the exact location being unknown.

Examination of a skull of an animal accidentally killed in Oregon were not incontrifutable. The conclusion drawn by the examiner from the Smithsonian Institute was that the skull was from a wolf, but that there were some characteristics similar domestic dogs. Personal discussions with geneticists indicate that "pure wolves" may not exist world wide. The domestic dog is a relatively recent departure from the evolutionary chain which includes the wolf, therefore genetically they are automatically very similar. In addition, the presence of domestic dogs throughout the world wide range of the wolf and the relatively common interbreeding that occurs between the species under those circumstances may prevent unequivocal confirmation of any wolf like animal as being pure wolf. Also, with the increase in licensed breeding of wolf-dog crosses within the State of Oregon since the 1960's and the possibilities of illegal and accidental releases of those animals into the wild, the question of native wolves remaining in Oregon may never be answered. A standard of confirmation may be more one of "if it looks like a wolf, acts like a wolf and howls like a wolf, it's a wolf" may be all that can be applied.

Although the likelihood of native wolves still occupying the Cascade Mountain Range in Oregon is quite slim, potentially suitable habitat conditions do appear to remain within Oregon and within the LSR. Two factors appear to be the most important in providing for viable wolf populations. Healthy and relatively abundant deer and elk populations are necessary as a food source and lack of human interference seem to be critical. The latter seems to be provided when there are relatively large unroaded areas (such as Yellowstone National Park, or the vast wilderness areas of north and northcentral Idaho), and or other limited access to the public such as road densities of 1 mile per square mile or less over relatively large areas. Since the LSR is not sufficiently large to provide all the needs of even one wolf pack, adjacent areas would also have to be in a favorable condition. In general, deer and elk populations are probably at or near their peak at this time. Being dependent upon grasses, shrubs and forbs for forage, their populations will likely decline as the early seral stages become less abundant on the LSR and matrix lands both within and adjacent to the analysis area. Although their populations will likely decline, they probably would not be a limiting factor in preventing occupancy of habitat by wolves within the analysis area. Road closures being instituted to comply with the Mt. Hood Forest Plan of from 1.5 to 2.5 miles per square mile of open road density probably would not provide sufficient security to support a viable wolf population. Therefore, without further reductions in road density and limiting of use by humans, disturbance would likely be the limiting factor to habitat occupancy by wolves.

Grizzly bear (*Ursus arctos*), undoubtedly occupied the analysis area and LSR under natural conditions but has been extirpated from the Cascade Range in Oregon, (although it is present in parts of the Cascade Range in Washington). Because of the potentially lethal nature of this animal to humans and domestic animals, and it's greater propensity to attack when provoked compared to most other animals on the North American Continent, grizzly bear generally do not coexist well with high densities of humans.

There is probably sufficient forage and shelter within and adjacent to the LSR to support some number of grizzlies, but the high level of human use throughout the year from mushroom pickers to skiers and hunters to snowmobilers and the extremely large area needed to provide security from such disturbance, probably precludes a viable population from occupying the habitat successfully.

FUNCTION OF THE WHITE RIVER LSR WITHIN THE LSR NETWORK FOR DISPERSAL, RECRUITMENT, AND REFUGIA

RELATION TO ADJACENT LANDS AND 100 ACRE LSRS

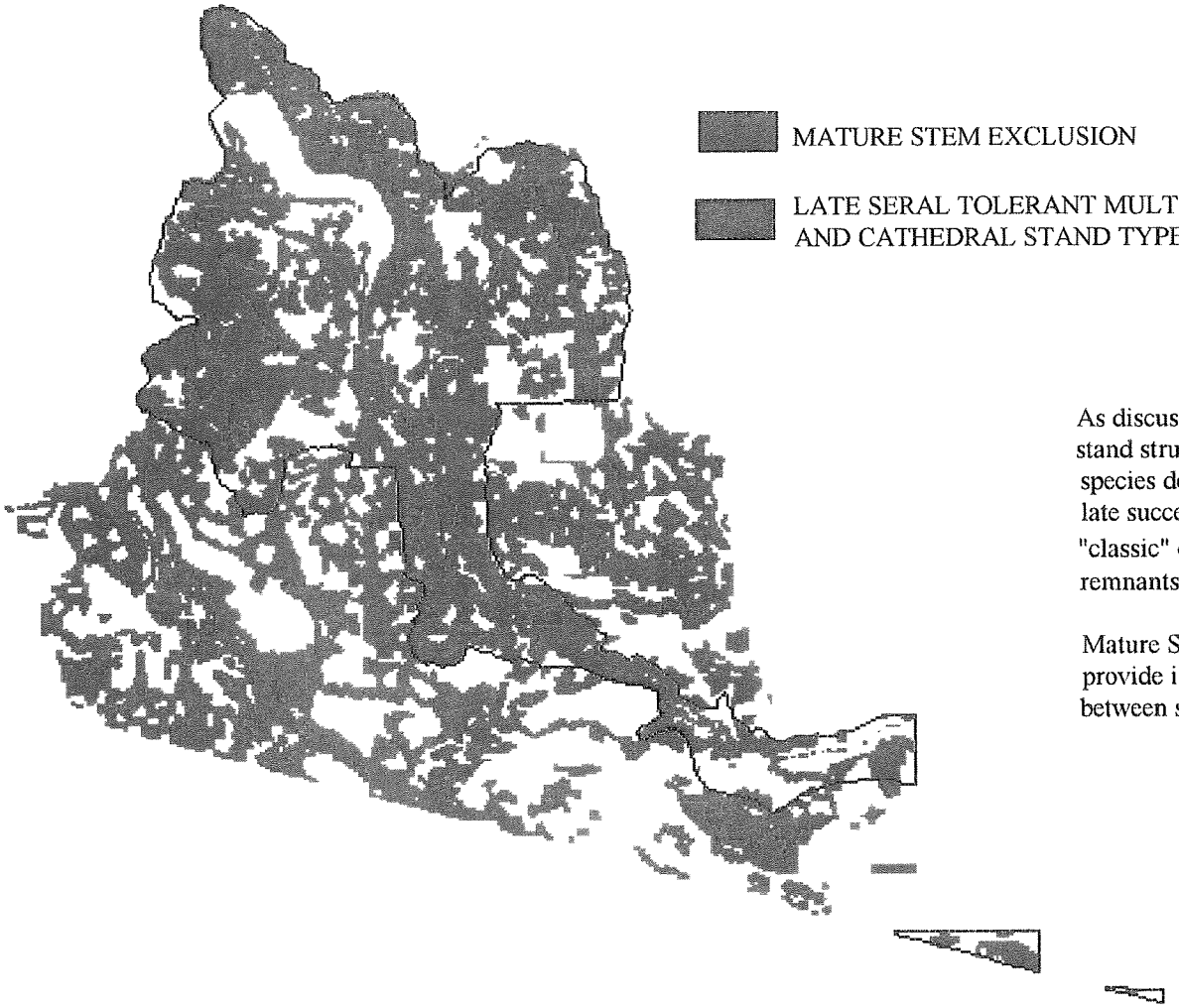
The availability of data limits landscape level discussions between LSRs to data provided through the "HABSCAPES" -- Interpreting Landscape Patterns: A Vertebrate Habitat Relationships Approach, model created by Kim Mellen, Mt. Hood/Gifford Pinchot National Forests, wildlife ecologist; Mark Huff, Pacific Northwest Research Station, wildlife/forest ecologist; and Rich Hagestedt, Mt. Hood National Forest, forest analyst.

Within the model, species are assigned to species guilds based on expected responses to different amounts and distributions of habitat across the landscape. Specifically, home range size, patch configuration use, and general habitat use (stand scale) were used to group species. The guilds are then linked to the vegetation database for the Mt. Hood National Forest. The Table beginning on page IV-21 lists Late Successional associated Vertebrates Known or Suspected to Occur in the White River LSR:

The vegetation criteria used to determine large tree habitat in "HABSCAPES", appears to be similar to the old growth structural stage used within the analysis area. Discussions with other biologists on the Mt. Hood National Forest indicates this information seems reasonably accurate for areas west of the Cascade Crest but does not fit east of the crest where the habitat availability and use by late-successional species is severely under predicted. Within the analysis area, vegetation was assigned to various structural stages from Stand Initiation through Late Seral Tolerant Multi-story. The actual structural stages used to determine habitat suitability were based upon known occupancy of such habitat by many of the late-successional associated species within the analysis area.

The table beginning on page IV-22 lists the species, their guild and structural stages they are considered to occupy within the analysis area.

CONTRIBUTION OF MATURE STEM EXCLUSION STAND TYPE TO CONNECTIVITY OF LARGE TREE HABITATS



As discussed on page IV-37, some stand structures known to be habitat for species dependent on large-tree late successional conditions are not "classic" old growth and contain only remnants of trees greater than 21" DBH.

Mature Stem Exclusion stands provide important connections between stands of more optimal structure.

Of the 18 terrestrial guilds listed, only three, **TSPLT, TMMLT**, and **TLMLT**; are closely tied to the large tree habitat (late-successional) habitat. A species of some concern, which is not well represented by guild categories is the white-headed woodpecker. Being represented by the **TMGG** guild which can use any structural class, seems to over-predict habitat for this mostly large ponderosa pine dependent species, therefore it will be addressed separately and as a representative of any other species that may need the Open Multi-story and Open Park-like stands of ponderosa pine/oak, ponderosa pine, and ponderosa pine/Douglas fir associations that are virtually absent from the landscape. Another set of species not well represented within the HABSCAPES guilds are any that may need interior forest habitat. Review of the analysis area, shows the TLMLT guild under-predicts the amount of interior forest habitat available, but most closely represents that habitat of the broad landscape tools available. *Therefore interior forest habitat will be addressed separately within the analysis area, and the TLMLT guild will be used to address interior forest habitat outside the analysis area and connectivity issues.*

The **TSPLT** (terrestrial, small home range, large tree patch) guild represents the northern flying squirrel, shrew-mole and red tree vole of which only the flying squirrel is a known resident. These species typically have their primary or secondary use in only 1 major structural category; or their primary use is in only 1 major structural category and secondary use is in just 1 other major structural category. Home range size is considered 52 acres for this guild with at least 50% of the home range in large tree patches of at least 4.8 contiguous acres. In general, these species do not easily cross openings or other habitats not meeting late-successional criteria.

Total availability of habitat for TSPLT species within the LSR is low according to the "HABSCAPES" analysis, with connectivity (dispersal) virtually non-existent. However, major refugia exist within the Mt. Hood, Iron, Windy, Barlow Butte, Twin, and White LU's.

Habitat availability for TSPLT species within the LSR is very good when using the structural stages identified as suitable habitat for eastside conditions. With the exception of the Outwash, Catalpa, Red and Little Boulder LUs late-successional habitat represents over 50 percent of the landscape with patches exceeding 4.8 acres in size and with good connectivity north-south and east-west across the LSR. The lower one half of the Canyon LU, as well as the Mustang, Byzandine and Triangle LUs are all within plant associations that naturally would be dominated by ponderosa pine and Douglas fir in an open multi-story to open park-like structural condition. Active management (or long term natural fire frequency) in these drier LUs to reduce the high stocking of understory white fir and/or Douglas fir would not produce stands suitable for the TSPLT guild. However, such species as the white-headed woodpecker would be greatly benefited by such "management".

Outside the LSR, but within the analysis area, habitat is much more fragmented with Abbot, Boulder Creek, Cedar, Frog, Green Lake, Highway, Little Knoll, Lynx and Rimrock exhibiting the greatest fragmentation and least habitat. However, even within these, there is fair connectivity of habitat. Riparian corridors account for a significant portion of the habitat and connectivity within these fragmented landscape units, therefore the corridors are often narrow and occasionally have small gaps.

Only the "HABSCAPES" model is available for analysis of the adjacent LSRs and reserved areas and is expected to underestimate late-successional habitat availability east of the Cascades, however general knowledge of the adjacent LSRs and reserved areas is used to supplement the HABSCAPES information. The Badger Creek Wilderness area lies immediately to the north and east of the

LSR. This might be expected to be a connecting link and additional late-successional habitat for the White River-Douglas Cabin-Surveyors Ridge LSR complex which skirts the east side of Mt. Hood. However, the majority of late-successional habitat in the Badger Creek Wilderness is found in the east half which functions as a connecting link between the Douglas Cabin LSR and the Surveyor's Ridge LSR. Recent (1995) aerial photos show that most of this habitat has been severly degraded or lost above 3500 feet elevation and is declining below 3500 feet. The Douglas Cabin LSR and the east half of the Badger Creek Wilderness and the lower elevations of the Surveyors Ridge LSR are relatively dry and are more conducive to open forested structure such as open multi-story or open park-like dominated by ponderosa pine or ponderosa pine-Oregon white oak plant associations. Much of that area has high densities of grand fir and Douglas fir in the middle and understory layers, creating high competition for moisture and a high risk of catastrophic loss due to fire or insect epidemic, with significant mortality already occurring. The most direct connecting link between the White River LSR and the Douglas Cabin LSR is the Threemile Creek riparian corridor within matrix lands just south of the Badger Creek Wilderness area. Another less direct link, also in highly fragmented matrix lands, exists through the Swamp LU and the northeast corner of the Cedar LU; then north along the extreme east edge of the Boulder Creek LU and continuing northeast (around the west edge of the Rocky burn) to the Douglas Cabin LSR.

The Surveyors Ridge LSR although generally drier than the White River LSR, does not appear to be too short of late-successional habitat and has relatively good connectivity for TSPLT species. However, connectivity is rapidly degrading in the western half of the LSR; one-fourth to one-half the Surveyors Ridge LSR (like the Douglas Cabin LSR) is probably not capable of maintaining the stand densities associated with the TSPLT guild through time. Open multi-story and open park-like stand structures are probably the most dense stand structures that nature will allow over the long term. The best connecting link between the White River and Surveyors Ridge LSRs, (and virtually the only contiguous habitat) for TSPLT species is the Highway 35 corridor along the west edge of the Badger Creek Wilderness area. This area is "protected" by a scenic viewshed corridor with habitat very similar to the Iron landscape unit into which it directly ties.

Connectivity of the White River LSR with the Roaring River LSR, appears to be mostly through two "corridors". A narrow and somewhat fragmented link appears to follow the Salmon River connecting the T-Twin LU with the Salmon River Wilderness area. The most contiguous link with the Roaring River LSR/Salmon River Wilderness/Zig Zag LSR complex appears to be within the Frog LU, Blue Box LU, Abbot LU, and Osprey LUs (mostly associated with riparian habitat, and scenic allocations). This "link" connects with habitat associated with Little Crater Lake and Timothy Lake and bald eagle management areas associated with Timothy Lake. A third corridor may exist between the Mt. Hood and Palmateer LUs and the Zig Zag LSR, but it is at relatively high elevation and appears to have some significant breaks and fragmentation associated with the Government Camp recreation complex. A potential link also occurs through the Warm springs Indian reservation via habitat in the Lynx, Highway and Junction LUs, then southeast through the reservation to habitat within the Stony creek drainage south of Clackamas and Timothy lakes. Suitability of the habitat within the reservation is not well known, but review of the allocations within their management plan and general knowledge of the area in question, indicates this link probably does exist, but is somewhat fragmented.

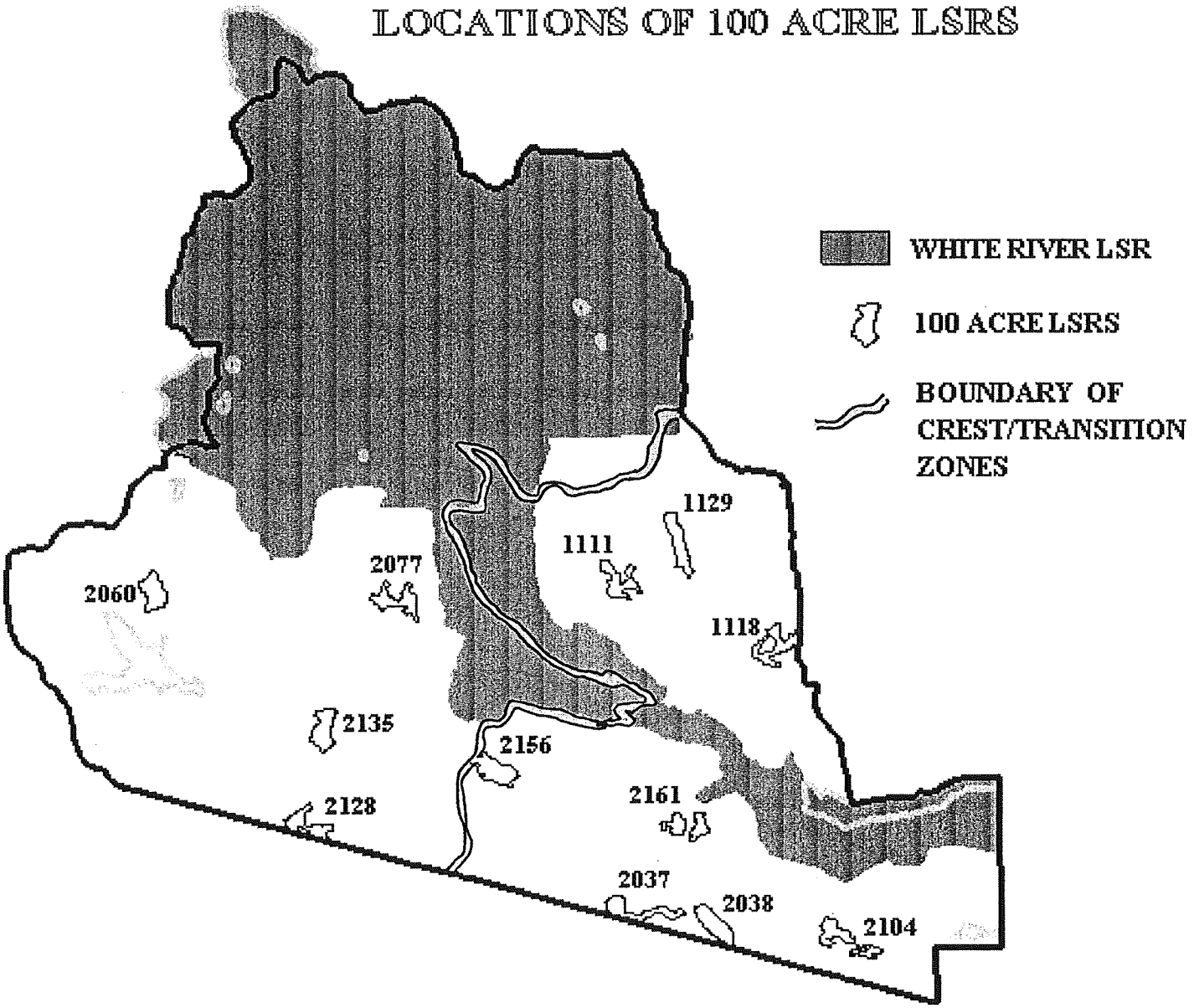
The **TMMLT** (terrestrial, medium home range, large tree mosaic) guild represents the black-backed woodpecker and three-toed woodpecker (known or suspected residents). The **TLMLT** (terrestrial, large home range, large tree mosaic) guild represents the northern goshawk, pileated woodpecker, wolverine, marten, fisher, northern spotted owl and barred owl, all of which are known residents, or suspected to occur with a high likelihood of presence. These species typically use the same structural classes as the TSPLT guild. However, home range size is considered from 500 to 3000 acres for these guilds with at least 50% of the home ranges in large tree patches of at least 20 to 40 contiguous acres. In general, these species do cross openings or other habitats not meeting late-successional criteria, although some form of cover may be necessary to provide a degree of security for such species as the marten, fisher and northern spotted owl.

Total availability of habitat for TMMLT and TLMLT guild species within the LSR is low to very low according to the "HABSCAPES" analysis, with connectivity (dispersal) poor. However, somewhat fragmented refugia exist within the Mt. Hood, Iron, Windy, Twin, and Barlow Butte LUs for both guilds.

Habitat availability for TMMLT and TLMLT species within the LSR is good when using the structural stages identified as suitable habitat for eastside conditions. With the exception of the Outwash, Catalpa, Red and Little Boulder LUs; late-successional habitat represents over 50 percent of the landscape with patches generally exceeding 40 acres in size and with good connectivity north-south and east-west across the LSR. The lower one half of the Canyon LU, as well as the Mustang, Byzandine and Triangle LUs are all within plant associations that naturally would be dominated by ponderosa pine and Douglas fir in an open multi-story to open park-like structural condition. Active management (or long term natural fire frequency) in these drier LUs to reduce the high stocking of understory white fir and/or Douglas fir will not produce stands suitable for members of these guilds, such as northern goshawk, marten, northern spotted owl or the barred owl. The black-backed and three-toed woodpeckers do not now inhabit these drier LUs except on an occasional basis. However, such species as the white-headed woodpecker would benefit by such "management".

Outside the LSR, but within the analysis area, habitat is much more fragmented with the Abbot, Boulder Creek, Cedar, Frog, Green Lake, Highway, Little Knoll, Lynx and Rimrock exhibiting the greatest fragmentation and least habitat. However, even within these, there is fair connectivity of habitat and over 50 percent spotted owl dispersal habitat. Riparian corridors account for a substantial portion of the habitat and connectivity within these fragmented landscape units.

