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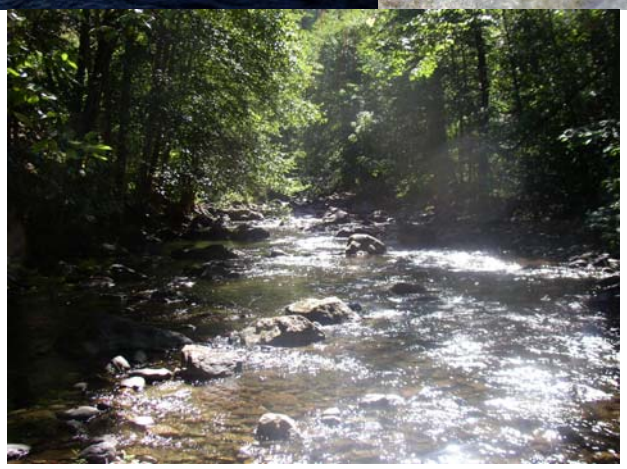
Sucker Creek

Watershed Analysis



Dear Reader:

This Sucker Creek Watershed Analysis (Version 1.0) provides an ecological context for a variety of resource management recommendations. It focuses on Bureau of Land Management (BLM) lands in the Sucker Creek 5th field watershed. The Forest Service completed a watershed analysis for their lands in the Sucker Creek watershed in 1996.

This watershed analysis identifies ecosystem components in the Sucker Creek 5th field watershed and describes their interactions at a landscape scale. The analysis addresses historical and current ecological components and trends. It makes recommendations for future management actions to achieve desired ecological conditions.

As you read this document, it is important to keep in mind that the watershed analysis process is an iterative process. The watershed analysis will be updated as necessary based on new information. It is also important to keep in mind that this is *not* a decision document. Its recommendations are a point of departure for project specific planning and evaluation work. Some of the recommendations may conflict or contradict other recommendations. Project planning, which includes the preparation of environmental analyses and documents as required by the National Environmental Policy Act (NEPA), will take these conflicts into consideration. Some individual recommendations in the watershed analysis may also conflict with management direction in the Medford District Resource Management Plan (RMP). Regardless of this, future project planning and resource management actions may show deference to objectives and directives of the RMP.

This watershed analysis will be used as a tool in land management planning and project implementation in the Sucker Creek watershed on BLM lands. Although ecological information, discussions and recommendations are presented at the landscape scale regardless of administrative ownership, please understand that the BLM will only implement management actions on BLM lands.

Preparation of this watershed analysis follows the format outlined in the draft federal watershed analysis guidelines in the document *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis (Version 2.2), 1995.*

If you have additional resource or social information that would contribute to our understanding of the ecological and social processes in the watershed, we would appreciate hearing about them.

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INTRODUCTION

Watershed analysis is a key part of the implementation of the 1994 Northwest Forest Plan (NWFP). It is primarily conducted at a 5th field watershed scale. Its purpose is to develop and document a scientifically-based understanding of ecological structure, functions, processes and interactions occurring in a watershed. It is one of the principal analyses used to meet the ecosystem management objectives of the NWFP's Standards and Guidelines. It is an analytical process, *not* a decision making process. A watershed analysis serves as a basis for developing and assessing project specific proposals and identifying monitoring and restoration needs.

Watershed analysis is designed to be a systematic, iterative and dynamic process for characterizing watershed and ecological processes to meet specific management and social objectives. It is subject to updates and expansion as needed.

This watershed analysis will document past and current conditions on BLM lands in the Sucker Creek watershed. It will interpret data, identify trends, and make recommendations on managing this watershed toward the desired future condition for BLM lands. The Forest Service completed a watershed analysis for their lands in the Sucker Creek watershed in 1996.

The first part of this analysis will address the core physical, biological and human factors that characterize the watershed and their important ecological functions. Regulatory constraints that influence resource management in the watershed will also be identified. Key issues will be identified to focus the analysis on the important functions of the ecosystem that are most relevant to the management questions, human values or resource conditions affecting the watershed. Next, current and reference conditions will be described. How and why ecological conditions and processes have changed over time will be discussed during the synthesis portion of the analysis. The final portion of the analysis will identify recommendations for the watershed that consider desired future conditions and the demand for the watershed's resources.