As an index of late-successional habitat within the analysis area, there are 13 northern spotted owl activity centers within the White River LSR, only three having less that the 1186 acres (USFWS minimum), one of which has 1012 acres, another 934 acres, and one with 338 acres on the extreme edge of the LSR. Of the 20 landscape units, three (Byzandine, Triangle and Outwash) are either too dry to produce suitable habitat or are a glacial outwash plain. Of the remaining 17 LUs in the LSR, nine have pair activity centers within them and the remainder all have suitable habitat that is likely being used within 1.2 miles of an existing activity center. Outside the LSR but within the analysis area there are 12 spotted owl activity centers with 100 acre LSRs in the 19 LUs. All the LUs outside the LSR provide suitable habitat for an activity center or one within 1.2 miles of their perimeter, but of the 12 activity centers, six do not have 1186 acres of habitat within 1.2 miles (520, 565, 813, 1087,1096, and 1136 acres).

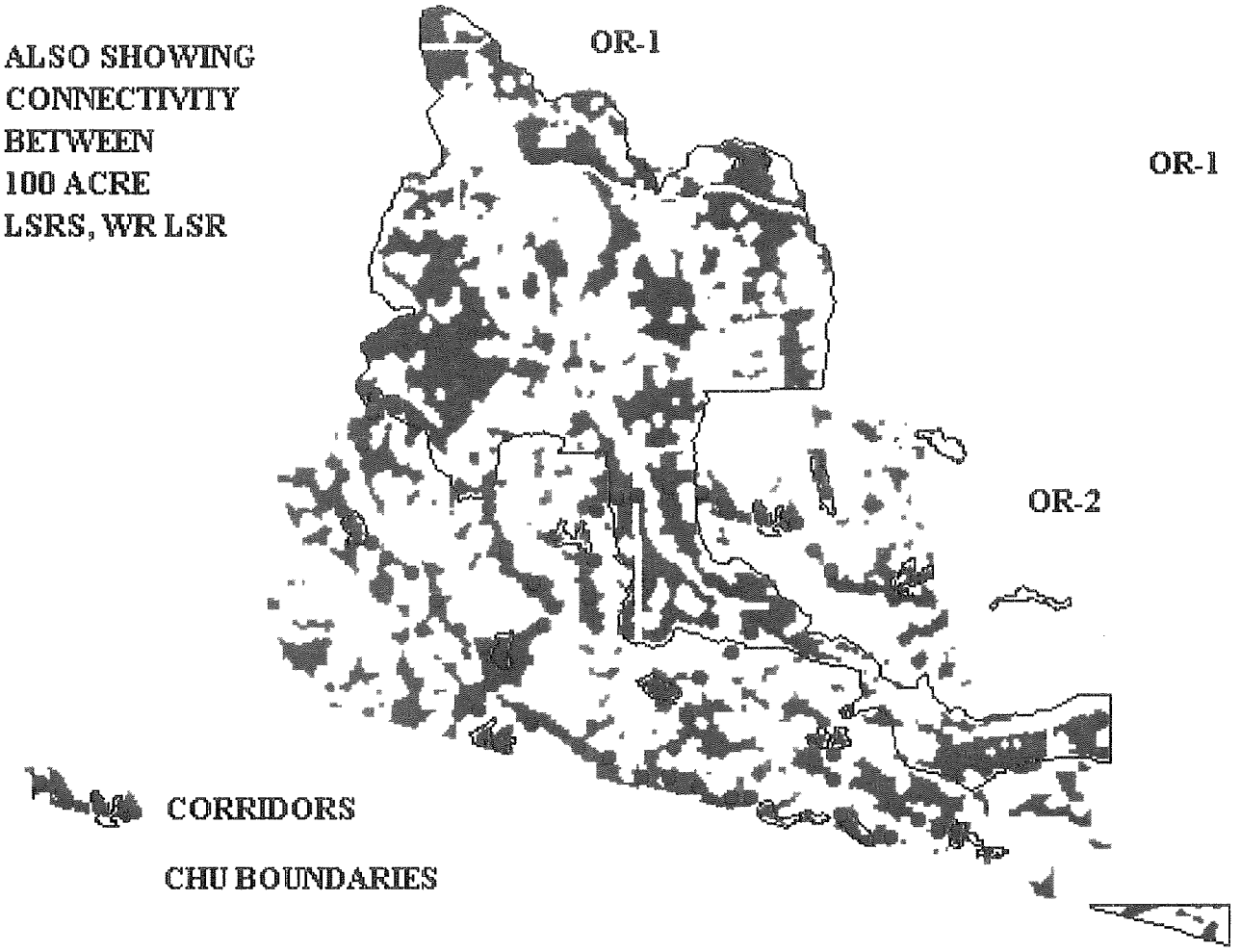

LOCATIONS OF 100 ACRE LSRS
WHITE RIVER LSR
100 ACRE LSRS
BOUNDARY OF CREST/TRANSITION ZONES
1129
1111
2077
2060
1118
2135
2156
2161
2128
2037
2038
2104

The relationship of the White River LSR to the adjacent LSRs for the TMMLT and TLMLT guilds is virtually identical to that of the TSPLT guild already described with the following notable exceptions. By their very nature (mosaic guilds) the TMMLT and TLMLT guilds are better able to disperse across the landscape than the more restricted patch guilds. Connectivity north-south and east-west across the entire analysis area and LSR are currently good. Dispersal gaps and barriers for some species occur within portions of the Swamp, Cedar, Little Knoll, Abbot, Highway and Rimrock LUs. However, all LUs have at least one corridor across them. The sufficiency of some of these corridors to any species which may be interior forest dependent will be discussed separately.

The White River LSR is also intersected by portions of two USFWS Critical Habitat Units (CHU's), OR-1, and OR-2. OR-1 CHU is located at the north extreme of the LSR and includes most of the Mt. Hood and Iron LUs, about one half of Outwash LU, about 15 percent of the Windy LU and a tip of the Palmateer LU. Except for the Outwash LU, which is not capable of producing spotted owl habitat, the other LUs in the White River portion of the OR-1 CHU are virtually unfragmented (except for roads) late-successional (NRF) habitat with a few meadows and talus outcrops mixed in. CHU OR-2 is located mostly within matrix lands in the southeast corner of the analysis area. White River LSR landscape units Canyon, White, Buck and Mustang are almost entirely within it. Currently these LUs are contributing a virtually continuous block of late-successional (NRF) habitat running east-west through the CHU. The Pathfinder, Wildfire, Camas, Clear Creek, Rimrock, Junction and Cedar LUs, and about three fourths of the Swamp and Boulder Creek LUs outside of the LSR make up the remainder of OR-2 CHU within the analysis area. This habitat is much more fragmented than within the LSR. However, sufficient NRF and dispersal habitat remain to provide over 1186 acres of NRF habitat for six of the eight activity centers in the matrix lands (only one of the eight actually has less than 1186 acres within 1.2 miles of its center, the other center has 1136 acres of NRF habitat on national forest lands within 1.2 miles plus almost 1/2 of the 1.2 mile circle is on the Warm Springs Indian Reservation which also has NRF habitat but which has not been mapped for this analysis). Connecting corridors of NRF and dispersal habitat (over 50% of the area within each landscape unit) exist north-south and east-west across the CHU with the exception of the west half of Cedar LU. Sometime in the future, much of the existing NRF habitat will be lost within the Mustang and east end of Canyon LUs within the LSR and the Pathfinder, Wildfire, and portions of the Camas, Clear Creek, Rimrock, Junction and Cedar LUs within the OR-2 CHU. It appears that much of this NRF habitat can be maintained in at least marginal condition for the next 20 years through selective thinning, while conditions improve at the more moist elevations where NRF habitat would naturally have occurred. See the following analysis of white-headed woodpecker habitat for a more complete description of these conditions.

CRITICAL HABITAT UNITS OVERLAYING WHITE RIVER STEWARDSHIP AREA INTERIOR HABITAT

ALSO SHOWING CONNECTIVITY BETWEEN 100 ACRE LSRS, WR LSR



The **white-headed woodpecker, pigmy nuthatch and flammulated owl** are examples of species that guild protocol in the HABSCAPES model may not properly address. The white-headed woodpecker and pigmy nuthatch are found almost exclusively foraging and nesting in ponderosa pine or Douglas fir, while the flammulated owl may utilize any cavity that is large enough within the drier habitats of the ponderosa pine zone. (Note: the only known nesting pair of flammulated owls on the east side of the Mt. Hood National Forest is in a large oak cavity within a ponderosa pine/oak stand between the Badger Creek Wilderness area and the Surveyors Ridge LSR.). Within the ponderosa pine zone, the relatively frequent occurrence of low intensity fires, naturally resulted in open stands (open multi-story and open park-like) of very large ponderosapine, ponderosa pine/Oregon white oak or ponderosa pine/Douglas fir. The frequency of fire in this "dry" zone prevented significant buildup of understory within these open stands (see vegetation description for further details). Presently there is virtually no representation of these stand conditions on the east side of the Mt. Hood National Forest. The high densities of understory within the late-successional habitat in this zone is resulting in moisture stress related mortality within the few very large ponderosa pine and Douglas fir that remain.

Although the present mix of large trees and understory generally meet the needs of such species as the spotted owl, natural mortality is already killing many of the larger overstory. The end result with no intervention will likely be catastrophic loss of large areas of habitat from insects or fire, with virtually no large trees remaining. In other words, "just letting them grow" will probably not result in maintenance or development of large trees or late-successional habitat in this zone. Returning such stands to open park-like or open multi-story condition would protect the existing large ponderosa pine and Douglas fir within them, virtually eliminate the potential for catastrophic loss and should enhance habitat for the white-headed woodpecker, pigmy nuthatch and flammulated owl, while returning the landscape to a more natural condition.

The present standard of 100 percent population potential for white-headed woodpecker for snags (60/100 acres) over 15 inches dbh will probably be difficult to achieve. Achieving this level of soft snags is dependent upon the ability of a hard snag to achieve soft snag characteristics then remain standing long enough to be usable. The R6 snag simulator model indicates that unless the snag is at least 19 inches diameter it probably would not develop the soft snag character, and then could only be expected to stand about a decade. Field reconnaissance and eastside experience indicates the snag simulator predictions for decay of hard snags to soft snags and their longevity probably may not be far from the truth. Also, the snag simulator model also indicates that if we are starting from year zero (today), in the first 30 years almost 4 snags per acre greater than 19" diameter must be saved or created naturally or otherwise to reach the 0.6 per acre (60/100 ac), needed for the 100 percent population potential. In addition natural or other mortality will have to continue to create about 0.6 snags per acre every decade for as far as the model is run to maintain the soft snag levels.

Ponderosa pine grown in this zone take close to 150 years to reach 19 to 20 inches diameter. Over a 150 year period, up to 1120 snags per 100 acres would have to be generated . At an expected basal area of from 80 to 120 square feet per acre, typical of healthy open park-like to open multi-story stands; only 12 to 18, live 20 inch, (less if larger), trees would be present per acre (1200 to 1800 per 100 acres). Even if the longevity was twice that predicted, the impacts to of maintaining the 60 soft snags per 100 acres, do not appear to be within any expected range of natural variability at the landscape scale. Saving fewer hard snags but in much larger diameter classes, (30 inch plus)

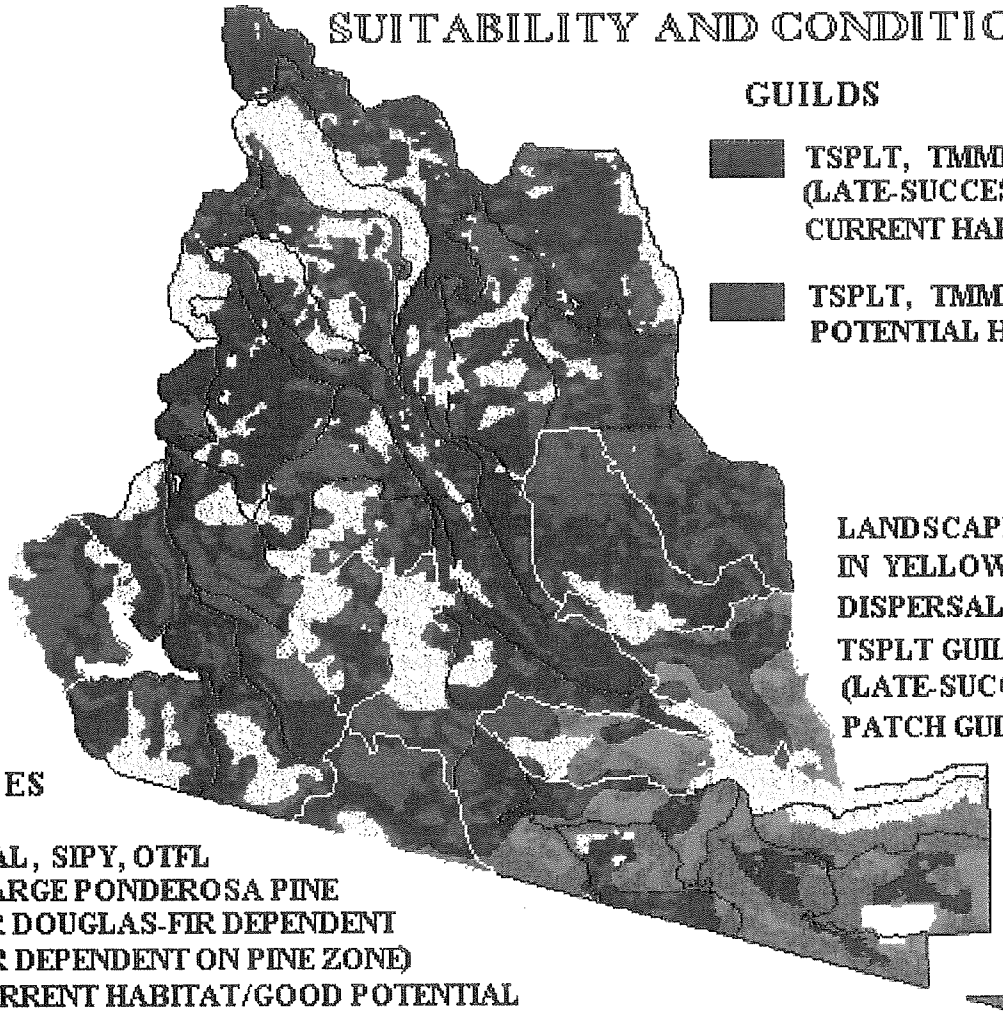
should greatly reduce the total number needed to be generated, since their longevity could be expected to be much greater than for the smaller soft snags. Whether such a strategy would be able to meet the 100 percent population potential while remaining within the range of natural variability has not been determined for this analysis. Further study of snag generation, decay and longevity rates, and viability standards for the white-headed woodpecker appear to be in order.

The Diablo Fire Climax Environmental Assessment in the Pathfinder and Wildfire landscape units has demonstrated that at least in the planning stages, timber harvest can move these excessively dense stands to a healthier condition and in the direction of Open Multi-story or Open Park-like desired future conditions, while still maintaining at least marginal spotted owl nesting, roosting and foraging, and late-successional characteristics. The Diablo planning effort indicated that much of the ponderosa pine zone can probably be brought to the desired open condition with two such entries over the next 20 years, although it will take much longer to grow the large ponderosa pine and Douglas fir where previous harvest has reduced or eliminated them. Interestingly, it appears that the first entry of a two entry process would yield 90 percent of the volume expected from a one entry method that would move as close to the open desired future conditions as possible but not retain any of the late-successional characteristics. (Note: very few stands are currently in a condition that one entry would be able to leave them in a fully suitable open multi-story or open park-like condition). Within the next two years, two timber sales based on that planning effort will be offered and hopefully harvested, allowing actual comparison of before and after conditions and the feasibility of such prescriptions.

It has been recognized that microenvironmental conditions change as you move into late-successional forest and away from openings. These changes are probably most important to some of the fungi, lichens, bryophytes, vascular plants, amphibians, mollusks, and arthropods, and least important to birds and mammals. Within the animal kingdom, the microinvertebrates and invertebrates (with the exception of many of the flying insects) are probably most closely tied to microenvironmental conditions because of their limited mobility. So little is known about invertebrates in the forested environment in terms of the species present, their needs or their function; that it is probably wise to protect interior forest habitat where practicable until more is learned.

Interior forest habitatis most closely represented by the TLMLT HABSCAPES guild. The TLMLT guild does not represent interior habitat within the analysis area as accurately as desired, although for general discussions of connectivity and analysis of relations between LSRs, it appears to be accurate enough. Existing interior forest habitat within the analysis area was mapped utilizing the UTOOLS program to create a 135 meter buffer around the edge of all recorded openings. Any late-successional habitat that was further that the 135 meter distance from an opening was then recorded as interior forest habitat. The White River and the lakes were buffered but probably should not have because of the higher humidity and riparian edge effects probably more than offset the drying effects of increased light and wind. Wet meadows were also buffered, but likely do not have nearly the effect that a more arid opening would have.

GRAPHIC SUMMARY OF HABITAT SUITABILITY AND CONDITION



GUILDS

TSPLT, TMMLT, TLMLT
(LATE-SUCCESSIONAL DEPENDENT)
CURRENT HABITAT/GOOD POTENTIAL

TSPLT, TMMLT, TLMLT
POTENTIAL HABITAT

LANDSCAPE UNITS OUTLINED
IN YELLOW CURRENTLY HAVE
DISPERSAL BARRIERS FOR
TSPLT GUILD SPECIES
(LATE-SUCCESSIONAL DEPENDENT
PATCH GUILD)

SPECIES

PIAL, SIPY, OTFL
(LARGE PONDEROSA PINE
OR DOUGLAS-FIR DEPENDENT
--OR DEPENDENT ON PINE ZONE)
CURRENT HABITAT/GOOD POTENTIAL

PIAL, SIPY, OTFL POTENTIAL HABITAT

Within the LSR, the existing interior forest habitat is relatively well distributed but has significant gaps. Outwash and Triangle are the only two LUs without any interior forest habitat, and in fact they are incapable of growing it. Byzandine, Ridge, Catalpa, and the lower one half of Canyon have little (less than 15 percent) interior forest. Of the last four LUs only Catalpa and part of Ridge are capable of supporting interior forest habitat in the long term.

Mt. Hood, Iron, Windy, Twin, Bonney, Buck, White and upper Canyon LUs form relatively contiguous large refugia of interior forest habitat and could provide recruitment of interior dependent species for populating of less ideal habitat. The Douglas Cabin LSR, Badger Creek Wilderness area and major portions of the Surveyors Ridge LSR, are probably not capable of growing and maintaining sufficient interior forest habitat to provide for recruitment of such species. Mustang LU is also largely interior forest habitat and forms a refugia (albeit a tenuous one) at the east end of the LSR. The remaining LUs in the LSR contain sufficient interior forest habitat to provide for connectivity and dispersal across the LSR. In the future, only the Outwash, Byzandine, Triangle, Mustang and east end of Canyon LUs will not be able to produce and maintain interior forest habitat. Because of their fire histories, the Barlow Butte, Ridge, Red, Palmateer and Bonney LUs will probably be able to produce and maintain from 25 to 60 percent of their areas in interior forest habitat. The remaining LSR landscape units should be at or above 60 percent interior forest habitat.

Connectivity of interior forest habitat to the north with the Surveyors Ridge LSR appears to be excellent along the highway 35 corridor. Connectivity with the Douglas Cabin LSR is best through the Surveyors Ridge LSR and Badger Creek Wilderness but only marginal in more direct routes along the Threemile creek drainage or along a corridor east through the Swamp and Cedar LUs outside the LSR, that may then connect north to the Douglas Cabin LSR.

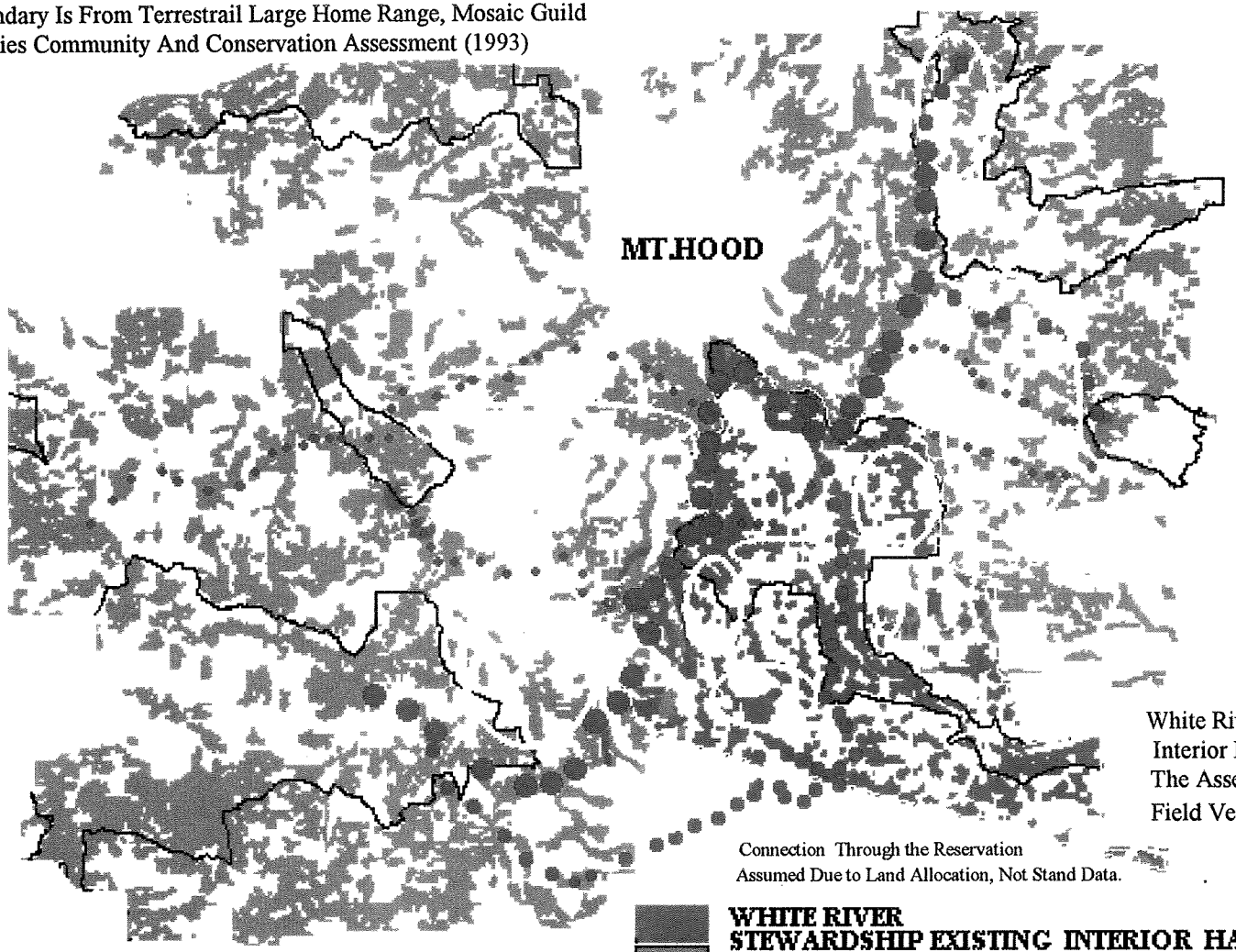
Outside the White River LSR but within the analysis area, interior forest habitat is much more fragmented. Probably none of the interior forest habitat blocks outside the LSR are large enough to be considered refugia or to provide much recruitment for populating other areas. However, there are some almost unbroken connecting corridors that link the White LSR with habitat on the Warm Springs Indian Reservation. The existing or potential for interior forest habitat within or through the reservation is not known other than as already discussed for late-successional habitat in the discussions of the TSPLT guild. The links with the Douglas Cabin LSR were discussed above. Linkage with the Roaring River/Zig Zag LSR-Salmon River Wilderness complex is quite fragmented but does exist through the Frog, Bluebox, Abbot, Osprey LUs and habitat near Little Crater and Timothy lakes. The Salmon River corridor may also provide a link with the Salmon River Wilderness although existing data does not support this. More site specific information for areas outside the analysis area is needed to accurately evaluate connectivity.

The only known introduced non-native birds and mammals in the LSR are; wild turkey, starling, English sparrow, and Virginia oppossum.

The effect of the starling and English sparrow on native late-successional species is thought to be minimal. These species tend to be most closely associated with human disturbance, buildings, cities, and towns; therefore would not be expected to have major affect upon late-successional species.

EXISTING CONNECTIVITY OF INTERIOR HABITAT AMONG ADJACENT LSRs and AREAS OF CONCERN

Stand Data Used On This Map Outside Of The White River Stewardship Boundary Is From Terrestrail Large Home Range, Mosaic Guild Species Community And Conservation Assessment (1993)



The wild turkey (both Merriam's and Rio Grande strains) has been introduced into the analysis area including the LSR. Within the LSR, they are limited to the Byzandine, Triangle, Mustang, Canyon and part of the lower White LUs. Outside the LSR they occupy the Pathfinder, Wildlfire, Camas, Junction, Clear Creek, Rimrock, and Cedar LUs. The principal affect of this species seems to be consumption of mast (mostly acorns, hazel nuts and pine seeds during the majority of the year and ground dwelling insects in the spring). Competition for mast could affect the western gray squirrel but that species is not considered a late-successional associate. Pigmy and flammulated owls also forage upon insects in the spring and potentially could be affected by competition with the wild turkey but this seems to stretch the imagination. Nesting requirements (brush, slash or other cover) does not appear to conflict with any native species.

The Virginia oppossum could inhabit virtually all of the LUs within the analysis area. However, it is not likely to be found in any other than the lower elevation LUs such as Mustang, Canyon, White, Byzandine and Triangle within the LSR and Pathfinder, Wildfire, Camas, Clear Creek, Rimrock and Cedar LUs outside the LSR. Within those LUs it is most likely to be found associated with perennial riparian zones which would eliminate Byzandine and Triangle. The most likely impact of the oppossum would be upon eggs and nestling birds. Therefore, virtually any late-successional bird species found within these LUs could have it's eggs or young fall prey to the oppossum, although for species such as medium to large owls, or hawks which tend to not leave the nests unattended and have the ability to defend the nest successfully, the risks are probably quite small. There is no evidence that oppossum occur in significant numbers in the analysis area or that their affect can be measured.

Summary: The White River LSR not only functions as a refugia for late-successional dependent species, but it appears to be the major center for recruitment of late-successional species within the White River-Surveyors Ridge-Douglas Cabin LSR/Badger Creek Wilderness area complex. Soils, climatic conditions and its positioning on the landscape make the northwest portion of the White River LSR a key area in an eastern linking of late-successional habitat north and south of Mt. Hood. The southeastern tail of the White River LSR could become an excellent example of "eastside" open multi-story and open park-like fire climax vegetation favorable to white-headed woodpeckers and similar species. Due to topography, potential hazards etc., and economics, the east end of the Canyon LU and north aspect of the Mustang LU may not be able to be actively managed to produce their natural open habitat condition. It may take catastrophic natural fire within that area to begin the process where repeated low intensity fire would eventually regenerate the open park-like and open multi-story ponderosa pine and Douglas fir stands that were relatively stable on the landscape.

The current functioning of the OR-1 CHU should remain intact, however through time (10-30) years much of the NRF habitat within the OR-2 CHU will likely be lost due to catastrophic insect or fire events or be degraded by thinning to at least maintain some NRF habitat functionality while reducing the threat of catastrophic loss. Much of the existing NRF habitat within the OR-2 CHU is already degraded due to existing mortality from stress related insect attacks.

Species of management concern identified and conflicting habitat needs: Most of the species of concern listed in table on the facing page will have their habitat maintained or improved through management to achieve late-successional habitat. The white-headed woodpecker, pigmy nuthatch and flammulated owl (not on the table) have already been addressed, as has the lynx.

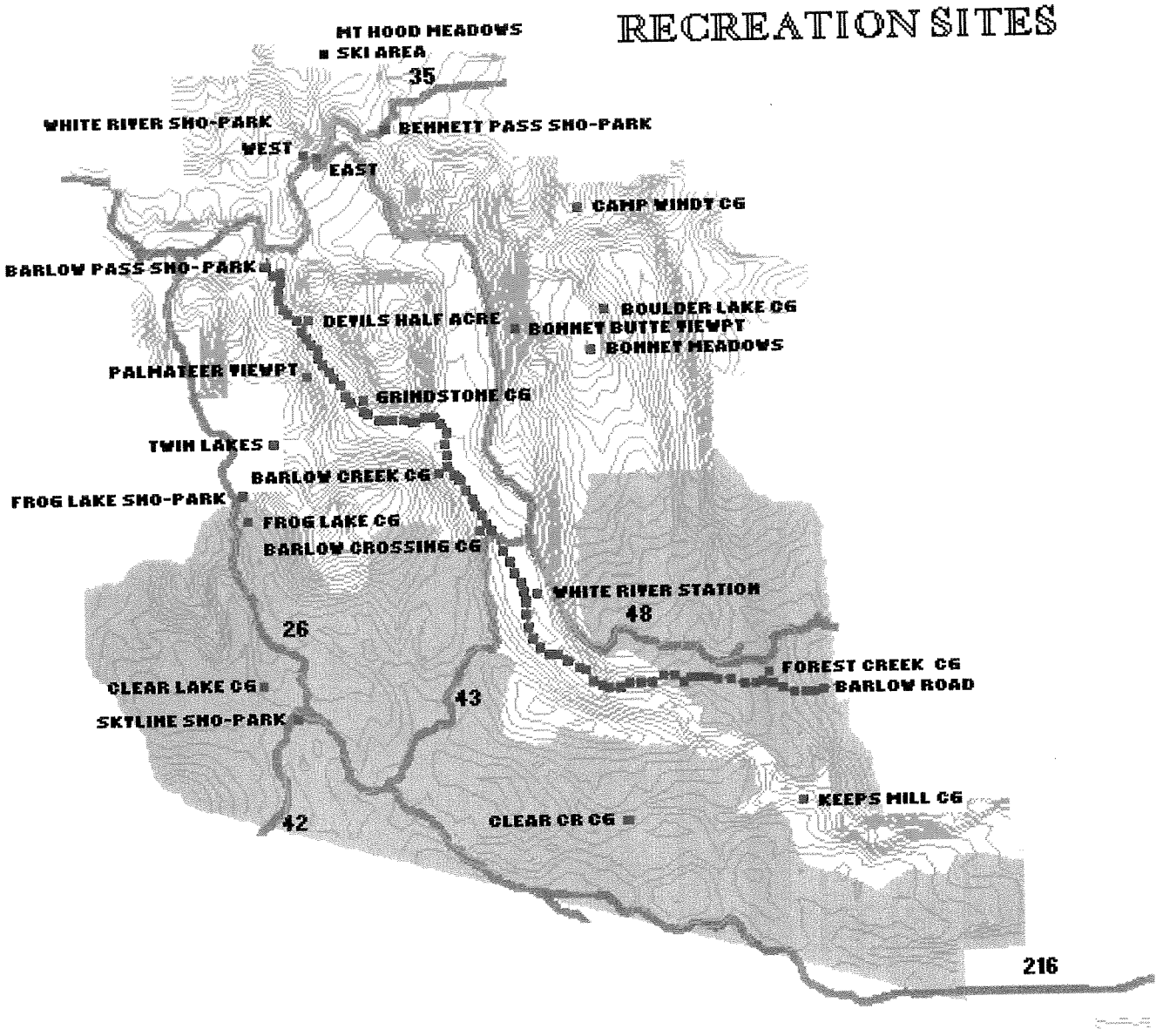
The **black-backed woodpecker** is the only other species of concern identified that may have needs that conflict with late-successional LSR objectives. The standards of 0.12 hard 17+ inch snags per acre plus the other cavity-nesting species snag requirements amounts to about 4 snags per acre in the first 30 years plus about 2.8 per decade thereafter. At about 100 years to grow a 20 inch tree and with healthy basal areas of from 160 to 200+ square feet per acre in the mixed conifer types, meeting the snag requirements would require a maximum of 25 percent of the standing basal area. Considering growth occurs constantly within the stands, leaving larger trees can mean leaving fewer (and potentially less of the basal area) because of their greater longevity, and the relatively high productivity within the mixed conifer zone, these snag retention standards appear to be within the potential range of natural variability on the landscape level. Although lodgepole pine rarely reaches a 17 inch diameter, the standard of "...or largest available..." (ROD C-46), and the fewer species that use lodgepole pine stands results in a much lower snag number that is also achievable. The recommendations for "...beetle infested trees for foraging..." (ROD C-46) are not clear, (ie. "...some such trees should be provided in appropriate habitat...") and can not be evaluated with respect to potential management or desired future conditions within the LSR. However, if future information (the ROD recommends gathering more for this species), indicates a need for lodgepole pine stands for this species; it would be in conflict with the stated late-successional objectives for LSR's. Within the White River LSR there has been a history of large scale stand replacing fires that often generate and perpetuate homogeneous lodgepole pine stands. One such stand of 165 acres, is present within the Palmateer landscape unit. The areas of the LSR with a cycling desired future condition could be managed for lodgepole pine and remain consistent with the ecological history of the LSR.

SPECIES OF MANAGEMENT CONCERN								
SPECIES	GUILD	LS/CLASS	GUILD	J-2	C3	PROP C3	VEGETATION STRUCTURE TYPE	PRESENCE
ASTR	Tailed Frog	Y	RIVA	Y			RIVER	KR
BAWR	Oregon Slender Salamander	Y	TSGG	Y			ANY	SRM
DICO	Cope's Giant Salamander	Y	LKRVA	Y			LAKE/RIVER	KR
FECA	Lynx		TLGSL*	N		Y	SE MSE CA LS OM	SREXT
LACI	Hoary Bat	Y	TMGG	Y			ANY	SRM
LANO	Silver-Haired Bat	Y	TMC	Y		Y	ANY	SRM
MAAM	Marten	Y	TLMLT	Y			SE MSE CA LS OM	KR
MAPE	Fisher	Y	TLMLT	Y			SE MSE CA LS OM OP	KR
MERME	Common Merganser	Y	LKRVARF	Y			LAKE/RIVER	KR
MYEV	Long-Eared Myotis	Y	TMGG	Y		Y	ANY	SRM
MYVO	Long-Legged Myotis	Y	TMGG	Y		Y	ANY	SRM
PHELO	Red Tree Vole	Y	TSPLT	Y	Y		SE MSE CA LS OM	SRL
PIAR	Black-Backed Woodpecker	Y	TMMLT	Y			SE MSE CA LS OM	KR
RHYCA	Cascade Torrent Salamander		RIVARF	Y			RIVER	SRL
STRNE	Great Gray Owl	Y	TLC	N		Y	ANY	KV, SRH

WHITE RIVER LSR LANDSCAPE UNITS WITH UNIQUE SPECIES OR SPECIAL HABITATS		
Landscape Unit	Habitat Or Unique Species Within Landscape Unit	Comments
Outwash	Wet Meadows, 4 Caddisflies, Copes Giant, Tailed Frog, Pacific Giant Salamander, Harlequin Duck, Forested Wetland	
Barlow Butte	Copes Salamander,Tailed Frog,Red Leg Frog,STOC Center,Redband Trout,Maidenhair Fern,Red Huckleberry	STOC Center Condition Ok
Bonney	Cascade Frog,Copes Giant/Long Toed/Pacific Giant Salamander,Tailed Frog,Redband Trout,STOC Center,Talus,Alder Glade,Hawkwatch,Wet Meadow	STOC Center Condition Good
Little Boulder	STOC Center,Lake,Talus,Copes Giant Salamander,Tailed Frog	STOC Center Condition Ok
Mt.Hood	4 Caddisflies,Seep/Alder Complexes,Switchback Falls,Tailed Frog Habitat	
Palmateer	STOC Center,Rock Outcrops,Wet Meadows,Red Legged Frog	STOC Center Condition Good
Windy	STOC Center,Aspen,Cottonwood,2 Lakes,Wet Meadows,Talus,Cascade Frog,N W Salamander, Many Springs	STOC Center Condition Ok
Byzandine	Winter Range	
Mustang	STOC Center,Talus,Cliffs,Redband Trout,Winter Range	
Triangle	Winter Range	
Buck	Copes Giant Salamander,Tailed Frog	Culvert Migration Barrier
Barlow Road	Fisher, 2 STOC Centers, Wet Meadow,Woodland Ponds,Cottonwd Galleries,Pacific Giant /Copes Salamander,R B Trout,Harlequin Duck,Fringed Pinesap	1 STOC Center Condition Poor
Canyon	STOC Center, Goshawk,Redband Trout,Cliffs,Talus,Winter Range,Creamy Stickweed	STOC Center Condition Good
Catalpa	Rough Skinned Newt,Western Toad,Long-Toed Salamander,Cascade Frog,Talus,3 Lakes,Wet Meadow Complex	
Iron	2 STOC Centers, Copes Giant/Pacific Giant Salamander,Tailed Frog,Alder Glades,4 Caddisflies	1 STOC Center Condition Poor Culvert Migration Barrier
Red	Redband Trout,Cascade Frog,Pacific Giant/Copes Salamander,Alaskan Yellow Cedar	
Ridge	Talus,Rock Outcrops,Intermittent Waterfall,Alder Glades,Spring Complex	
T-Twin	Pacific Giant Salamander	
Twin	Rough Skinned Newt,Wet Meadows,2 Lakes,Talus	
White	STOC Center,Halequin Duck,Cottonwood,Alder Glades,Fischer,Redband Trout,Cascade Frog,Springs	STOC Center Condition Ok

Notes: **Redband Trout** above is Redband/inland Trout

STOC Center is Northern Spotted Owl Activity Center


RECREATION SITES
MT HOOD MEADOWS
SKI AREA
35
WHITE RIVER SNO-PARK
WEST
EAST
BENNETT PASS SNO-PARK
CAMP WINDY CG
BARLOW PASS SNO-PARK
DEVILS HALF ACRE
BOULDER LAKE CG
BONNET BUTTE VIEWPT
BONNET MEADOWS
PALMATEER VIEWPT
GRINDSTONE CG
TWIN LAKES
BARLOW CREEK CG
FROG LAKE SNO-PARK
FROG LAKE CG
BARLOW CROSSING CG
WHITE RIVER STATION
48
26
FOREST CREEK CG
BARLOW ROAD
CLEAR LAKE CG
43
SKYLINE SNO-PARK
KEEPS MILL CG
42
CLEAR CR CG
216

HUMAN USE

Primary recreation use of the LSR has been in a dispersed or semi-primitive fashion along the White River corridor and at the minimum development campground sites in the corridor - primarily along the Barlow Road. Big game hunting brings an increase of use of the LSR - perhaps as high as 2500 hunters annually. The lower stretches of White River are nearly inaccessible except for a road to Keeps Mill campground. Few other trails exist in the eastern zone of the LSR and the occasional hiker must "bushwhack" into the rough canyon to reach the White River itself.

Mt. Hood Meadows Ski Resort

Immediately adjacent to the LSR's western end is the Mt. Hood Meadows Ski Area. The resort was constructed in the late 1960's. It is now "built-out" under the authority of a 1978 Master Development Plan and the ski area's owners have been preparing an updated plan. The existing ski area has 3,458 acres within its permit boundary. The selected alternative of a 1990 EIS envisioned the permit area growing by 796 acres. New novice skier terrain with a chairlift (Iron Creek) and parking space addition near Mitchell Creek would be part of 700 acres of expansion into the White River drainage and the LSR. The remaining 96 acres on the northeast corner is sought to incorporate existing cross-country ski trails now operated under a separate special use permit. The 1990 FEIS was appealed and further study is occurring for a Supplemental EIS (SEIS) planned for 1996 publication. Current proposals by the ski area permittee still contain a 700 acre expansion into White River watershed with approximately 200 acres of that being in the White River LSR as described above. The selected 1990 EIS Alternative and the SEIS proposal create roughly 90 acres of permanent openings in late-successional habitat and would also fragment existing connectivity of a major corridor to adjacent LSRs.

The current SEIS team is also studying a proposal by the Federal Highway Administration to re-build the intersection of the ski area access road and Highway 35 to mitigate a dangerous curve that causes numerous accidents each winter. This activity could affect up to 25 acres on the northeast edge of the LSR through tree removal and created openings.

Both the ski area expansion and access road realignment are, by NWFP ROD definition, incompatible with the standards and guides for LSRs because they create permanent openings. A preliminary LSRA by the Mt. Hood National Forest Winter Sports Coordinator in 1995 also concluded that new ski run development in the Iron Creek area would be incompatible with LSR objectives. Immediate replacement with in-kind habitat in this area is not possible because no additional late-successional habitat of this plant association and structure exists outside of but adjacent to the LSR boundary. *This LSR assessment will provide the landscape-level framework for a site-specific analysis of the impacts of the road realignment and ski area expansion alternatives on the functioning of the White River LSR. The pending SEIS is the logical analysis tool by which to decide the value of these proposals.*

When passed by Congress, the Omnibus Oregon Wild and Scenic Rivers Act of 1988 specifically mentioned the ski area adjacent to the White River W&S River and the intent of the legislation to give the agency the option of considering ski area expansion into the White River drainage. The agency is currently taking that option by preparing a Supplemental EIS for the proposed new master plan which will decide whether to expand into White River drainage.

Other Recreation Uses

The Mt. Hood National Forest is recognized as an "urban forest" because of its proximity to a large metropolitan area. The growing population of Portland is having the effect of increasing recreation demands on the forest as a whole. That demand pressure is slowly moving eastward - past Mt. Hood and into areas like the White River LSR. Even the desire for more primitive "dispersed" recreation is on the upswing.

Other human uses run the normal gamut from woodcutting, to driving for pleasure to collecting special forest products (mushrooms, beargrass).

The scenery provided by the LSR from several viewpoints including the Mt. Hood Loop Highway and Timberline Lodge is high quality and important. The existing condition is for the most part classified as meeting the Partial Retention Scenic Quality Level. Some highly visible geometrically shaped clearcuts on Barlow Ridge and other ridgetops are exceptions.

As reported in the White River Watershed Analysis, most of the campgrounds in this area are built in Riparian Reserves and because of vegetation removal by users, soil compaction and other stream side impacts, some sites are in need of reconstruction/revegetation to improve the riparian conditions. The Wild & Scenic Plan has more details of restoration needs at the recreation sites in the river corridor. Boulder Lake, Barlow Creek, Barlow Crossing and White River Station campgrounds are the most needy of those in this category.

Most of the trails located within the LSR (primarily in the western half) were constructed for hiking and horseback use, but early Forest Service trail standards were not as sensitive to erosion concerns as we are today. Although horse use is very light, if it is increased naturally or via permitted outfitter operations, monitoring will be needed to see whether erosion is increasing. These same trails are often used by the growing mountain bike community. Mountain bikes can be fairly innocuous as far as impacts on old roads and trails designed for their use, but again, these trails were not built for bikes and monitoring is needed to assure the growing use patterns do not conflict with ACS strategies.