Four planning documents are frequently referred to throughout this analysis:
1. *Record of Decision for Amendments to U.S. Forest Service and Bureau of Land Management Planning Documents In the Range of the Northern Spotted Owl* and its Attachment A, entitled the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species In the Range of the Northern Spotted Owl* (April 1994) (NWFP).

2. *Final EIS / Record of Decision for the Medford District Resource Management Plan* (June 1995) (RMP).

3. *Final Supplemental EIS for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (March 2000), and the ROD and Standards and Guidelines for Amendment to the Survey & Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (January 2001) *and its associated Annual Species Reviews.*

4. *Record of Decision Amending Resource Management Plans for Seven Bureau of Land Management Districts and Land and Resource Management Plans for Nineteen National Forests In the Range of the Northern Spotted Owl,* and its *Final Supplemental EIS for the Clarification of Language in the 1994 Record of Decision for the Northwest Forest Plan* amending wording about the Aquatic Conservation

Strategy (March 2004).

The Forest Service Sucker Creek Watershed Analysis (May 1996) is also referenced.

Sucker Creek Watershed Analysis
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I. CHARACTERIZATION

A. PURPOSE

The purposes of this section are to identify the dominant physical, biological and human processes, and factors in the watershed that affect ecosystem function or condition; to relate these features and processes to those occurring in the Sucker Creek watershed; to provide the context for identifying elements that need to be addressed in the analysis; and to identify, map and describe the land allocations, the NWFP objectives and some of the regulatory constraints that influence resource management in the watershed (Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis (Version 2.2, RIEC 1995)).

B. INTRODUCTION

The Sucker Creek watershed is in the Klamath Mountain Physiographic Province of southwestern Oregon. It is in Josephine County, approximately 20 miles southwest of the city of Grants Pass (Appendix A, Map 1). This 5th field watershed is 62,496 acres in size and drains into the Illinois River. Emphasis for this watershed analysis is on the northwest and central west parts (in Townships T39-R7W, T39-8W, T40-7W, and T40-8W), see Map 3. This is referred to as the watershed analysis area.

Approximately 14 million years ago, tectonic uplift began and was shaped by water erosion and deposition into a mountainous terrain with a relatively broad valley floor in the part downstream from the town of Holland. Elevation ranges from 1,340' to 3,680' on BLM lands and the watershed has approximately 244 miles of stream which contain Chinook and coho salmon as well as steelhead and cutthroat trout. Soils formed from Klamath Province andesitic and dacitic volcanic rocks in upper slopes of the watershed, melange rocks (mixed mafic) intermixed with serpentinized ultramafic rocks mainly in the mid to lower slopes of the watershed, and the broad valley bottom of mixed alluvial material between Holland and the mouth of Sucker Creek. (References: USGS, Geologic Map of Klamath Mountains, California and Oregon, Irwin W.P., 1994) A variety of soils support diverse forested and non-forested vegetative types. Forests supply wood, recreation, and special forest products while providing habitats for terrestrial and aquatic wildlife and plants. People have settled and developed the toe slopes of the mountains and the valley floors.

C. CLIMATE

The Mediterranean climate, influenced by marine air, has cool, wet winters and warm, dry summers. Average annual precipitation ranges from approximately 56" in the west end to more than 66" in the east side of the watershed (BLM isohyetal map, on file). The Illinois Valley Airport Remote Automated Weather Station (RAWS) three miles south of Cave Junction indicates that the lowest average monthly temperature occurs in January (37.8ºF) and the highest in August (91.3ºF).

D. LAND OWNERSHIP

This Sucker Creek Watershed Analysis addresses all BLM lands in the 62,496 acre watershed. Table I-1 notes the general land ownership distribution in the watershed.

Table I-1: Land Ownership in the Sucker Creek Watershed

Land Ownership	Acres	Percent of Total
BLM	5,801	9%
Forest Service	44,147	71%
National Park Service	465	<1%
State/County and Private	12,082	19%
Watershed Total	***62,495***	***100%***

Maps 2 and 3 (Appendix A) show the location of BLM land in the watershed.
Table I-2 summarizes watershed land allocations. See also Map 4.