Similar to the campground situation above, dispersed recreation use in the LSR is at times in conflict with LSR and ACS objectives. A few lakes (Lower Twin, Boulder and Green) are not currently 1) "maintaining and restoring the physical integrity of the aquatic ecosystem, including shorelines and banks," 2) "main-taining and restoring the sediment regime under which the aquatic ecosystem evolved," and 3)"maintaining and restoring the species composition and structural diversity of plant communities in riparian areas and wetlands."

Infrastructure

Road Density: In keeping with the Wild & Scenic River plan and for protection of aquatic and riparian habitats, many roads have been obliterated and/or closed and others are proposed for the same treatment. This work will assure that open road density is about 1.5 miles of road per square mile. Where road closure is not recommended, the White River watershed analysis did prescribe reconstruction, drainage improvements or surfacing for many miles of road in the LSR.

Existing Campgrounds and Recreation Use: (site capacity shown to display relative site size, Paot=People at one time).

- **Boulder Lake CG**
- 15 Paot, 2 Ac.
- **Devils Half Acre CG**
- 6 Paot, 1/4 Ac.
- **Grindstone CG**
- 9 Paot, 1/2 Ac.
- **Barlow Creek CG**
- 16 Paot, 1Ac.
- **Barlow Crossing CG**
- 36 Paot, 2Ac.
- **White River Station CG**
- 50 Paot, 4 Ac.
- **Keeps Mill CG**
- 16 Paot, 1 Ac.
- **Bonney Meadows CG**
- 36 Paot, 3 Ac.
- **Camp Windy CG**
- 9 Paot, 1/2 Ac.

All of the above sites provide the minimum facilities of toilet, fire ring and tables -- no potable water. Keeps Mill has a pit toilet which needs to be replaced with a vault. The Boulder Lake camping area is heavily impacted around the shoreline and the pit toilet could be replaced with a composting unit or moved further from the water. All are free to the public.

Other Constructed Facilities:

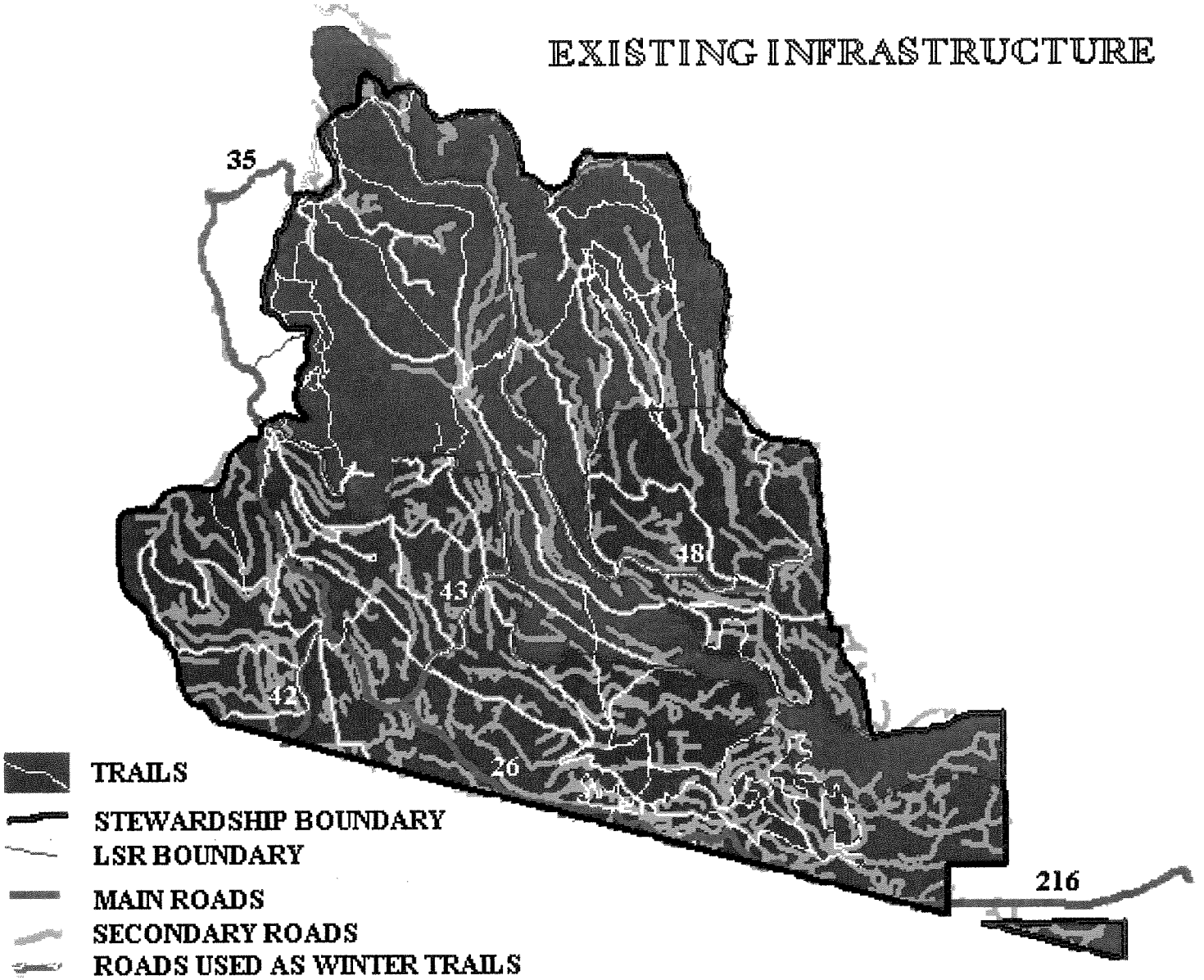
- **White River East Sno-Park**
  .25 Ac. paved
- **Bennett Pass Sno-Park**
  .25 Ac. paved with vault toilet
- **Barlow Pass Sno-Park**
  .5 Ac. paved
- **Frog Lake Sno-Park**
  2 Ac. paved with vault toilet

The **Clear Creek Irrigation ditch** main diversion is in a 100 ac LSR, the **Bear Springs Ranger Station waterline** is in a100 acre LSR , the **Clear Creek Irrigation Ditch** is in a 100 acre LSR (McCubbins), The **Lost-Boulder/Forest Irrigation Ditch** main diversion is in the White River LSR, and a portion of ditchline is in the LSR as well as an old control station at Boulder Lake.

Grasshopper Grazing Allotment - no constructed facilities.

White River Grazing Allotment - no constructed facilities.

Maxine Rock Pit in theByzandine area is seldom used, but is a valuable rock source for future management needs. The five-acre created opening is permanent and cannot be revegetated.


EXISTING INFRASTRUCTURE
35
48
43
42
20
216
TRAILS
STEWARDSHIP BOUNDARY
LSR BOUNDARY
MAIN ROADS
SECONDARY ROADS
ROADS USED AS WINTER TRAILS

MAJOR FINDINGS SYNTHESIS MATRIX

The major findings from this section are an integrated compilation and comparison of the findings from all the previous parts of this analysis. The team used a matrix to track inter-relationships and to assess the *functioning of the LSR as a whole, the surrounding landscape as a whole, and each landscape unit's contribution to the big picture.*

The existing conditions part of this document highlighted some current trends which address resiliency, connectivity and riparian conditions.
The criteria used in the matrix on page IV-59 to assess these factors are:

Resiliency:

- Appropriate Species Mix
- Appropriate Stocking
- Appropriate Mix of Stand Structures
- Past Manipulation
- Relationship to Connectivity and Riparian Condition

Resiliency is low if 3 of the first four factors are less than 40% appropriate.
Resiliency is moderate if 2 of the first four factors are less than 40% appropriate.
Resiliency is high if none or 1 of the first four factors are less than 40% appropriate. Please remember that appropriateness is discussed in terms of comparison with the desired conditions.

Connectivity:

- Appropriate levels of interior mature forest habitat (stand structures MSE, CA, LS, FEM with a 135 meter buffer on other stand structures and non-forest).
- Appropriate locations of interior mature forest habitat
- Land allocations

Connectivity is low if interior habitat is below 25% of potential and land allocations adjacent to the LU are not providing connectivity now or do not have land allocations expected to provide it in the future.
Connectivity is moderate if interior habitat is below 50% of potential and land allocations adjacent to the LU are providing moderate connectivity now and have land allocations expected to provide it in the future.
Connectivity is high if interior habitat is above 50% of potential and land allocations adjacent to the LU are providing moderate to high connectivity now and have land allocations expected to provide it in the future.

Riparian Condition:

- Canopy Closure
- Instream wood
- Sediment

Riparian Condition is Good if stream data show no deficiency in any of the three above factors.
Riparian Condition is Fair if stream data show no deficiency in 2 of the three above factors.
Riparian Condition is Poor if stream data show deficiency in 2 of the three above factors.

Other Factors:

- Presence of Unique Species or Habitats.
- Road Densities (expressed in miles of road proposed for closure).
- Number of proposed (from other large scale plans) recreation restoration projects.
- Fish Migration Barriers.

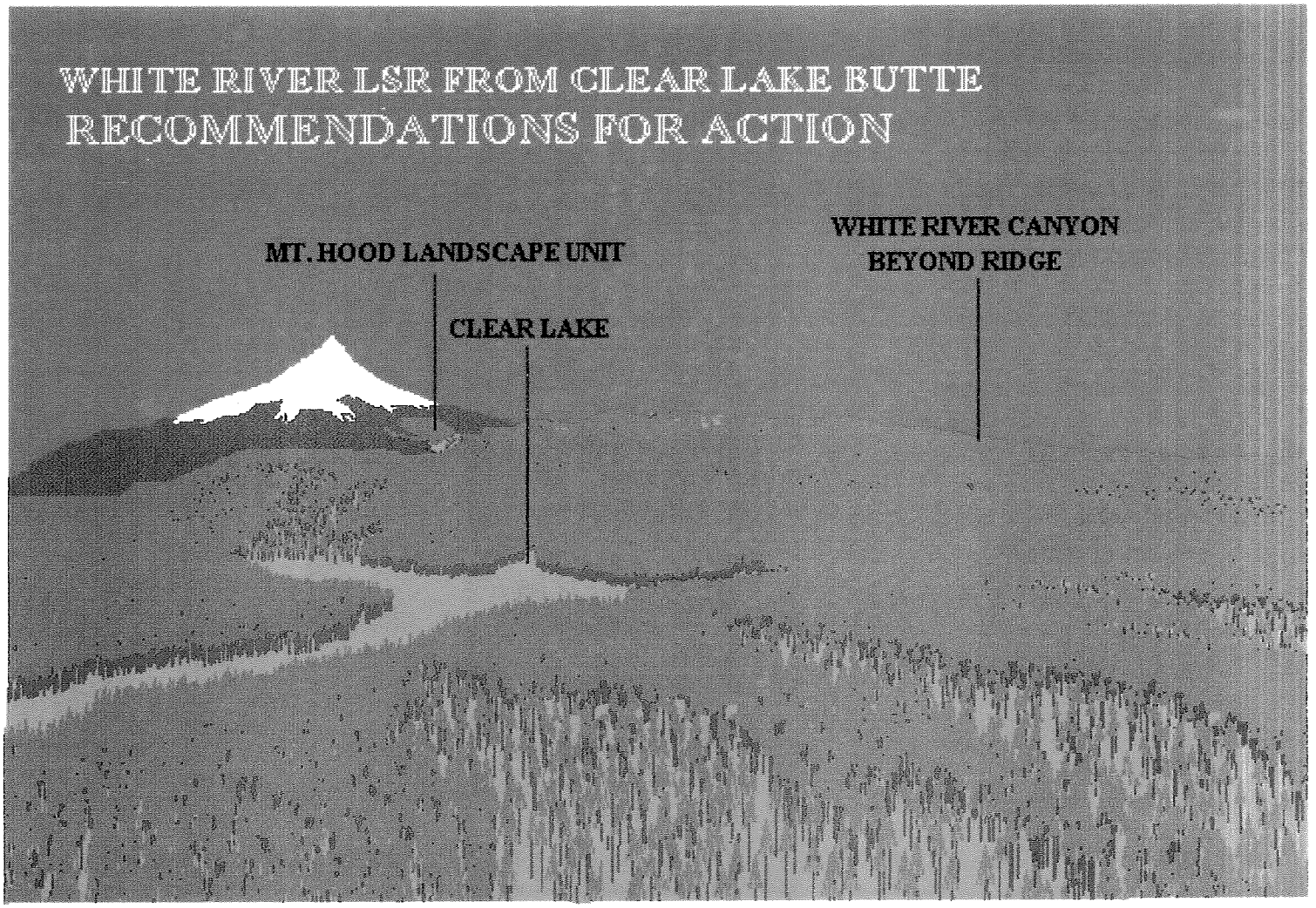
Results: Each Landscape Unit was rated separately using a numerical scoring system. The LUs are listed in order of least to most intact ecosystem function considering all of these factors together. On the next page is the matrix of scoring data we used. *The numbers either express high, moderate, or low in reverse scale or are the actual number of a factor. See page IV-60 for the LSR stand data we used.*

Landscape Units In Order Of Lowest To Highest Ecological Functioning --Within The White River LSR=Bold Type
Landscape Units Outside Of LSR Rated Separately From Lowest To Highest Functioning For Contributing To LSR Values And Objectives=Normal Type

Landscape Unit	Resiliency H-M-L	Existing Connectivity H-M-L	Potential x Existing Connectivity *2	Number Of Unique Species Or Habitats*	Road Closures #See Note	Number Recreation Restoration Projects	Riparian Condition H-M-L	Relative Score Highest Number = Worst Situation
Little Boulder	80	80	80	5	20	1	40	306
Catalpa	50	80	80	8	12	0	40	270
Mustang	80	20	80	4	25	0	40	249
Canyon	80	20	20	4	30	2	40	196
Byzandine	80	50	50	0	6	0	0	186
Triangle	80	80	0	0	6	0	0	166
Red	50	50	0	5	15	0	30	150
Outwash	20	80	0	7	9	0	30	146
Barlow Road	50	20	0	18	18	2	37	145
Palmateer	50	20	20	4	7	3	30	134
Ridge	20	50	50	5	6	0	0	131
Bonney	50	20	0	10	16	0	30	126
Barlow Butte	50	35	20	5	14	0	0	124
Buck	80	20	0	2	6	0	0	108
Windy	20	20	0	8	8	2	40	98
White	50	20	0	8	10	1	0	89
Twin	50	20	0	4	11	2	0	87
Iron	20	20	0	16	27	0	0	83
T-Twin	50	20	0	1	6	0	0	77
Mt.Hood	20	20	0	4	6	0	0	50
Boulder Cr.	80	80	80	*Note: The use of the number of special habitats in this sense was: If other things are equal, problems in a landscape unit with special habitats are more significant than problems where no such habitats exist. The relative weighting for this item was low as it was meant as a "tie-breaker"sort of factor. Point being: we know it's a good thing to have special habitats! *2 If Existing Connectivity Is High And Potential Is Low, Score=80 If Existing Connectivity Is Low And Potential Is High, Score =80 If Existing Connectivity Is High And Potential Is High, Score=0, And So Forth: L/L=0 L/M=50 H/M=20 M/L Or M/H=50 M/M=0 # Not Actual Miles-LU With Most Miles Rd. To Close=39 Of 39, Etc.	36			276
Cedar	80	80	50		38			248
Highway	80	80	50		35			245
Abbott	50	80	80		22			232
Green Lake	80	80	50		21			231
Swamp	80	65	65		19			229
Wildfire	80	50	50		39			219
Osprey	50	80	50		34			214
Frog	50	65	65		33			213
Lynx	50	80	50		32			212
Pathfinder	80	50	50		29			209
Little Knoll	50	80	50		26			206
Rimrock	80	80	0		31			191
Bearpaw	50	65	50		23			188
Utopia	50	50	50		28			178
Bluebox	20	50	50		24			144
Camas	80	50	0		13			143
Junction	50	50	0		37			137
Clear Cr.	50	50	0		17			117

COMPARISON OF EXISTING AND DESIRED VEGETATION STRUCTURES IN WHITE RIVER LSR LANDSCAPE UNITS

LSR LUs	Landscape Unit Acres	Existing Stand Initiation	DFC Stand Initiation	Existing Stem Exclusion	DFC Stem Exclusion	Existing Mature Stem Exclusion	DFC Mature Stem Exclusion	Existing Cathedral	DFC Cathedral	Existing Late Seral Tolerant Multistory	DFC Late Seral Tolerant Multistory	Existing Fire Exclusion Multistory	Existing Open Parklike	DFC Open Parklike	Existing Open Intolerant Multistory	DFC Open Intolerant Multistory	Existing Interior Habitat	DFC Interior Habitat
Barlow Butte	2344	14%	9%	26%	6%	17%	14%	35%	64%	2%	3%	0%	0%	0%	0%	0%	14%	34%
Barlow Road	1791	3%	1%	12%	5%	40%	2%	33%	41%	6%	42%	0%	0%	0%	0%	0%	35%	57%
Bonney	3076	13%	8%	19%	5%	43%	25%	16%	37%	3%	17%	0%	0%	0%	0%	0%	30%	39%
Buck	835	18%	0%	1%	0%	65%	0%	14%	84%	2%	12%	0%	0%	0%	0%	0%	47%	90%
Byzandine	526	7%	5%	3%	5%	29%	0%	0%	0%	0%	0%	42%	0%	45%	0%	45%	15%	0%
Canyon	3276	10%	3%	19%	2%	29%	5%	28%	28%	7%	19%	0%	0%	33%	0%	4%	27%	34%
Catalpa	1736	6%	6%	46%	4%	44%	28%	0%	52%	1%	8%	0%	0%	0%	0%	0%	14%	56%
Iron	2643	8%	0%	4%	17%	24%	0%	18%	9%	41%	61%	0%	0%	0%	0%	0%	42%	53%
Litte Boulder	2167	33%	3%	13%	2%	23%	4%	12%	33%	19%	57%	0%	0%	0%	0%	0%	16%	77%
Mt. Hood	832	0%	0%	3%	2%	10%	0%	0%	0%	81%	90%	0%	0%	0%	0%	0%	71%	92%
Mustang	1672	7%	0%	4%	0%	5%	0%	0%	4%	3%	0%	80%	0%	29%	0%	69%	52%	0%
Outwash	1807	0%	10%	34%	32%	6%	0%	4%	4%	2%	3%	0%	0%	0%	0%	0%	0%	1%
Palmateer	1060	3%	15%	33%	10%	37%	27%	17%	37%	7%	8%	0%	0%	0%	0%	0%	22%	35%
Red	982	4%	9%	43%	6%	33%	17%	12%	61%	4%	7%	0%	0%	0%	0%	0%	13%	35%
Ridge	873	0%	11%	27%	7%	22%	16%	28%	9%	0%	32%	0%	0%	0%	0%	0%	13%	16%
T-Twin	586	0%	0%	28%	0%	72%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	55%	95
Triangle	72	0%	0%	0%	5%	12%	5%	0%	0%	0%	0%	18%	0%	90%	0%	0%	0%	0%
Twin	2586	5%	8%	8%	3%	58%	17%	3%	31%	26%	41%	0%	0%	0%	0%	0%	58%	64%
White	2042	2%	2%	2%	3%	36%	5%	13%	26%	35%	62%	0%	0%	0%	0%	0%	49%	76%
Windy	3581	4%	22%	22%	3%	31%	31%	31%	7%	4%	48%	0%	0%	0%	0%	0%	35%	62%


WHITE RIVER LSR FROM CLEAR LAKE BUTTE
RECOMMENDATIONS FOR ACTION
MT. HOOD LANDSCAPE UNIT
CLEAR LAKE
WHITE RIVER CANYON
BEYOND RIDGE

PART V

RECOMMENDATIONS FOR ACTION

The previous sections of this assessment described the range of natural conditions, the desired conditions, the existing conditions and assessed the LSR and surrounding landscape for ecosystem function according to the objectives of the Mt. Hood Forest Plan as amended by the Northwest Forest Plan.

We now have a good idea of where our goals and objectives are being met, whether they will continue to be met in the future, and where they are not being met. We know what part each landscape unit plays in this picture of the landscape. See the map on the facing page for a visual summary of our findings.

POSSIBILITY FOR IMPROVEMENT

The next task is to see where management can hope to improve or enhance ecosystem functioning. A landscape unit does not become a high management priority simply because it is rated as relatively low in function. There must be confidence that we can do something about it!

The assessment team went over the concerns for each landscape unit and rated each one for possibility for improvement. When this improvement possibility is overlayed with functioning, the following priorities become apparent:

FUNCTION +	IMPROVEMENT =	PRIORITY
High	High	Moderate
High	Moderate	Low
High	Low	Low
Moderate	High	Moderate
Moderate	Moderate	Moderate
Moderate	Low	Low
Low	High	High
Low	Moderate	High
Low	Low	Moderate
Low	Very Low	Low

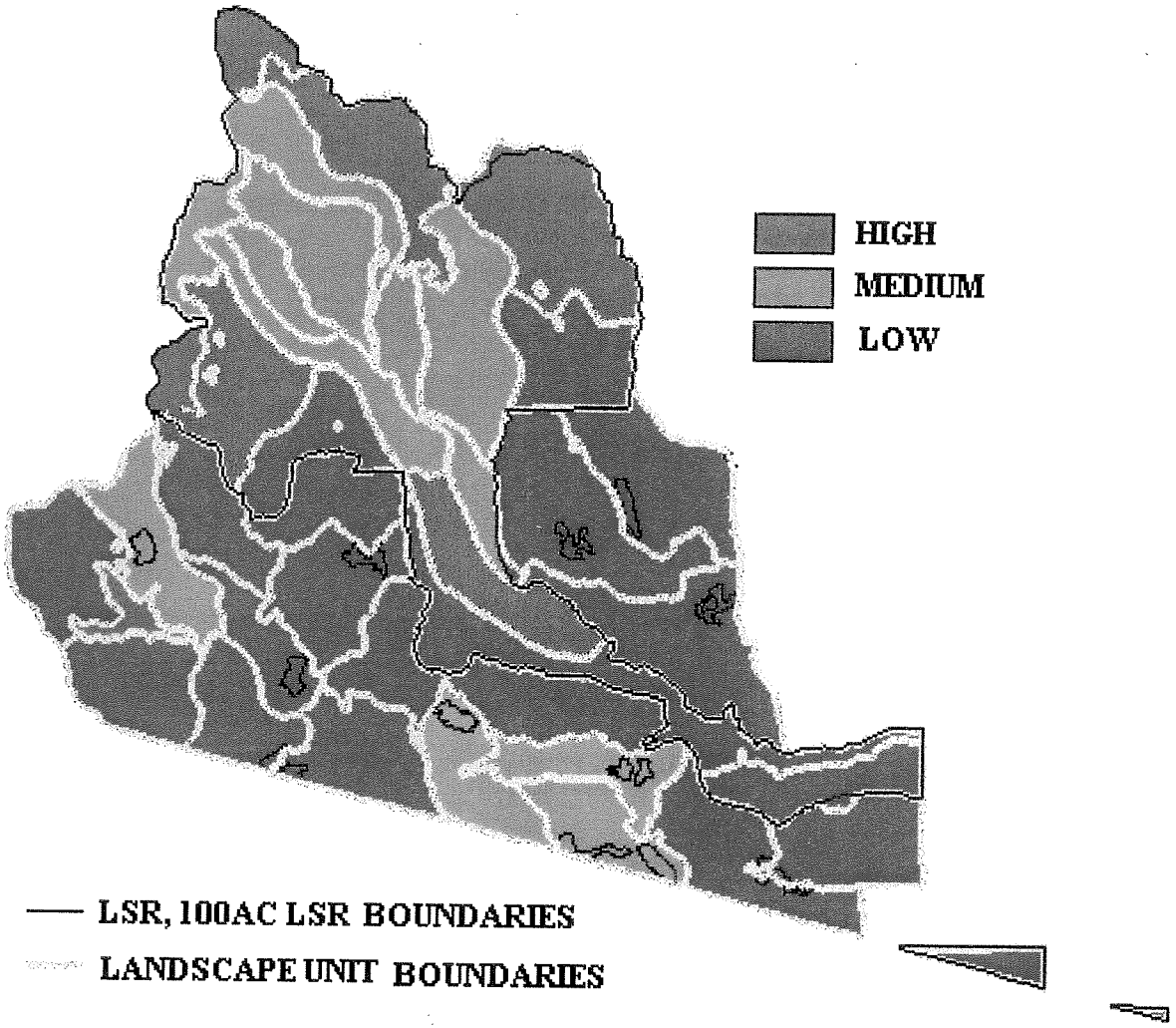
CRITERIA FOR PROJECT VALIDATION AT THE LANDSCAPE UNIT LEVEL

Once a landscape unit has been selected on the project schedule, the following process should be followed at the scale of the landscape unit:

- Validate desired stand structures at the stand, landscape unit and adjacent landscape unit level.
- Update or validate ecological data with walk-through stand evaluation.
- Develop final site specific desired conditions for each landscape element and reconcile at landscape level for connectivity, refugia, interior habitat, etc.
- Prepare prescriptions or projects which will move the area to the DFCs while maintaining as much late-successional habitat as will be stable for at least 20 years.

MANAGEMENT PRIORITY				
Landscape Unit	LSR	Improvement Score	Priority	Implementation Schedule
Byzandine	Yes	110	1	1999
Triangle	Yes	100	1	2000
Mustang	Yes	90	1	2001
Pathfinder	No	75	1	1997
Wildfire	No	75	1	1996
Frog	No	60	1	2002
Highway	No	60	1	1998
Catalpa	Yes	50	1	2003
Clear Cr.	No	50	1	2004
Canyon	Yes	40	1	2005
Junction	No	40	1	2006
Abbott	No	30	1	2007
Bearpaw	No	30	1	2008
Lynx	No	30	1	2009
Osprey	No	30	1	1997
Rimrock	No	30	1	2010
Cedar	No	25	1	2011
Green Lake	No	20	1	2012
Barlow Road	Yes	125	2	2013
White	Yes	110	2	2014
Palmateer	Yes	60	2	2015
Red	Yes	50	2	2016
Bonney	Yes	40	2	2017
Buck	Yes	30	2	2018
Camas	No	30	2	2018
Little Boulder	Yes	20	2	2020
Utopia	No	15	2	2021
Little Knoll	No	10	2	2022
Swamp	No	5	2	2023
Boulder Cr.	No	0	3	After 2023
Windy	Yes	50	3	After 2023
Barlow Butte	Yes	20	3	After 2023
Iron	Yes	20	3	After 2023
Twin	Yes	20	3	After 2023
T-Twin	Yes	10	3	After 2023
Bluebox	No	0	3	After 2023
Mt.Hood	Yes	0	3	After 2023
Outwash	Yes	0	3	After 2023
Ridge	Yes	0	3	After 2023

RELATIVE ECOSYSTEM FUNCTION



DESIGN PARAMETERS, MONITORING NEEDS, AND MITIGATION MEASURES APPLICABLE TO ANY PROJECTS WITHIN THE WHITE RIVER LSR OR 100 ACRE LSRs

General Design Parameters

All thinnings either from above or below are assumed to include aspects of variable design for both overstory and understories. However, a blanket statement is not possible as it *entirely* depends on the interface between the desired conditions and the existing conditions. *The project list starting on page V-6 includes an estimate of the intermediate stand structures expected after* ***treatment.*** *These structures are defined on page II-4 indicating what the post treatment canopy closure, acceptable snag and downed wood levels, species compostion of each layer and size classes in each layer would be.* It is our hope that we can get away from the idea that commercial thinning prescriptions should be based on the foundation of spacing. We do not expect to implement commercial thinnings based on basal area or a particular spacing. This is to ensure that spacing is completely random and variable as per natural conditons.

Pre-commercial thinning contracts will be loosely based on spacing. *See page V-15 for examples of how these ideas will be applied.*

Acceptable Tree Mortality in The Crest Zone: 300-500 acres is the largest scale high mortality (greater than 25%) from any natural disturbance process event considered "absorbable" without reassessment at the landscape level.

Acceptable Tree Mortality in The Transition Zone and Eastside Zones: Insect and disease and the resultant mortality should occur on a much smaller scale in these zones. The desired condition is to have the greatest number of acres in the desired stand structures; 10 to 20 acres of high mortality with significant risk of catastrophic loss to desired late-successional habitat would be a trigger requiring assessment of the situation at the landscape unit level. Such an event would indicate that the landscape unit in question should move ahead in terms of priority. No salvage per se would be conducted, but rather stand densities would be handled as per the project recommedations already planned. Any new disturbance greater than 50 acres would require re-assessment at the landscape level (the scale used in this document).

Salvage: No salvage within the LSR is necessary at this time or expected to be necessary within the scope of years this iteration of assessment is planned to cover. Tree mortality will be accepted as part of the natural scheme *unless the above two triggers are met.* If they are met, the action they would trigger would be a landscape-level re-assessment.

Hazard Trees along Open Roads: Use the guide by Richard Thurman illustrated on page III-7.

General Mitigation Measures

Snags: In general snags will be left as per the eventual desired condition for each stand type unless adjacent stands are deficient and additional snags are prescribed to compensate. Creation of snags *from green trees* will occur when stands do not contain sufficient numbers of existing snags per acre.

Snags will then be created from green trees to achieve at least 40% of population potential for all species except the black-backed woodpecker which is at 100% in the mixed conifer; and at least 60 percent population potential for all species except the white-headed woodpecker which is at 100 percent in the ponderosa pine zone. The actual numbers of snags to be created will be dependent upon the latest research information on population viability and needs for the species involved as well as the range of natural conditions for the landscape unit and plant association. Tree species selection for snag creation will be based upon the anticipated makeup of the stands once they achieve their desired future condition, unless this would prevent or significantly delay the

achievement of that desired future condition. Under those circumstances, snags would be created from trees in the existing stand that most closely meet the characteristics of the prefered snags. As an example, within the ponderosa pine zone about 4 snags per acre are needed to meet the standards (see white-headed woodpecker page IV-45). Often there are not four green large diameter ponderosa pine or Douglas fir remaining in those stands. To convert these trees to snags would severely retard achieving the Open Park-like or Open Intolerant Multi-story stand structure desired. In such cases, white fir could be used to replace some or all of the ponderosa pine and Douglas-fir even if the diameters were not quite up to standards.

Northern Spotted Owl Activity Centers: There will be seasonal restrictions within 1/4 mile of activity centers for any projects with the potential for disturbance. In White River LSR and 100 acre LSRs, *survey for current locations of owl activity centers prior to any habitat impacting project implementation.*

Riparian Reserves: Canopy closures within riparian reserves with the desired condition of Open Park-like will not drop below 60%. Canopy closures in Riparian Reserves with the DFC of Open Intolerant Multi-story, or Cathedral will not drop below 70%.

Do not use ground disturbing equipment to accomplish projects in riparian reserves unless ground disturbance is necessary to achieve aquatic conservation objectives such as would occur with deep ripping compacted soil.

Scenery: Evaluate projects for their effects on sensitive scenery from viewpoints along the Barlow Road, Road 48, Highway 35, Highway 26, Mt. Hood Meadows Ski Area, Timberline Lodge, trails, campgrounds or heavily used dispersed campsites

General Monitoring Needs:

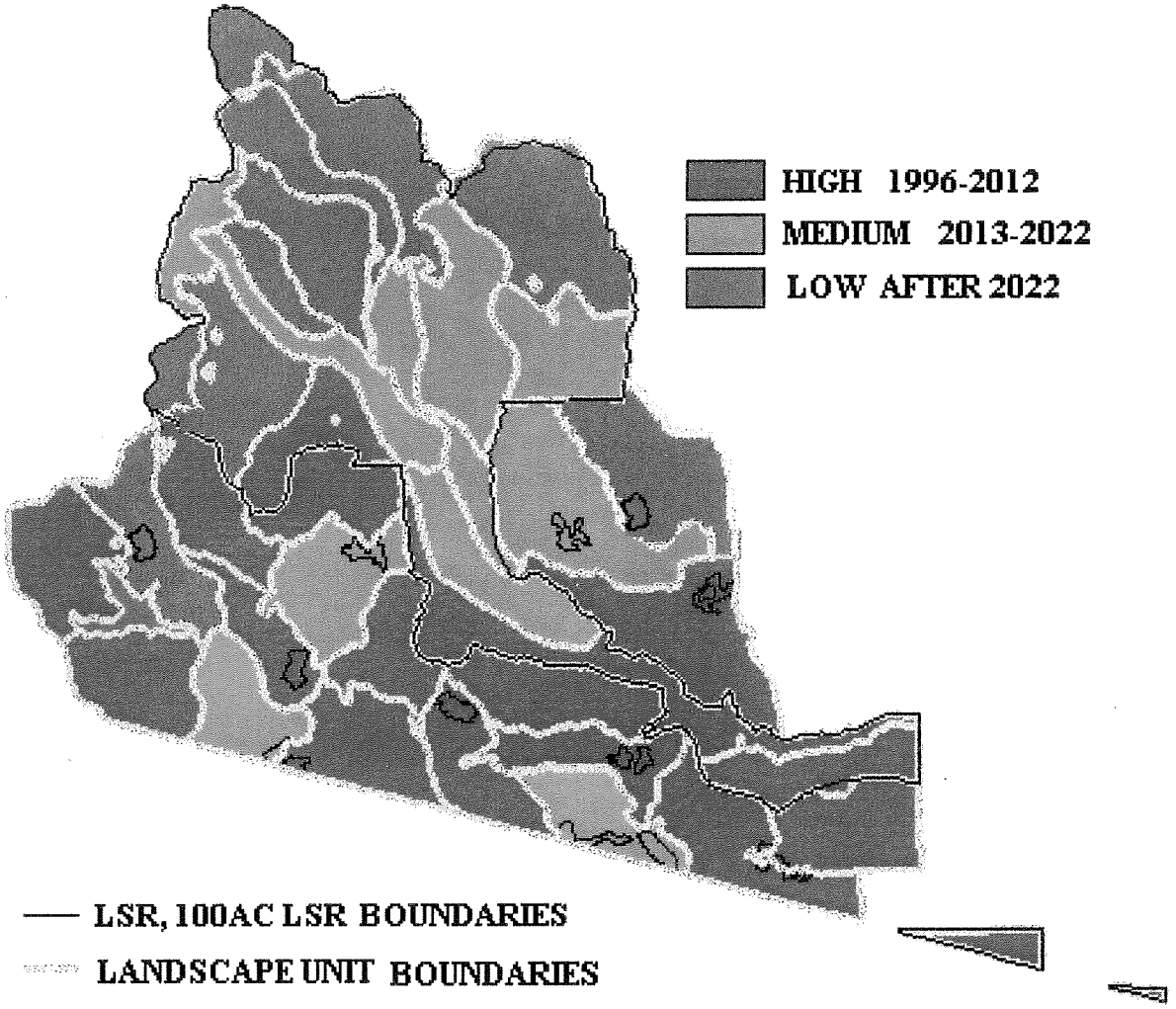
- Survey for species occurence for species listed of management concern.
- Develop site-specific desired conditions for riparian reserves based on specific data for each stream reach.
- Monitor white headed woodpecker soft snags needs.
- Apply general landscape and landscape-unit effectiveness monitoring at 10-year intervals.
- Continue or improve stream temperature monitoring to build baseline information.

TRIGGERS FOR LANDSCAPE LEVEL RE-ASSESSMENT

- Large scale disturbances such as those mentioned under design parameters.
- The process used for validation at the landscape unit level will ensure that this assessment is a living document. However, landscape analysis and design is a valuable process and should be undertaken when:

- New methods or information make the foundation underlying this assessment invalid or inadequate.
- The projects and schedule of work are complete.
- Surrounding land use changes or the surrounding landscape is affected by a large scale disturbance.
- New management direction is incompatible with the goals and objectives of this assessment.

TREATMENT/PROJECT PRIORITY IMPLEMENTATION SCHEDULE



PROJECTS

The following pages list projects intended to correct or to begin to correct problems found during analysis. Please refer to the **stand type definitions** on page II-4 to help with the understanding of the *canopy closure, species composition, size classes and large woody material and snags* expected for each DFC **or** *post-treatment stand type.*

SUGGESTED MANAGEMENT ACTIONS						
LU	**LSR**	**PROBLEMS**	**SILVICULTURE PROJECTS**	**RESTORATION PROJECTS**	**SURVEY/ MONITOR**	**MITIGATION**
Byzandine	Yes	Low Resiliency Low Connectivity (Low Potential). No Data On Intermittent Streams. Winter Range. Remnant Large Pine At Risk.	Thin M S E Stands, Thin F E M, Stands From Below To Achieve Eventual D F C of O P, O M. Expected Post Treatment Stand Structures: M S E, U R, F E M, O M. Underburn Thinned Stands.	Add Large Woody Material To Major Intermittent Stream.	Survey Condition Of Intermittent Streams. Monitor Sediment From Maxine Pit.	Leave Clumps Of Untreated Areas For Thermal Cover, Arrange C A Structure For Thermal Cover.
Triangle	Yes	Low Resiliency Low Connectivity (Low Potential). No Data On Intermittent Streams. Winter Range. Remnant Large Pine At Risk.	Thin F E M Stands From Below In Forested Areas To Achieve Eventual D F C of O P. Expected Post Treatment Stand Structures: O M, F E M, U R Underburn Thinned Stands.		Survey Condition Of Intermittent Streams.	Leave Clumps Of Untreated Areas For Thermal Cover.
Mustang	Yes	Low Resiliency High Connectivity (Low Potential). Low Wood In Mukluks Cr. Remnant Large Pine At Risk. Topography May Limit Treatment Scope.	Thin M S E Stands, Thin F E M Stands From Below To Achieve Eventual D F C of O P, O M-Disfavor Grand Fir. Expected Post Treatment Stand Structures: O M, F E M, U R, C A. Underburn Thinned Stands. Thin Plantations, Variable Spacing And Leave Untreated Clumps.	Close 3.97 Miles Of Road. Add L W M To Mukluks Cr.	Walk-Through Survey Of Condition Of Intermittent Streams.	No Silviculture Activity Within 1.2 Miles Of S T O C Activity Center Within And Adjacent To L U.

Pathfinder	100 Ac L S R	Low Resiliency High Connectivity (Low Potential). Remnant Large Pine At Risk. Noxious Weeds. Winter Range.	Thin M S E Stands, Thin F E M Stands From Below To Achieve Eventual D F C of O P, O M-Disfavor Grand Fir. Expected Post Treatment Stand Structures: O M, F E M, U R, C A. Underburn Thinned Stands. Thin Pine Plantations By Underburning/Pre-Commercial Thinning -Variable Spacing.	Close 8.94 Miles Of Road. Plant Hardwoods In Riparian Areas. Rehab Existing Spring Development. Control Houndstongue, Tansy.		No Silviculture Activity In 100 Acre L S R. Arrange C A Structure For Thermal Cover. Maintain Balance Of Owl N R F Habitat.
Wildfire	100 Ac L S R	Low Resiliency High Connectivity (Low Potential). Remnant Large Pine At Risk. Noxious Weeds. Winter Range.	Thin M S E Stands, Thin F E M Stands From Below To Achieve Eventual D F C of O P, O M-Disfavor Grand Fir. Expected Post Treatment Stand Structures: O M, F E M, U R, C A. Underburn Thinned Stands. Thin Pine Plantations By Underburning/Pre-Commercial Thinning -Variable Spacing. Maintain Int. Habitat Corridor.	Close 11.93 Miles Of Road. Control Houndstongue, Tansy.		Maintain Balance Of Owl N R F Habitat. Arrange C A Structure For Thermal Cover. No Silviculture Activity In 100 Acre L S R.
Frog	No	Moderate Resiliency Low/Mod Connectivity (High Potential) Goshawk Nest	Thin M S E Stands To Achieve The Eventual D F C Of L S, C A Expected Post Treatment Stand Structures: U R, M S E, C A. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 7.24 Miles Of Road.	Survey For Goshawk.	No Thinning 30 Acres Around Goshawk Nest.
Highway	100 Ac L S R	Low Resiliency Low Connectivity (High Potential) Highway 26 Viewshed	Thin M S E Stands To Achieve The Eventual D F C Of C A, L S ,O M Expected Post Treatment Stand Structures: U R, M S E, O M, C A. Thin Plantations, Variable Spacing And Leave Untreated Clumps Maintain Function Of Interior Habitat Corridor.	Close 8.08 Miles Of Road.		Leave Untreated Stands Along 26 In Clumps, I T M, Flush Cut Stumps In Near Foreground. No Silviculture Activity In 100 Acre L S R.

Catalpa	Yes	Moderate Resiliency (Stocking) Low Connectivity Low Wood In Green Lake Cr.	Thin Plantations To Produce Variable Spacing , Species Diversity To Achieve Eventual D F C Of C A , L S.	Close 1.6 Miles Of Road Add L W M In Green Lake Creek.	Monitor Natural S E M S E Stands For Self-Thinning, Insect And Disease Levels Over The Next 5-13 Years.	
Clear Cr.	100 Ac L S R	Moderate Resiliency Moderate Connectivity (Moderate Potential)	Thin F E M Stands From Below To Achieve Eventual D F C of O M, L S Expected Post Treatment Stand Structures: O M, F E M, U R, C A. Underburn Thinned Stands. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 3.3 Miles Of Road.		No Silviculture Activity In 100 Acre L S R.
Canyon	Yes	Low Wood In Clear And Mukluks Cr. Resiliency Low In Lower Canyon. High Connectivity (Moderate Potential). Winter Range.	Thin F E M, M S E Stands From Below To Achieve The Eventual D F C Of C A, L S Upper Canyon O P, O M, Lower Canyon Expected Post Treatment Stand Structures: U R, F E M, O M,C A Thin Plantations, Variable Spacing And Leave Untreated Clumps Maintain Function Of Interior Habitat Corridor.	Close 6 Miles Of Road Add L W M To Clear And Mukluks Creeks.	Monitor M S E, F E M , S E Stands For Self-Thinning, Insect And Disease Levels. Need Stand Exams Below Keeps Mill.	Treat Stands Above Confluence With Cedar Creek Only. Arrange C A Stands For Thermal Cover. Lower Canyon Probably Not Treatable Due To Topography. No Silviculture Activity Within 1.2 Miles Of S T O C Activity Center Within And Adjacent To L U.