Approximately 3,800 acres (66% of the BLM land) are in the matrix land allocation and 2,000 acres are in late successional reserves (LSRs) (34% of BLM). Riparian reserves occur in matrix and LSR allocations. Riparian reserve acreage has not been mapped or determined. Additional land types that occur in the above land allocations include unmapped LSRs (including Known Spotted Owl Activity Centers (KSOACs)), RNAs, and Botanical Emphasis Areas. Acreages for these uses are 139, 188, and 141 respectively.

The upper portion of the Sucker Creek watershed analysis area is designated as a Tier 1, Key Watershed, under the Northwest Forest Plan (NWFP). This is a special designation as part of the Aquatic Conservation Strategy (ACS)."Tier 1, Key Watersheds were selected for directly contributing to anadromous salmonid…conservation" (P. B19, NWFP ROD). Most of the Tier 1, Key Watershed is on USFS land with a minor amount of BLM land within the watershed analysis area, see Map 4a.

Riparian reserves border all the streams on federal land in the watershed. These areas are a critical part of the NWFP's Aquatic Conservation Strategy (ACS) to restore and maintain the ecological health of watersheds and aquatic ecosystems. The main purposes of the reserves are to protect the health of aquatic systems and their dependent species as well as provide benefits to upland species. These reserves help maintain and restore riparian structure and function, benefit fish and riparian-dependent species, enhance habitat for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for terrestrial and aquatic animals and plants, and provide greater connectivity of late-successional forest habitat (USDA, USDI 1994a).

E. REGULATORY CONSIDERATIONS

Relevant federal laws include the Clean Water Act, Clean Air Act, National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), National Historic Preservation Act, Endangered Species Act (ESA), and the Oregon and California Lands Act (O&C Act).

F. EROSION PROCESSES

The most common erosion processes occurring in this watershed are concentrated flow erosion (sheet or rill erosion and gully erosion), stream bank erosion, and mass wasting. These erosional processes are driven by gravity and water (precipitation and runoff) on soil shear strength. Other factors that have influenced erosional processes are climate, vegetation, and fire. Water erosion is important as it not only detaches soil particles (and sometimes earthen material), but also transports the material downhill.

Concentrated flow erosion is a concern on hill slopes where most vegetation has been removed and roads or other human built features have concentrated runoff in unconsolidated ditches, and diverted it to areas where surface protection is inadequate. Soil erosion occurs when soil particles are detached by raindrop splash or when overland flow of water moves particles to another location on the landscape. Eroded soil particles can move from less than an inch to many miles depending on topography and vegetative cover. This erosion is of concern because it can reduce soil productivity and increase sediment in local waterways.

Stream bank erosion occurs as large volumes of water and debris rush through waterways, dislodging soil particles from stream banks and transporting them downstream. This type of erosion can widen a stream channel, which may cause the stream to spread and become shallower. Also, detached soil sediments may deposit in fish spawning gravel or rearing pools, reducing habitat quality. High road densities may exacerbate this type of erosion especially during times of increased peak flows (see Road Density section below). Deep, fine-textured soils (clay subsoils) that occur at the base of upland areas on fans, foot slopes, and terraces are most susceptible to stream bank erosion.

Mass movement occurs in the form of debris slides and earth flows. These phenomena occur in different areas and under different conditions but most involve water-saturated soil moving downhill which can result in the loss of tons of soil. Furthermore, soil moving downhill eventually reaches a stream or waterway and can have detrimental effects. Soils that may be susceptible to mass movement in the watershed are predominately serpentine influence soils (particularly Cornutt) on slopes greater than 35%.

These erosional processes, combined with the uplifting of the landscape that has been occurring for the last 14 million years, are primarily responsible for the morphological characteristics of the watershed. As the landscape uplifted, belts of varying rock types were exposed to weathering. Uplift occurred faster than erosion, which resulted in deeply incised stream canyons (draws) with high gradients (Rosgen Aa+) in most of the watershed and in alluviated valley streams with low to moderate gradients and entrenched channels (Rosgen B, C, and F). Riparian areas along these streams provide habitats for plants and animals associated with aquatic systems. Many of the riparian areas have been disturbed as a result of past timber harvest and road construction.