Junction	100 Ac L S R	Moderate Resiliency Moderate Connectivity (Moderate Potential). Highway 26 Viewshed.	Thin M S E, F E M Stands From Below To Achieve Eventual D F C of , O M, L S. Expected Post Treatment Stand Structures: O M, F E M, U R, C A. Underburn Thinned Stands. Thin Plantations, Variable Spacing And Leave Untreated Clumps Maintain Function Of Interior Habitat Corridor.	Close 8.69 Miles Of Road.		Leave Untreated Stands Along 26 In Clumps, I T M, Flush Cut Stumps In Near Foreground. No Silviculture Activity In 100 Acre L S R.
Abbott	No	Moderate Resiliency Low Connectivity (High Potential).	Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 3.88 Miles Of Road.		
Bearpaw	100 Ac L S R	Moderate Resiliency Mod/Low Connectivity (High Potential)	Thin M S E, Stands From Below To Achieve Eventual D F C Of C A , L S. Expected Post Treatment Stand Structures: U R, M S E, C A. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 3.91 Miles Of Road.		No Silviculture Activity In 100 Acre L S R.
Lynx	No	Moderate Resiliency Low Connectivity (Moderate Potential).	Thin M S E To Achieve Eventual D F C Of C A , L S. Expected Post Treatment Stand Structures: U R, M S E, C A.	Close 6.82 Miles Of Road.		
Osprey	No	Moderate Resiliency Low Connectivity (Moderate Potential). Clear Lake C G Uncontrolled Dispersed Use Around Clear Lk. Osprey Nests	Thin M S E To Achieve Eventual D F C Of C A. Expected Post Treatment Stand Structures: U R, M S E.	Close 7.85 Miles Of Road. Restore Shoreline Clear Lake. Rehab Campground.	Survey For Osprey.	No Thinning 10 Acres Around Osprey Nest.
Rimrock	No	Low Resiliency Low Connectivity (Low Potential).	Thin M S E, F E M Stands From Below To Achieve Eventual D F C of , O M, O P, C A, L S Expected Post Treatment Stand Structures: O M, F E M, M S E , U R, C A Underburn Thinned Stands. Thin Plantations, Variable Spacing And Leave Untreated Clumps			

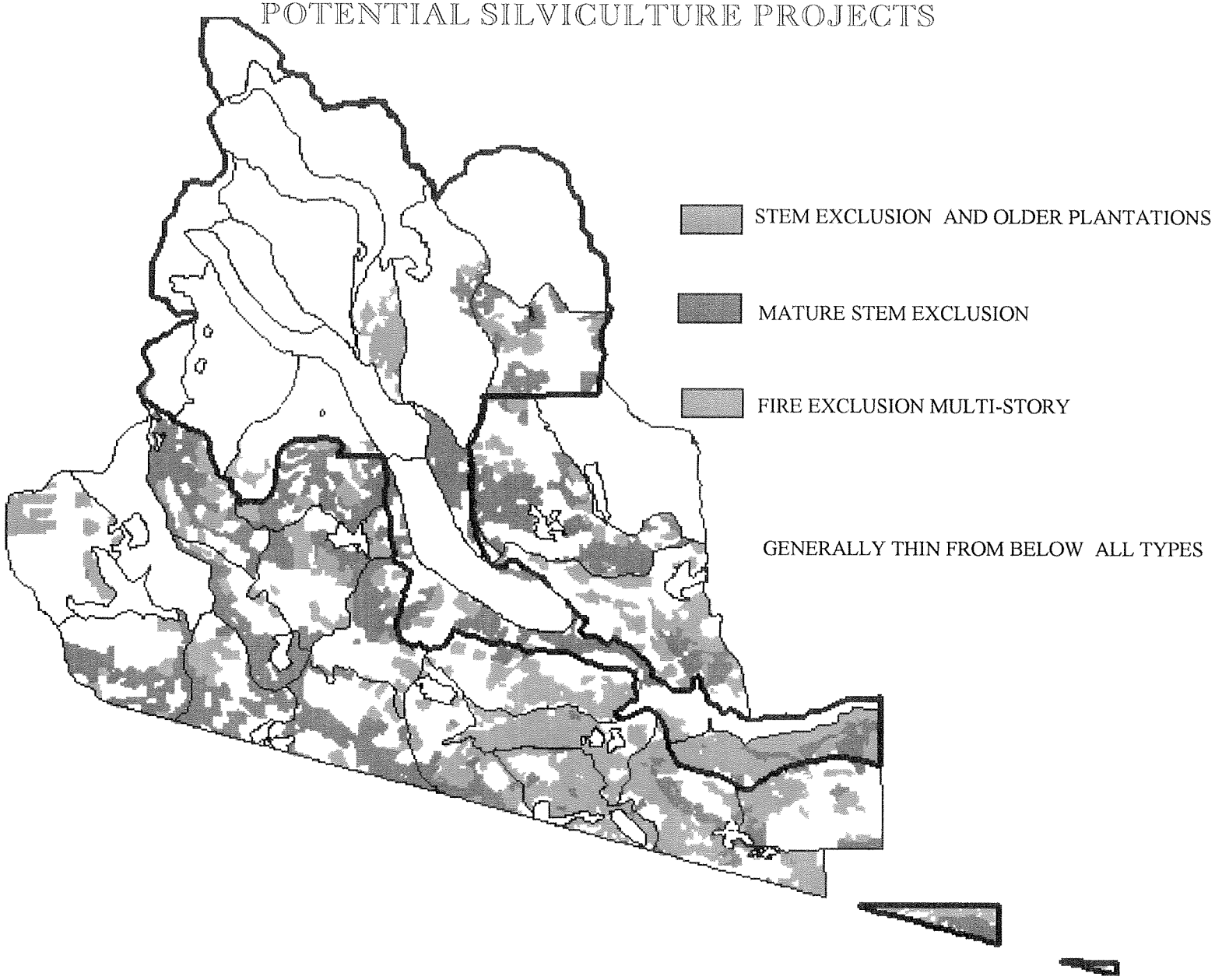
Cedar	100 Ac L S R	Low Resiliency Low Connectivity (Moderate Potential).	Thin F E M Stands On Eastern Edge For An Eventual D F C Of C A , O M. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 8.75 Miles Of Road.		
Green Lake	No	Low Resiliency Low Connectivity (Moderate Potential).	Thin M S E Stands From Below Eventual D F C Of C A, L S Expected Post Treatment Stand Structures: U R, M S E. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 3.86 Miles Of Road.		No Silviculture Activity In 100 Acre L S R.
Barlow Road	Yes	Moderate Resiliency High Connectivity (High Potential). High Sediment And Low Wood In Green Lake Cr. 1 S T O C Activity Center In Poor Condition. Bank Erosion Along Barlow Road. Cottonwood Galleries Old, Decadent.		Rehab Barlow Crossing And Barlow Creek C Gs. Control Grazing Impacts In Devil's Half Acre. Close 3.69 Miles Of Road Consider Realignment Of Barlow Road Where Eroded By Barlow Cr. Develop Treatment To Revitalize Cottonwood Galleries. Add L W M To Green Lake Creek.	Monitor Denser Stands For Self-Thinning And Insect/Disease Levels. Track Actual Location Of Activity Center To Guide Other Projects. Monitor Sediment Input Into Barlow Cr.	Heritage Resources Involvement With Barlow Road Re-Alignment.
White	Yes	Moderate Resiliency. No Data On Steams. Cottonwood Galleries In Poor Condition. 'Many Dispersed Camps In Poor Condition.		Close 1.09 Miles Of Road. Develop Treatment To Revitalize Cottonwoods. Restore White River Station C G. Restore Dispersed Sites. Improve Drainage On Barlow Road Near White River.	Suvey Perennial Streams. Survey For Harlequin Duck Activity Every 5 Years. Monitor Condition Of Existing M S E Stands To Determine Insect/Disease Levels.	

Palmateer	Yes	Moderate Resiliency High Connectivity (Potential Moderate) Sediment From Trail Into Unnamed, Unsurveyed Stream. Sediment From Devils Half Acre C G Into Barlow Cr.		Relocate Trail Rehab Damage Caused By Or Move Devils Half Acre C G.	Monitor M S E , S E Stands For Self-Thinning, Insect And Disease Levels. Monitor Barlow Creek For Sediment From Devils Half Acre C G . Monitor Outlet Of Unnamed Pond At Headwaters Of Palmateer Cr.	
Red	Yes	Moderate Resiliency Moderate Connectivity (Moderate Potential)	Thin S E To Achieve An Eventual D F C Of C A. Expected Post Treatment Stand Structures: U R, S E	Close 2.74 Miles Of Road.	Monitor M S E Stands For Self-Thinning, Insect And Disease Levels.	
Bonney	Yes	Moderate Resiliency High Connectivity (Moderate Potential)	Thin S E ,M S E Stands South Of Bonney Meadows To Achieve The Eventual D F C Of Cycle, C A, L S Expected Post Treatment Stand Structures: U R, M S E, S E.	Reconstruct 4891 /Bonney Cr. Crossing. Close 3.24 Miles Of Road.	Monitor M S E , S E Stands For Self-Thinning, Insect And Disease Levels	
Buck	Yes	Low Resiliency No Data On Streams Steep	Thin M S E Stands From Below (Unless Too Steep) Eventual D F C Of C A, L S , Expected Post Treatment Stand Structures: U R, M S E. Maintain Function Of Interior Habitat Corridor.	Survey Perennial Streams Remove Migration Barrier-Culvert On Rd. 48.		Do Not Attempt To Thin Any Stands Where Topography A Barrier To Maintaining L S R Objectives.
Camas	100 Ac L S R	Low Resiliency Moderate Connectivity (Moderate Potential)	Thin F E M Stands From Below To Achieve Eventual D F C of O M, L S, C A Expected Post Treatment Stand Structures: O M, F E M, U R, C A Underburn Thinned Stands.			No Silviculture Activity In 100 Acre L S R.

Little Boulder	Yes	Low Resiliency (Past Mgmt, Stoc) Low Connectivity (High Potential). High Sediment In Boulder Cr. Low Canopy Closure In Cedar Cr. Owl Activity Center Barely Meets Habitat Needs.	Thin Stagnated S E, M S E Stands To Achieve An Eventual D F C Of C A, L S, M S E. Expected Post Treatment Stand Structures: U R, M S E.	Close 4 Miles Of Road Relocate Trail In Boulder Cr.	Monitor M S E Stands To See If They Will Begin To Self-Thin Over The Next 10 Years And Begin To Improve On Their Own.	
Utopia	100 Ac L S R	Moderate Resiliency Moderate Connectivity (Low Potential). Osprey Nest	Thin M S E Stands From Below Eventual D F C Of C A, L S. Expected Post Treatment Stand Structures: U R, M S E. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 4.97 Miles Of Road.	Survey For Osprey.	No Silviculture Activity In 100 Acre L S R No Thinning 10 Acres Around Osprey Nest.
Little Knoll	100 Ac L S R	Moderate Resiliency Low Connectivity (Moderate Potential).	Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 4.42 Miles Of Road.		No Silviculture Activity In 100 Acre L S R.
Swamp	100 Ac L S R	Low Resiliency. Low/Mod Connectivty (High Potential).	Thin M S E Stands To Achieve Eventual D F C Of C A, L S. Expected Post Treatment Stand Structures: U R, M S E. Thin Plantations, Variable Spacing And Leave Untreated Clumps	Close 3.72 Miles Of Road.		No Silviculture Activity In 100 Acre L S R.
Boulder Cr.	100 Ac L S R	Low Resiliency Low Connectivity (High Potential). Low Wood, High Sediment In Boulder Cr.		Close 8.64 Miles Of Road Add L W M To Boulder Cr.		
Windy	Yes	High Sediment In Boulder Cr.		Restore Boulder Lakeshore Relocate Trail Along Boulder Cr.		

Barlow Butte	Yes	Moderate Resiliency Moderate Connectivity (Moderate Potential). No Data On Streams.		Close 1.87 Miles Of Road Plant Cottonwoods Along Alpine Cr. In Clearcuts.	Survey Perennial Steams Monitor M S E , S E Stands For Self-Thinning, Insect And Disease Levels.	
Iron	Yes	No Data On Streams.		Close 5 Miles Of Road Remove Stream Migration Barrier Address Existing Slump On 4890-220.	Suvey Perennial Streams For Water Quality, Vertebrates And Invertebrates.	
Twin	Yes	Moderate Resiliency. No Data On Streams.		Restore Twin Lake Shorelines. And Campsites. Rehab Trail 495/482.	Monitor M S E , S E Stands For Self-Thinning, Insect And Disease. Survey Perennial Streams.	
T-Twin	Yes	Moderate Resiliency Pockets Of Insect/Disease Mortality. Highway 26 Viewshed.	Create Fire-Break Along Highway 26 Corridor With Large-Tree Character C A, Stands By Thinning.		Monitor For Recovery From Insect/Disease Mortality.	Achieve Retention V Q O By Flush Cuting Stumps And Minimum Disturbance Logging.
Bluebox	100 Ac L S R	High Resiliency Moderate Connectivity (High Potential).		Close 3.91 Miles Of Road.		
Mt.Hood	Yes	No Data On Streams.			Survey Perennial Streams For Water Quality, Vertebrates And Invertebrates.	
Outwash	Yes				Survey For Harlequin Duck Activity Every 5 Yrs	
Ridge	Yes	Moderate Connectivity (Low Potential) No Data On Streams.			Survey Per. Streams Monitor M S E , S E For Self-Thinning, Insect And Disease .	

GRAPHIC SUMMARY OF LOCATION AND TYPE OF POTENTIAL SILVICULTURE PROJECTS



DESCRIPTION OF THE RECOMMENDED SILVICULTURE PROJECTS IN THE WHITE RIVER LSR

The silviculture projects recommended in the projects table and summarized on page V-14 fall into four categories:

- **Pre-commercial Thin**
- **Thin Stem Exclusion**
- **Thin Mature Stem Exclusion**
- **Thin Fire Exclusion Multi-story**

We will briefly explain the methods we plan to use to implement these projects within the White River LSR in a manner suitable to the objectives of an LSR. We mentioned the project design process and general mitigation which will be used on pages V-1 to V- 4. After our projects are validated and designed, we will develop implementation guides to ensure that the expected post-treatment stand structures are achieved on the ground. The following are *generalized guides* which illustrate the philosophy and methods we use for the detailed prescriptions and marking guides (which are impossible to produce before a project is actually begun).

Diversity and variability will be expressed in three major ways: 1) change in the DFC across the landscape, 2) Knowledge of local conditions and 3) change in existing conditions across the landscape. Where post-treatment stand structures are mentioned without reference to the range of canopy closures, it is assumed that the range in the stand will vary as per the range indicated for the structure type on page II-4.

Pre-Commercial Thin: The following is an *example* prescription:
Thin to an *average* of 300 trees an acre. To reduce the effect of regular spacing, use 12' by 12' with a plus or minus factor of up to 6 feet in order to favor individual trees over spacing (favor the "best tree" over spacing considerations). Use "invisible species" (no cut, no spacing) and include all hardwoods, Pacific yew, and western red cedar. Leave untreated clumps of one-half to one acre in 15% of the stand. The maximum cutting diameter is six inches and the minimum height is one foot.

Natural stands which are pre-commercially thinned may have green tree remnants with diameters conducive to snag creation.

- Stands with a DFC of Open Park-like should favor ponderosa pine and introduce multiple layering with a *great diversity* in spacing (larger plus or minus factor).
- Stands with a DFC of Open Multi-story should introduce multiple layering *and* multiple species--especially in plantations now almost 100% pine (larger plus or minus factor) *and more preferred* species with preference geared to the particular species indentified as deficient while generally favoring intolerants. Pure pine plantations may require planting of Douglas-fir, white pine and cedar depending on conditions.
- Stands with a DFC of Cathedral should not require as much diversity of spacing and should be scheduled for more frequent but lighter thinning treatments in order to maintain closed canopies. Intolerant species would still be favored.
- Late Seral Tolerant Multi-story DFC requires multiple layers; introduction of these layers may begin early with spacing geared to *introduce both tolerant and intolerant species* into the layers. This will require site-specifc knowledge of conditions in the stand.
- All other DFC stand structures require a smaller plus or minus factor and less emphasis on invisible species and multiple thinning entries.

Thin Stem Exclusion: This category is for commercial thinning of natural stands or older plantations. The expected post-treatment condition specified in the projects table is based on the existing stand conditions overlayed with the eventual desired stand structure. For example, if we are thinning a Stem Exclusion stand to a DFC of Open Park-like, we might expect the post-treatment structure of Stem Exclusion with more open canopy closures and clumpy spacing because we wish to begin the introduction of new layers. We would apply a range to the canopy closure to create the clumpiness. We would favor ponderosa pine unless the stand is a plantation of pure ponderosa pine. Since Stem Exclusion does not offer habitat for late successional dependent species, post-treatment structure will mostly depend on the eventual DFC and zone:

- If the DFC is Cycle or Mature Stem Exclusion, the post-treatment stand structure may be Stem Exclusion with a more open canopy closure--taking the canopy closure from over 100% to 70-80% for example.
- If the DFC is Cathedral, the post treatment stand structure may be Stem Exclusion with canopy closure greater than 60% but less than 85% to get optimal growth but no new layers at this entry. Intolerant species are favored in layer 1 and a mix of tolerants and intolerants in layer 2 which is less than 25% of the total canopy.
- If the DFC is Open Intolerant Multi-story or Open Park-like, the post-treatment stand structure may be Stem Exclusion varying from 80% to 40% canopy closure with Stand Initiation in very small openings (one-fourth to one acre).
- If the DFC is Late-Seral Tolerant Multi-story, we may choose to treat the stand as if for the DFC of Cathedral and introduce additional layers in a later treatment or allow natural forces to introduce layering later. Alternatively, we may treat the stand to begin the layering earlier. The post-treatment stand structure would then be Stem Exclusion varying from 90% to 65% canopy closure with Stand Initiation in very small openings (one-fourth to one-half acre). Tolerant species are favored in layer 3, a mix of tolerant and intolerants in layer 2 and intolerant species in layer 1.

General Guidance: Treatment of Stem Exclusion requires:

- Retention of any remnant large-diameter trees (if existing).
- Marking of trees *on the basis of desired canopy closures* developed from the overlay of existing structures and eventual desired structures rather than on the basis of spacing and basal area.
- Snags and downed wood left as per the eventual desired stand structures or greater if adjacent stands are deficient.
- Stem Exclusion stands are single layered and composed of intolerant species; management objectives generally are to introduce new layers and species or to grow larger trees.
- Favoring of species would be toward the introduction of diversity for most DFC's. Open Park-like may retain the most uniformity of species composition by favoring ponderosa pine with some Douglas-fir.

Thin Mature Stem Exclusion: The expected post-treatment condition specified in the projects table is based on the existing stand conditions overlayed with the eventual desired stand structure. For example, if we are thinning a Mature Stem Exclusion stand to a DFC of Open Park-like, we might expect the post-treatment structure of Understory Reinitiaion because we wish to begin the introduction of new layers. We would favor ponderosa pine and Douglas-fir.

Mature Stem Exclusion can offer habitat for late-successional dependent species, thus post-treatment canopy closures will depend on the eventual DFC, existing habitat use, relative stand stability and zone:

- If the DFC is Cathedral, the post treatment stand structure may be Mature Stem Exclusion with canopy closure greater than 60% but less than 85% to get optimal growth but no new layers at this entry. All remnant large diameter dominants are retained. Intolerant species are favored in the overstory and a mix of tolerants and intolerants in the understory which is less than 25% of the total canopy. If the stand contains large trees of intolerant species, the stand may be Cathedral (at DFC) post-treatment.
- If the DFC is Late-Seral Tolerant Multi-story, the post-treatment stand structure may be Cathedral or Understory Reinitiation.
- If the DFC is Open Intolerant Multi-story or Open Park-like, the post-treatment stand structure may be Cathedral or Understory Reinitiation depending on numbers of large trees of intolerant species, current habitat needs and relative stand stability. Stand Initiation may be present in very small openings (one-fourth to one acre).

General Guidance: Treatment of Mature Stem Exclusion requires:

- Knowledge of the role of the stand in terms of thermal cover, late-successional habitat corridors, and relative stability.
- Retention of any remnant large-diameter trees (if existing).
- Marking of trees *on the basis of desired canopy closures* developed from the overlay of existing structures and eventual desired structures rather than on the basis of spacing and basal area.
- Snags and downed wood left as per the eventual desired stand structures or greater if adjacent stands are deficient.
- The retention of sufficient canopy closure to function as late-successional habitat if the stand is stable enough to provide the habitat for at least 20 years.

Thin Fire Exclusion Multi-story: The expected post-treatment condition specified in the projects table is based on the existing stand conditions overlayed with the eventual desired stand structure. For example, if we are thinning a Fire Exclusion Multi-story stand to a DFC of Open Park-like, we might expect the post-treatment structure of Open Park-like if all of the components of the stand which were present before fire exclusion are still existing (not a common condition); we might expect a post-treatment structure of Open Intolerant Multi-story if most of the older components are still present and *current habitat utilization indicates a preference to maintain canopy closures near 60%.* We might expect the stand to continue to be categorized as Fire Exclusion Multi-story if stocking levels are improved (thinned) yet still retain the canopy closure and tolerant species associated with Fire Exclusion Multi-story. This may be preferred over opening the stand completely --especially if many of the older stand components are gone. In stands where many of the original stand components are missing or dead and the existing stand is in danger of imminent loss, we might expect the resulting post-treatment structure to be Understory Reinitiation. Thus, the same existing stand structure (Fire Exclusion Multi-story) the same zone (Transition) and the same DFC (Open Park-like) may produce the post-treatment structures of Open Park-like, Open Multi-story, Understory Reinitiation or Fire Exclusion Multi-story. Other possibilities include:

- If the DFC is Open Intolerant Multi-story, the post-treatment stand structures will most likely be Open Intolerant Multi-story where most of the required components exist, or Understory Reinitiation where many stand components of the past are dying or dead.

The post-treatment stand structure may continue to be Fire Exclusion Multi-story where habitat requirements indicate keeping a closed canopy and where conditions are relatively stable, or where stand conditions are relatively stable and few older components exist.

- If the DFC is Cathedral, most Fire Exclusion Multi-story stands will result in Understory Reinitiation or Cathedral for post-treatment structure.

General Guidance: Treatment of Fire Exclusion Multi-story requires:

- Knowledge of the role of the stand in terms of thermal cover, late-successional habitat corridors, and relative stability.
- All ponderosa pine or Douglas-fir greater than 24" DBH, living or dead to remain.
- Grand-fir in good condition greater than 24" to remain if needed to maintain layer 1 desired canopy closure.
- Marking of trees *on the basis of desired canopy closures* developed from the overlay of existing structures and eventual desired structures rather than on the basis of spacing and basal area.
- Snags and downed wood left as per the eventual desired stand structures or greater if adjacent stands are deficient.
- Thinning of layer 2 and 3 favoring ponderosa pine if DFC is Open Park-like with other species used to help maintain desired canopy closure, equally favoring Douglas-fir and ponderosa pine if DFC is Cathedral or Open Intolerant Multi-story.
- Maintaining grand fir in layer 2 and 3 if DFC is Open Intolerant Multi-story, and maintaining some grand fir in layer 2 if DFC is Cathedral. *In all cases where the stand appears relatively stable, grand fir remaining is preferable to not meeting the desired canopy closures.*

FIRE MANAGEMENT PLAN

Existing Fire Risk

Fire Occurrence Rates. Fire occurrence rates are very low for the entire area, generally 0.097 fires per 1000 acres per year, based on data from 1970-1990. Some areas of concentrated starts include the higher peaks and around camp sites. Fires rarely occur in multiple starts (busts). Arson has not been a problem. At present, lightning is the primary cause of most fire starts in and around the LSRs and the cause of most fires that exceed 1 acre in size. Lightning busts are possible, but rare. The last major lightning bust on record was in 1961. A similar event today would likely result in at least one escaped fire due to the reduction in both initial attack personnel and reinforcements within all wildland fire fighting agencies in the area. Most human caused fires have remained small, but the trend in the number of human-related starts appears to be increasing as recreation use increases. One recent larger fire resulted from human activity of some sort around a landing in T5S R10E section 9.

Fuel Loadings. We have not used Brown's method for inventorying downed woody material to estimate natural fuel loadings. This discussion is based on observations of current conditions and is qualitative. Due to the lack of complete data, areas of low, moderate, and high fuel loading have not been mapped. The discussion is by Fire Group. Fine fuels are woody material less than 3 inches in diameter, ponderosa pine needles, and grass.

Loadings in Fire Groups One and Two are generally moderate in terms of downed woody material. Ladder fuels are fairly extensive and probably outside the range of natural conditions. These two fire groups would normally carry a moderate loading in the form of cured grass by late June or early July. Due to tree encroachment, the grass load has declined.

Loadings in Fire Groups Three and Nine range from moderate to high. Ladder fuels are very extensive and we believe they are outside the range of natural conditions. Dwarf mistletoe is a significant factor in increasing both downed woody loadings and ladder fuels. Recent spruce budworm and bark beetle activity are also causing slow but consistent increases in downed woody loadings. Since fuel accumulation rates far exceed decay rates, fine fuel loadings are starting to become a concern, particularly on the north side of White River.

Fuel loadings in Fire Groups Four, Five, Six, and Eight are highly variable. Loadings range from very light to very heavy. The heaviest downed woody loadings occur in pockets of spruce budworm related mortality and very old stands. Examples of higher loadings include a small patch (less than 20 acres) near the Barlow Road above Devil's Half Acre, the PCT near Barlow Pass, and the PCT south of Bird Butte (primarily Fire Groups Six and Eight). Extensive ladder fuels mostly occur in dense stands in the Stem Exclusion stage associated with old burns, such as south of Bonney Meadows and east of Bird Butte. As yet, these stands have low downed woody fuel loadings, although downed wood is increasing south of Bonney Meadows. Stands west of Grasshopper Point also have extensive ladder fuels and increasing downed wood loadings.

In Fire Groups Five and Six, fuel ladders in the form of lichens can be more significant than conifer regeneration. High lichen loadings are a potential problem only in older stands; we did not attempt to identify any specific areas where lichen loadings appeared to significantly increase fire risk.

Much of the Barlow Creek burn area contains little or no woody fuel less than 6 inches in diameter. Towards the bottom of Barlow Creek, very large logs with char lie scattered throughout the stands. We suspect that many stands on Bonney Butte are in a similar condition, particularly towards the top of the Butte, but have not confirmed it.

Almost no downed woody material occurs in areas of Fire Group Seven.

Ladder fuels in the form of regeneration of other conifer species and lichens are very limited at present. Palmateer basin contains little understory vegetation (forbs and brush) also.

Stand structure type is a poor predictor of existing fuel loading since each structure type covers a range of actual stand conditions. For example, Late Seral Tolerant Multistory stands on Frog Lake Buttes still have relatively low downed woody loadings, particularly in fine material while several such stands along White River have moderate to high loadings.

Expected Fire Intensity and Severity.

Fire intensity in this discussion refers to flame lengths. Fire severity refers to duff and downed log consumption. Before 1855, both fire intensity and severity were low in Fire Groups One, Two, Three, and Nine. These areas mostly underburned with low flame lengths. Fires were generally frequent enough to limit duff buildup and downed log numbers. Frequent fire was a main factor in creating and maintaining the characteristic old growth structures in these areas--Open Parklike in Fire Groups One and Two, Cathedral in Fire Groups Three and Nine. Since the average fire return interval was more variable in Groups Three and Nine, occasionally the fuel complex would support moderate and high intensity fires and moderate severity fires. Fire return was probably frequent enough to limit high severity fire to very small spots that are insignificant even at the stand level.

Current conditions will support high intensity and severity fires, particularly in Fire Groups Two, Three, and Nine. Such fires would eliminate any existing late-successional and old growth stands and the potential to move existing stands towards the characteristic old growth structure quickly. On steeper slopes, as in White River canyon, such a burn would be much more susceptible to erosion due to the near total loss of protective cover. A high intensity rainstorm before a new vegetative cover established might result in a change in site capability, under worst case conditions. In addition, since the various organisms typical of these Fire Groups are not adapted to high intensity or severity fires, we could see significant reductions in soil arthropods and fungi, particularly mychorrhizal fungi.

Fire Groups Four, Five, Six, Seven, and Eight typically experienced a wider range of fire intensities and severities than the drier fire groups, although high intensity fires are the most significant at the landscape level. Fire severity would also be highly variable within an individual burn. Successive reburns often result in high severity fires as a cumulative effect. Most organisms and ecologies within these fire groups are adapted in some manner to high intensity and high severity fires. We do not believe that the fire regime and expected intensities and severities have changed significantly from what was characteristic before 1855.

As stated earlier, much of the area within these fire groups is relatively young and does not carry the fuel complex needed to support development of a high intensity fire. Some exceptions have already been noted. We also need to consider the typical conditions under which the largest high intensity fires burn. These conditions include extreme drought, low relative humidity, high temperature, and high winds. Under these conditions, research in Yellowstone National Park after the 1988 fire season found that stand structure stage and fuel complex are largely irrelevant. Essentially everything will burn until the weather changes (winds die, temperatures drop, humidities rise, or significant precipitation falls).

Fire can result in stand-replacement in two ways--it can kill the tree crowns or it can kill a critical amount of tree cambium. Not all stand-replacing fires are crown fires, although this type of fire is the one most often considered. Underburning can also result in stand replacement by scorching, not burning, tree crowns and by killing the cambium near the tree bases or roots (lethal underburn).

Large Stand Replacement Fire Risk: Crest Zone (Fire Groups Five, Six, Seven, and Eight). The risk of a large stand-replacing wildfire is generally moderate to low. Much of this zone is relatively young, and fuel buildup is generally low with some exceptions in stands that have not burned for over 100 years. The recent spruce budworm outbreak created jackpots of fuel sufficient to support development of moderate intensity fires. The low number of starts in the Crest Zone means a low probability that such a fire could occur in any given year. The probability that a given start could result in a moderate or high intensity fire increases in severe drought years, such as 1994. A fire start could smolder for several days until a wind event caused it to flare up and crown, as occurred with the Grasshopper Fire in 1994. The probability of such an event in any year is somewhat higher in the large roadless area bounded by roads 3530 (Barlow Road), 43, and 2610, US Highway 26, and State Highway 35 simply due to the lack of access. The slopes of Bonney Butte and upper Boulder Creek are also relatively inaccessible. Fire risk in the Crest Zone is highest in young, overstocked stands near Bonney Meadows. These stands are generally over 60 years old but are so dense that tree growth has essentially stopped. They are highly vulnerable to root disease and insect attack as an agent of mortality. Once the stands begin to open, snow breakage would create additional fuel since the individual trees depend on the surrounding trees for support. Conditions that could result in a moderate or high intensity fire might develop rather quickly.

Transition Zone (Fire Groups Three, Four, and Nine). Stand-replacing fire risk is generally moderate to high, especially in the lower part of the zone (eastern edge of Rimrock, Clear Creek, and Camas LUs; all of Mustang, Pathfinder, and Wildfire LUs; Canyon LU below Boulder Creek). Clearcuts and shelterwoods break fuel continuity in this zone. However, in-growth of shade tolerant species and widespread insect and disease related mortality has increased fuel loadings and ladder fuels. As with the Crest Zone, the low number of overall fire starts means a low probability that a moderate or high intensity fire could develop in any given year. Further, this zone is heavily roaded, except for White River canyon, allowing for rapid initial attack. An escaped fire would depend on the combination of dry conditions, high winds, and either an overwhelming number of starts at the same time (a fire bust) or a lack of firefighting personnel due to the fire load elsewhere in the region of nation. Since the Transition Zone can burn nearly every year, the probability that an individual start could transition into a major fire increases when initial attack is delayed. Lethal underburning is a strong possibility in the Transition Zone, particularly in areas where ponderosa pine is still a major stand component and the area has not burned for several decades. This risk is highest in the Mustang, Pathfinder, and Wildfire LUs. Ponderosa pine sheds a large number of bark plates each year. Through time, deep pedestals of bark plates and needles have built up around the bases of these trees. The pedestals can be over 4 inches deep around the larger trees. Fire can smolder for many hours to days in these pedestals, killing the cambium even through the thick bark present on the living boles. In addition, smaller diameter grand fir and/or western hemlock are common species in these stands. Neither species is very fire resistant such that even a fire that does not crown can kill the cambium of these thin-barked trees.

Eastside Zone (Fire Groups One and Two). Stand-replacing fire is a moderate risk in the Eastside Zone, primarily because there is little of this zone represented and its condition is similar to the Transition Zone. Byzandine and Triangle LUs are in this zone. Since these LUs are surrounded by other ownerships and near agricultural lands, it faces a slightly higher fire risk from escaped agricultural burns. We do not expect that

many such escaped burns would threaten or reach the LSR.

As the landscape moves towards the Desired Future Conditions identified in the Watershed Analysis, Wild and Scenic River Plan, and Landscape Analysis and Design, the risk of stand-replacing fire will change in all zones. The risk should decrease in the lower Transition Zone and Eastside Zone as stands become more open and dominated by fire resistant species. The risk should increase in the upper Transition Zone and throughout the Crest Zone as stands age and fuels increase. The risk will become highest first in the Palmateer Basin. The lodgepole stands in the basin are about 50 years old now. Lodgepole pine only lives to around 100 years (80-125 years is the typical range). As these stands approach "biological rotation" we can expect a mountain pine beetle epidemic that will kill a significant number of trees. Fuel loadings will increase dramatically and the basin will support a stand-replacing fire long before most of the Crest Zone. Assuming the average fire return interval for most of the Crest Zone is 250-300 years and lodgepole pine lives an average of 100 years, then Palmateer basin could burn 2-3 times for each time the rest of the Zone burns.

Also of concern in the Crest Zone is the likelihood of reburns and delayed conifer regeneration. Research in areas dominated by crown fire has found that reburns are highly likely. More than one reburn can occur. Each reburn usually does not cover the first burn area in its entirety and includes some previously unburned forest.

Studies of recovery rates after wildfires in wilderness areas and National Parks have shown that natural regeneration can take many decades to accomplish. This delay may be due to one or more factors such as lack of seed sources in the fire interior, dominance by dense brush for several years to decades after the fire, and severe erosion triggered by lack of cover, hydrophobic soils, and a high intensity rainstorm shortly after the fire. While we do not know the causes, there was apparently a 20-30 year delay in conifer regeneration following a major fire in Barlow Creek. While we have not been able to date this fire, it apparently occurred in the 1920s. Lookout panoramas taken in 1933 show extensive snags which have already lost their fine branches and some bark. The stands within the burn area average around 50-60 years old.

PROPOSED MANAGEMENT OF IDENTIFIED FIRE RISKS

Prescribed Natural Fire: The LSR standards and guidelines permit the use of prescribed natural fire (PNF) to meet LSR objectives. The White River Wild and Scenic River Plan also identified a desire for use of PNF to meet river management objectives. Based on LSR size and shape, location on the larger landscape, and surrounding land uses, we believe that only the Crest Zone of White River LSR is a good candidate for PNF. Since this LSR also abuts the Badger Wilderness, we recommend that the detailed planning effort for prescribed natural fire occur in conjunction with PNF planning for the wilderness. Due to the general lack of late-successional and old growth forest throughout the LSR and surrounding forest, we recommend that the prescription limit PNF candidate fires to those starts which will produce only low or moderate intensity fires, at least for the next 10 years.

The prescription parameters should consider:

1. Drought conditions[1],
2. Large fuel dryness[2],
3. Current and expected wind speed and direction,
4. Proximity to existing late successional and old growth stands,
5. Probability of burning into and reducing late successional and old growth stands, and
6. Proximity to Highway 35, Highway 26, Barlow Road, Mt. Hood Meadows Ski Area, and the Transition Zone.

Allowing low and moderate intensity fires to burn in the Crest Zone will help reduce some fuel buildups and create stand diversity by altering species compositions and creating snags.

Management Ignited Prescribed Fire: The LSR standards and guidelines also permit the use of management ignited prescribed fire to meet LSR objectives. Due to the size and position on the landscape of the portions of White River LSR in the Transition Zone and Triangle and Byzandine LUs in the Eastside Zone, prescribed natural fire is not advisable at this time. Instead, restoring the ecosystem functions of fire in maintaining the characteristic old growth structure will need to depend on planned ignitions. In both zones, some mechanical vegetation manipulation to reduce the risk of high intensity fires and escaped fires may be appropriate. Such manipulations would reduce the presence of ladder fuels and of fire sensitive species. Prescribed burning is not advisable in the 100 acre LSRs due to their small size and management objectives. Prescribed burns should occur on about the same return interval as estimated for pre-1855 conditions. More detailed fire history studies using fire scarred trees would help better establish an appropriate return interval, assuming a sufficient number of living trees or stumps of known date-of-origin remain in or adjacent to the LSRs. Prescribed burning of natural fuels generally is not appropriate in Fire Group 4. Some exceptions may exist in ponderosa pine plantations; burning could open the plantation and create a seedbed suitable for other species.

Initially, we expect such management ignited prescribed fires to be conducted in spring in order to better control fire effects. Of particular concern is the buildup of needles and bark flakes around large diameter ponderosa pine. Raking these accumulations well away from the boles is an acceptable alternative to spring burning provided such raking occurs at least one year before the planned burn. Studies in other areas have found that many fine roots have migrated into this pedestal of needles and bark flakes in order for the tree to capture scarce moisture. Raking reduces expected fire intensity and severity around the bole, but damages and destroys many of the fine roots. Raking at least one year in advance of the burn should allow the tree to replace the lost and damaged roots. These roots should regrow deep enough in the soil profile to adequately protect them from low severity fire.

Site specific burn plans will identify objectives and monitoring needs for each burn, as required by Forest Service Manual direction and the FEIS for managing competing and unwanted vegetation. The Barlow Ranger District integrated resource analysis for burning natural fuels also contains a potentially useful monitoring plan.

Management ignited prescribed burning should meet the following goals for managing LSRs:

1. Protecting or enhancing stand conditions for old growth associated species, and
2. Reducing the risk of large scale, stand-replacing disturbances.

[1] Probably as measured by the Keetch-Byron Drought Index.

[2] Probably as measured by the Energy Release Component (ERC) for NFDRS fuel models G and H.

The lack of access, escape routes, and safety zones means using management ignited prescribed fire within White River canyon will be difficult and expensive. Use of this tool may be very limited and restricted to less ecologically desirable burn times. If management ignited prescribed fire is identified as not cost effective or too unsafe, then burning should concentrate on the adjacent forests. The greatest need for restoring fire as a primary ecosystem function to meet LSR objectives is in Fire Groups Three and Nine.

FIRE SUPPRESSION GUIDELINES

Appropriate Suppression Response:
Three suppression responses to wildfires are allowed under manual direction--confine, contain, and control. The Mt. Hood National Forest uses a centralized dispatch system on single starts and a district dispatch system on multiple starts. All fires handled by Mt. Hood Dispatch start with a control strategy. Since district dispatch is not employed until multiple starts occur, burning conditions are such that only a control strategy is used. Confine and contain strategies are almost never used.
The wildfire management goal in LSRs is to keep all stand-replacing events as small as possible. However, few wildfires have the potential to become stand-replacing events. Wildfires with the lowest probability of this type of burning are those that occur outside the main fire season (before June 15 and after October 15) in most years. In wet years, such as 1995, even fires starting within the main fire season have a very low probability of transitioning into a stand-replacing event.
Until a PNF Plan is prepared and approved, all fire starts are declared wildfires. Even after approval of a PNF plan, regional policy is that all human-caused starts are declared wildfires. A given start that is a good candidate for a prescribed natural fire under the physical and ecological guidelines of the PNF plan may still be declared wildfires due to social considerations or the regional or national fire load at the time of the start.
We recommend greater use of confine and contain strategies within White River LSR on declared wildfires to improve the cost effectiveness of wildfire suppression and to use the available fire fighting forces more efficiently. We did not have time to fully develop guidelines for use of confine and contain strategies. Appropriate indicators for use of either strategy would be time of year, current levels in selected fire danger indices, current trend in indices, fire location, and fire potential. A matrix could be developed that uses time of year and one or more fire danger index, such as ERC. The table on this page displays an example of such a matrix. A copy of the running trend of the selected indices that includes the historical average, a dry year or years, and a wet year or years would assist in the decision-making process for use of alternative suppression strategies. Separate matrices would probably be needed for White River canyon and the remainder of the LSR. The only appropriate suppression response within 100 acre LSRs is Control.

Example of a decision matrix for the appropriate suppression response:

Fuel Model G--White River LSR Above Deep Creek			
TIME OF YEAR	0-30TH PERCENTILE ERC	30-50TH PERCENTILE ERC	+50TH PERCENTILE ERC
October 15-June 15	Confine	Contain	Contain Or Control
June 15-July 15	Confine Or Contain	Contain Or Control	Control
July 15-September 15	Confine Or Contain	Control	Control
Sept. 15-October 15	Confine	Contain Or Control	Control

Due to its small size, location, and fragmentation (2 separate parcels), we recommend continued use of a control strategy for all wildfires in Triangle and Byzandine LUs. Use of fire within this area should be restricted to management ignited prescribed fire.

Once the 90th percentile of the selected fire danger index is reached, burning conditions are generally extreme and a control strategy is the only acceptable option. Experience has also shown that rapid initial attack is critical to successful initial attack under extreme burning conditions. Any delays are much more likely to result in an escaped fire and a stand-replacing event. Energy Release Component (ERC) is a good indicator of seasonal and long-term drought since this value is influenced by 1000 hour fuel moisture. Throughout White River LSR, NFDRS fuel models G and H are the most suitable for evaluating fire danger and escaped fire risk.

Minimum Impact Fire Suppression: Safety of fire fighters and forest users is the highest priority in all suppression efforts. All fire suppression activities must follow guidelines developed in the Fireline Handbook and listed by the hazard abatement plan developed after the South Canyon Fire deaths. White River Wild and Scenic River plan has standards and guidelines related to certain suppression tactics within the river corridor. Late Successional Reserve standards and guidelines require use of the minimum impact suppression tactics ("light hand" tactics) designed to minimize the size of all wildfires while producing the least possible impact on late successional and old growth habitat. Elements of particular concern are late successional and old growth stands, snags, downed logs, and duff.

Moody and Mohr (1988) developed a guide for minimum impact suppression tactics, which we recommend for use on both wildfire suppression and for mop-up of prescribed burns within LSR and Riparian Reserve boundaries. Minimum impact tactics include such practices as:

- Allow fires to burn to natural barriers.
- Minimize constructed fireline and fireline width; consider use of fireline explosive (FLE), cold-trailing, and wet line to lessen impacts from constructed line.
- Minimize bucking and felling of trees and snags in line construction.
- Remove only those limbs with potential to spread the fire beyond the fireline.
- Consider allowing trees and snags to burn out instead of felling them, provided they do not pose a significant safety risk to firefighters or pose a significant risk of spotting outside the fireline.
- Limit use of bulldozers to slopes of less than 25%. Bulldozers should not be used on the White River sand flats or the sandy slopes immediately adjacent to the sand flats.
- Minimize spading, or "potato patching" during mop-up; as much as possible use water or foam and stirring or allow fuels to burn out naturally.
- Minimize bucking during mop-up; instead attempt to roll logs to extinguish the fire.
- Extinguish smoldering logs as soon as possible.
- Locate portable pumps to minimize the risk of fuel spills entering streams, ponds, or other areas containing water; keep hazardous materials spill kits in close proximity to all portable pumps.

Post fire rehabilitation needs should be identified quickly and rehabilitation carried out both quickly and at ecologically appropriate times. For example, seeding should not occur at times when germination and subsequent survival are expected to be very low. Erosion control seeding should rely on native species or sterile non-native species as much as possible.

Logistics: No suitable locations for incident base camps or camps for 100 people or more exist within White River LSR. Suitable locations for smaller camps and spike camps may exist within campgrounds and rock pits (see table on page V-14) No wet meadows, such as Bonney Meadows or Devil's Half Acre, or lakes should be used as campsites. White River sand flats should not be used as a campsite. Dry meadows, such

as Palmateer basin, may be used as short-term camps. When laying out camps, minimize the number of trails needed to reach cooking, eating, sleeping, latrine, water supply, and other locations. Do not allow crews to clear vegetation or dig trenches in sleeping areas. Use sawdust or other material on trails to minimize potential erosion. Use commercial toilets in camps in roaded areas; do not depend on campground and day use area toilets. In remote areas, sling in portable toilets or materials to construct portable latrine areas whenever possible. Avoid constructing primitive latrines. Track all camp impacts and develop and update camp rehabilitation plans.

Use of Barlow Road to transport heavy equipment should be avoided if possible and minimized if essential. Limit the use of native surface roads to transport large numbers of crews and equipment. Off road vehicle travel should be limited only to the minimum essential to meet fire suppression objectives or to protect firefighter safety.

Air Operations: No natural openings with adequate access are available for use as a helibase within the LSR. Some natural openings and rock pits are suitable for use as helispots. Most will easily handle light helicopters, but only a few would handle a medium helicopter without modification. Helicopters should not use wet meadows or on White River sand flats. Helicopters may be able to use the sno-parks at White River and Highway 35, Mt. Hood Meadows Ski Area parking lots, or at the White River Boy Scout Camp; however traffic control on Highway 35 probably will be needed. Helispot construction should be minimized. If a spot is to be used only for cargo drops, use slings and longline in lieu of contructed helispots. No helibases should be constructed. Locate helicopter fueling areas outside Riparian Reserves. If a helicopter fueling As stated in the Wild and Scenic River Plan, Northwest Forest Plan, and the Mt. Hood Forest Plan, retardant drops should be directed to minimize entry of chemicals into streams, lakes, water courses, or other waterbodies. The Wild and Scenic River Plan allows only uncolored or fugitive chemical suppressants and other water additives. This same restriction should apply to all of White River LSR, but is not necessary for Triangle and Byzandine LUs. As soon as possible, switch to using helitankers and helicopters with buckets near waterbodies. Helitankers and helicopters with buckets are capable of making more precise drops, reducing the probability of accidental drops into a waterbody. The table on the next page lists potential camp locations for large wildfires in White River LSR.

POTENTIAL CAMP LOCATIONS		
USE	LOCATION	COMMENTS
Incident Base Camps[1]	Farmer's Field(S)--Juniper Flats, Wamic Flat, Or Smock Prairie	Also Helibase
	Mt. Hood Meadows Ski Area	May Require Pre-Season Agreement With Permittee
	Possibly Unknown Location In Or Near Government Camp	
	Wildwood Campground, Welches, Or	Blm Campground. Long Travel Times To Support Incident
	Tygh Valley Fairgrounds	Also Helibase
	Tygh Valley Indian Rodeo Grounds	Also Helibase, Use If Tygh Valley Fairgrounds Not Available
Spike Camps/Day Sleeping[2]	White River Station Campground	
	Barlow Creek Campground	
	Barlow Crossing Campground	
	Bonney Meadows Campground	
	Hazel 'T'	Need To Survey For Sensitive Plants And Archeological Sites Before Using.
	Rock Creek Reservior Day Use Area	Capable Of Supporting Showers And Caterer
	Camp Cody	Limited Availability. Capable Of Supporting Showers And Caterer.
[1] Should be located in area capable of expanding to support a National sized incident.		
[2] Unless otherwise stated, intended only to support up to six crews and transport vehicles, no showers or caterers.		

Rehabilitation: Rehabilitation plans must be designed to restore or move the area towards the late successional or old growth conditions, prevent or stop sediment from reaching Riparian Reserves, and restore camp sites and similar areas to the pre-fire condition. Wildfire suppression and the logistical support to the effort will cause some significant damage regardless of how careful and conscientious incident managers and firefighters are. Some rehabilitation work is anticipated on all fires larger than 5 acres. Rehabilitation work may be needed on fires 1-5 acres in size that occur in sensitive areas. Rehabilitation guidelines include:

- Pick up and remove all flagging, garbage, litter, and equipment. Reduce the need for litter and garbage pickup by recycling as much material as possible.
- Discourage the conversion of constructed firelines to recreational trails, by covering the line with brush, limbs, and both sound and rotten logs. The preferred source of these materials is the material removed to construct the line.
- Fill in cup trenches and dug out areas and obliterate berms created during the suppression effort.
- Construct waterbars as needed to reduce erosion on steeper slopes. A soil scientist or hydrologist will provide guidance on the spacing needed.
- Consider subsoiling compacted areas in incident base camps, spike camps, and other high use areas. Scattered rocks and logs and/or transplant small trees and shrubs into the rehabilitated area.
- Erosion control seeding and other rehabilitation work involving planting should use native species or sterile non-native species whenever possible.
- Flush cut and cover with soil all stumps in high use or visually sensitive areas, such as along Barlow Road, Road 48, Highway 35, and US Highway 26, and in or near Mt. Hood Meadows Ski Area, White River Boy Scout Camp, campgrounds or heavily used dispersed campsites.
- Reshape any constructed helispots in visually sensitive areas or designated viewshed to more closely resemble a natural opening. This rehabilitation effort will likely require falling more trees and potentially the loss of some late successional or old growth trees or habitat.

The incident resource advisor may require additional rehabilitation to meet LSR and Riparian Reserve Objectives or Wild and Scenic River objectives. A resource advsior will decide soon after a wildfire is reported whether rehabilitation might be needed. Rehabilitation planning and implementation should begin as soon as possible after firefighting efforts begin and must begin before the fire is declared contained.

Post Fire Monitoring and Evaluation: Post fire monitoring and evaluation will serve to identify areas of this plan or of the suppression effort that need improvement, formulate different strategies and tactics to add to the plan, and assist in adaptive management. Initial evaluation should occur before the firefighting effort ends on all extended attack and project fires. This evaluation should discuss the strategy and tactics used and success or failure of minimum impact tactics in meeting LSR and Riparian Reserve objectives, standards, and guidelines. It should also discuss whether firefighter safety was compromised and what changes might be made to better protect firefighters and still meet LSR and Riparian Reserve objectives. Lastly, the evaluation should rate the incident resource advisor and the Escaped Fire Situation Analysis in providing clear direction to the incident management team on meeting LSR and Riparian Reserve objectives. A copy of the evaluation should be filed with the incident management package and with the LSR Assessment.

Within one year of any fire exceeding five acres, an interdisciplianry team should revisit the burn area to ascertain the success or failure of rehabilitation in meeting LSR and Riparian Reserve objectives and standards and guidelines. This team should be comprised of resource specialists with expertise in the areas of concern on a given fire and a representative of the fire management organization. A team need not be very large if the concerns or items under evaluation considered minor or small-scale. A copy of the evaluation should be filed with the incident management package, line officer, and LSR Assessment.

REFERENCES

Abbot, H.L. 1857. Reports of explorations and surveys, Vol. VI. Senate Ex. Doc. No. 78. Beverly Tucker, Washington, DC [incomplete copy].

Aikens, C. M. 1986. Archaeology of Oregon. USDI Bureau of Land Management, Oregon State Office.

Bailey, W. 1912. The Barlow Road. The Quarterly of the Oregon Historical Society 13: 287-296.

Barlow, M.S. 1902. History of the Barlow Road. The Quarterly of the Oregon Historical Society 3: 71-81.

Barlow Ranger District. 1992. (unpub.) Natural fuels underburning integrated resource analysis. USDA Forest Service, Mt. Hood National Forest, Gresham, OR. 62 p.

Barlow Ranger District. 1992. (unpub.) Rocky Burn integrated resource analysis. USDA Forest Service, Barlow Ranger District, Dufur, OR.

Barlow, W. 1912. Reminiscences of seventy years. The Quarterly of the Oregon Historical Society 13: 240-286.

Bauer, S.B. and T.A. Burton. 1993. Monitoring protocols to evaluate water quality effects of grazing management on western rangeland streams. EPA 910/R-93-017. US Environmental Protection Agency, Region 10, Water Division, Surface Water Branch, Seattle, WA. 203 p.

Behnke, R.J. 1992. Native trout of Western North America. Amer. Fish Soc. Monograph 6. 275 p.

Blaustin, A., D.B. Wake, and W.P. Sousa. 1994. Amphibian declines: judging stability, persistence and susceptibility to local and global extinction. Conservation Biology 8: 60-71.

Bonneville Power Company, Oregon Department of Fish and Wildlife, and Mt. Hood National Forest. 1985. White River Falls fish passage project: final technical report. 101 p.

Brown, J.K. and T.E. See. 1981. Downed dead woody fuel and biomass in the northern Rocky Mountains. Gen. Tech. Rep. INT-117. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 48 p.

Bryant, R. L., L. Conton, R.E. Hurlbett, and J.R. Nelson. 1978. Cultural resource overview of the Mt. Hood National Forest, Oregon: vol. 1. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.

Burtchard, G.C. 1994. Posy archaeological project: upland use of the central Cascades; Mt. Hood National Forest, Oregon. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.

Burtchard, G.C. and R.W. Wheeler. 1991. Mt. Hood cultural resource reevaluation project. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.

Bury, R.B. 1988. Habitat relationships and ecological importance of amphibians and reptiles. Contribution #74 of the old growth wildlife habitat program. USDA Forest Service, Olympia, WA.

Castleman, M. 1991. The healing herbs. Rodale Press, Emmaus, PA.

Cooper, L. 1993. White River Wildlife Area long range management plan. Oregon Department of Fish and Wildlife, Portland, OR. 54 p.

Corkran, C. 1995. Herpetologist, Mt. Hood study group. Personal communication.

Corkran, C. and C. Thoms. 1994. Field manual of Oregon Amphibians (draft). Northwest Eco. Res. Int. 92 p.

Corn, P.S. and R.B. Bury. 1990. Sampling methods for terrestrial

amphibians and reptiles. Gen. Tech. Rep. PNW-GTR-256. USDA Forest Service, Pacific Northwest Research Station, Portland , OR. 34 p.

Christner, J. 1981. Changes in peak streamflows from managed areas of the Willamette National Forest. USDA Forest Service, Willamette National Forest, Eugene, OR.

Diaz, Nancy and Dean Apostol. 1992. Forest Landscape Analysis and Design, USDA Forest Service Pacific Northwest Region R6 ECO-TP-043-92

Dore, J. and L. Wold. unpub. Mt. Hood National Forest Stream Survey Handbook.

Dumond, D.E. 1983. Alaska and the Northwest Coast. In Ancient North Americans. J.D. Jennings, ed. W.H. Freeman and Co., New York, NY.

Dunne, T. and L. Leopold. 1978. Water in environmental planning. W.H. Freeman & Co., New York, NY.
Elmore, W. 1995. Riparian Ecologist, USDI Bureau of Land Management, Prineville District, Prineville, OR. Personnal communication.

Evers, L., J. Colby, R. Crump, R. Dobson, and H. Hubbs. In Press. Fire ecology of the mid-Columbia area.

USDA Forest Service, Pacific Northwest Region, Portland, OR.

Forest Service. 1989. Rural development opportunities in special forest products. USDA Forest Service, Washington Office, Washington, DC.

Forest Service and Bureau of Land Management. 1994a. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents within the range of the northern spotted owl. Seattle, WA. [218 p.]

Forest Service and Bureau of Land Management. 1994b. Final supplemental Environmental Impact Statement on management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl: Appendix J2. Seattle, WA.

Forest Service. 1994 (unpub.) Miles Creek Watershed Analysis. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.
Forest Service. 1994c. White River National Wild and Scenic River management plan. USDA Forest Service, Pacific Northwest Region, Portland, OR. [114 p.]

Forest Service. 1990. Land and resource management plan: Mt. Hood National Forest. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Forest Service. 1990.
Final Environmental Impact Statement
Mt. Hood Meadows Ski Area
USDA Forest Service,
Pacific Northwest Region
Mt. Hood National Forest
Gresham, Oregon.

Forest Service. 1995.
White River Watershed Analysis
USDA Forest Service
Pacific Northwest Region
Mt. Hood National Forest
Gresham, Oregon.

Forest Service. 1994
White River National Wild and Scenic River Management Plan.
USDA Forest Service
Pacific Northwest Region
Mt. Hood National Forest
Gresham, Oregon.

Forest Service 1991.
Barlow Road Management
Integrated Resource Analysis and Implementation Guide.
Mt. Hood National Forest
Gresham, Oregon.

Franklin, J.F. and C.T. Dryness. Natural vegetation of Oregon and Washington. Oregon State University Press, Corvallis, OR. 452 p.

French, D. and K. French. 1989. Warm Springs Sahaptin medicinal plants: a summary (preliminary version). Reed College, Portland, OR.

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.R. Tonn, and D.S. Page-Dumroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. Res. Paper INT-RP-477. USDA Forest Service, Intermountain Research Station, Ogden, UT. 12 p.

Habeck, J.R. 1994. Using General Land Office records to assess forest succession in ponderosa pine/Douglas-fir forests in western Montana. Northwest Science 68(2): 69-78.

Hagle, S. K., S. Tunnock, and C.J. Gilligan. 1987. Field guide to diseases and insect pests of Idaho and Montana forests. R1-89-54. USDA Forest Service, Northern Region, Missoula, MT. 123 p.

Halverson, N.M., C. Topik, and R. Van Vickle. 1986. Plant association and management guide for the western hemlock zone: Mt. Hood National Forest. R6-ECOL-232A-1986. USDA Forest Service, Pacific Northwest Region, Portland, OR. 111 p.

Harris, D.D. and L.E. Hubbard. 1983. Magnitude and frequency of floods in eastern Oregon. Water Investigations Report 82-4078. US Geological Survey, Portland, OR.

Hayes, M. P. 1994. The spotted frog (*Rana pretiosa*) in western Oregon. Oregon Department of Fish and Wildlife Tech. Rep. 94-1-01.

Hayes, M. P. 1995. Herpetologist, Portland State University, Portland, OR. Personal communication

Hayer et al., ed. 1994. Measuring and monitoring biological diversity: standard methods for amphibians. Smithsonian Institution, Washington, D.C.

Helliwell, R. 1987. The preservation and management of cultural plants on the Warm Springs Indian Reservation: a proposal.

Helliwell, R. 1988a. Forest plants of the Warm Springs Indian Reservation.

Helliwell, R. 1988b. Preliminary plant term list: Warm Springs Sahaptin, Wasco, and Paiute.

Helliwell, R. 1989. Important traditional plants of the Warm Springs Indian Reservation. Warm Springs Culture and Heritage Program, Warm Springs, OR.

Helliwell, R., L. Cartwright, T. Butler, B. Otani, and L. Kemp. 1990. Mt. Hood National Forest Noxious Weed Management Plan. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.

Hemstrom, M.A., W.H. Emmingham, N.M. Halverson, S.E. Logan, and C. Topik. 1982. Plant association and management guide for the Pacific silver fir zone: Mt. Hood and Willamette National Forests. R6-ECOL-100-1982a. USDA Forest Service, Pacific Northwest Region, Portland, OR. 104 p.

Hickman, J.C. 1993. The Jepson manual. University of California Press, Berkeley, CA.

Hitchcock, C. L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle, WA. 730 p.

Hitchcock, C.L., A. Cronquist, M. Owenby, and J.W. Thompsen. 1969. Vascular plants of the Pacific Northwest. University of Washington Press, Seattle, WA.

Hopkins, W. E. and R. C. Rawlings. 1985. Major indicator shrubs and herbs on National Forests of eastern Oregon. R-6-TM-190-1985. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Hunn, E. S. 1990. Nch'i-Wana, "The Big River": mid-Columbia Indians and their land. University of Washington Press, Seattle, WA.

Hunn, E. S. and D. H. French. 1981. Lomatium: a key resource for Columbia Plateau native subsistence. Northwest Science 55(2): 87-94.

Hutchins, A. R. 1991. Indian herbology of North America. Shambhala, Boston, MA.

Johnson, D.M., R.R. Peterson, D.R. Lycan, J.W. Sweet, and M.E. Neuhaus. 1985. Atlas of Oregon lakes. Oregon State University Press, Corvallis, OR.

Kaye, T., and K. Kuykendall. 1992. Status report for *Astragalus tyghensis*. Oregon Department of Agriculture, Natural Resources Division, Plant Conservation, Biology Program, Salem, OR.

Kirk, D. R. 1970. Wild edible plants of western North America. Naturegraph Publishers, Happy Camp, CA.

Kostow, K. et al. In Press. Oregon Department of Fish and Wildlife 1994 annual report: rainbow/redband/steelhead trout (*Onchorrhynchus mykiss*).

Land, R. 1987. Extinction thresholds in demographic models of terrestrial populations. American Naturalist 130: 624-635.

Langille, H.D., F.G. Plummer, A. Dodwell, T.F. Rixon, and J.B. Leiberg. 1903. Forest conditions in the Cascade Range Forest Reserve, Oregon. Professional Paper No. 9. US Geological Survey, Washington, DC. 298 p.

Leonard, et al. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society, Seattle, WA.

Leonhardy, F.C. and D.G. Rice. 1970. A proposed cultural typology for the lower Snake River region, southeastern Washington. Northwest Anthropological Research Notes 4: 1-29.

Lesher, R.D. and H.R. McClure, Jr. 1986. Major indicator shrubs and herbs on National Forests of western Oregon. R6-TM-229-1986. USDA Forest Service, Pacific Northwest Region, Portland, OR.

Lewis, W.H. and M.P.H. Elvin-Lewis. 1977. Medical botany: plants affecting man's health. Wiley Interscience Publication, New York, NY.

Liss, W.J., G.L. Larson, E. Deimling, L. Ganio, R. Gresswell, R. Hoffman, M. Kiss, G. Lomnicky, C.D. McIntire, R. Truitt, and T. Tyler. 1995. Ecological effects of stocked trout on naturally fishless high mountain lakes, North Cascades National Park Service Complex, USA. USDI Tech. Rep. NPS/PNROSU/NRTR-95-03.

Mahar, M.J. 1953. Ethnobotany of the Oregon Paiutes of the Warm Springs Reservation. Master's Thesis. Reed College, Portland, OR.

Martin, G.J. 1995. Ethnobotany: a people and plants conservation manual. Chapman and Hall, London, England.

Moffatt, R., R.E. Wellman, and J.M. Gordon. 1990. Statistical summaries of streamflow data in Oregon: vol. I and II. US Geological Survey, Portland, OR.

Moore, M. 1993. Medicinal plants of the Pacific west. Red Crane Books, Sante Fe, NM.

Murdock, G.P. 1980. The Tenino Indians. Ethnology 19: 129-149.

Neuenschwander, L. 1995. Fire ecologist, College of Forestry, Wildlife, and Range, University of Idaho, Moscow, ID. Personal communication.

Oliver, C.D. and B.C. Larson. 1990. Forest stand dynamics. McGraw-Hill, Inc., New York, NY. 467 p.

Oregon National Heritage Program. 1993. Rare, threatened, and endangered plants and animals of Oregon. Oregon National Heritage Program, Portland, OR.

Oregon Water Resources Department. 1995a. Public access on-line water allocation database. Salem, OR.

Oregon Water Resources Department. 1995b. Electronic water rights database. Salem, OR.

Palmer, J. 1847. Journal of travels over the Rocky Mountains to the mouth of the Columbia River, made during the years 1845 and 1846. Ye Galleon Press, Fairfield, WA. 186 p.

Raphael, M.G. 1988. Long-term trends in abundance of amphibians, reptiles, and mammals in Douglas-fir forests of northwestern California. In Symposium for management of amphibians, reptiles, and small mammals in North America. R.C. Szaro, K.E. Severson, and D.R. Patton, tech. coords.

Ray, V.F. 1939. Cultural relationships in the plateau of northwestern North America. Frederick W. Hodge Publication No. 3. Southwestern Museum, Los Angeles, CA.

Sawyer, R.W. 1932. Abbot railroad surveys, 1855. The Quarterly of the Oregon Historical Society 23: 1-24, 115-135.

Scharpf, R.F., tech. coord. 1993. Diseases of Pacific coast conifers. Ag. Handbook 521. USDA Forest Service, Pacific Southwest Research Station, Albany, CA. 197 p.

Topik, C., N.M. Halverson, and T. High. 1988. Plant association and management guide for the ponderosa pine, Douglas-fir, and grand fir zones: Mt. Hood National Forest. R6-ECOL-TP-004-88. USDA Forest Service, Pacific Northwest Region, Portland, OR. 136 p.

Turner, N. J. et al. XXXX. Thompson ethnobotany: knowledge and uses of plants by the Thompson Indians of British Columbia. Memoir No. 3. Royal British Columbia Museum, Vancouver, BC. P. 70-76.

Wall, W.R. 1995 (unpub.) White River subbasin lakes report within the Mt. Hood National Forest. USDA Forest Service, Mt. Hood National Forest, Gresham, OR.

Washington Forest Practices Board. 1993. Board manual: standard methodology for conducting watershed analysis. Version 2.0. Washington State Department of Natural Resources, Olympia, WA.

Washington National Heritage Program. 1994. Endangered, threatened and sensitive vascular plants of Washington. Department of Natural Resources, Olympia, WA.

Zukar, Hummel, Hogfoss. 1983. Oregon Indians: culture, history, and current affairs. Western Imprints,