Roads on sloping ground intercept surface water and shallow groundwater. The water is commonly routed by the road to a draw or other natural drainage that is part of the natural stream system. Roads can cause water to reach streams more quickly than would naturally occur. Greater road density causes greater potential for increased peak stream flows. With increased peak flow, stream banks are more susceptible to erosion as the stream channel adjusts to altered flow patterns. Additional stream sediment caused by this phenomenon comes predominately from eroded stream banks. Other sources of stream sediment are the road surface, sloughs from steep road banks, and eroded channels created by flows at drainage outlets down slope.

Road design and position on the landscape produce varying effects. For example, an outsloped road with water dips, a rocked surface, and outlet filters would produce fewer adverse effects than a lower slope natural surface road with ditches. Relevant factors are proximity to streams, surface water concentration and distribution due to road drainage design, and surface material.

Road density is the total road length for a given area, commonly expressed as miles of road per square

mile. Road densities in excess of four miles per square mile are considered high and may have detrimental cumulative effects on stream water quality and quantity at the small watershed scale. BLM land in the Sucker Creek watershed has variable road densities. The overall road density is moderate (3.4 miles/mile^2), covering approximately 1.5 to 2% of the land area. Although some road designs are less impacting than others, high road densities may indicate an increased risk of erosion and sedimentation because roads can intercept surface water and shallow groundwater, causing increased and concentrated runoff. In roaded systems, flows from 0.4 to 5 year storm events may result in somewhat greater peak stream flows than if there were no roads (Beschta 2000). However, the minimum detectable level of increased peak flows found in research (Ziemer 1981) has been where roads cover ≥5% of the land area in small watersheds.

G. HYDROLOGY

The watershed has an unusual shape: the down stream, west end is long and narrow. Althouse Creek and Sucker Creek flow into the East Fork Illinois River within a half mile of one another. Much of Sucker Creek watershed's narrow strip is likely a shared flood plain between the three main streams. The watershed's stream flow fluctuates with the seasonal variation in rainfall. Peak flows occur during high intensity, long duration storm events, usually in the winter and early spring. Stream flows in this watershed are heavily affected by storm events and snow melt. There are six stream gages in the watershed: Sucker Creek downstream from Little Grayback Creek (USGS gage 14375100), Sucker Creek upstream of Little Grayback Creek (USGS gage 14375000), Grayback canal (USGS gage 14374000), Grayback Creek (USGS gage 14374500), Cave Creek (USGS gage 14373700), and Windy Creek (USGS gage 14373900).

H. WATER QUALITY

Water quality varies throughout the watershed. Primary activities affecting water quality are mining, timber harvest, and water withdrawals. Portions of Sucker Creek were identified in DEQ's 1998 303(d) List Decision Matrix as "water quality-limited" for temperature, habitat modification, and flow modification. The entirety of Grayback Creek made the list for habitat modification only. In 1998, USDA developed a Water Quality Management Plan (WQMP) for the Grayback-Sucker Creek watershed, resulting in the delisting of both creeks. All current and future management activities potentially affecting water quality in this watershed must adhere to the WQMP. Other streams in the watershed may warrant examination for water quality limitations due to high summer temperatures, flow modification, and sedimentation.

I. STREAM CHANNEL

The major streams in the watershed can be classified into one of four stream types based on the Rosgen system of stream classification (Table III-3): A, B, C or F. Type A streams are steep, entrenched, cascading, step / pool streams with high energy transport associated with depositional soils and are very stable if bedrock or boulder dominated. Type B streams are moderately entrenched, have moderate gradient, riffle-dominated channels and infrequently spaced pools. They have a very stable plan and profile with stable banks. Type C streams are moderately meandering with floodplains on one or both sides of the channel. Type F streams are entrenched, meandering and have riffle / pool channels on low gradients with high width to depth ratios.

J. VEGETATION

The watershed is dominated by mixed conifer and mixed conifer / hardwood forests. Vegetative conditions across the landscape are highly variable. Maps 5, 6, 7, and 8 illustrate the mosaic patterns of vegetation that exist today. The areas directly associated with creeks contain the most mature component of the Forest. Scattered large, mature Douglas-fir, ponderosa pine, and sugar pines in the uplands are interspersed with brush. Fire exclusion has resulted in significant increases in stand density (more stems per acre); shifts in species composition (increases in fire-intolerant, shade-tolerant species); and changes in stand structure (Agee 1993, McKelvey 1996). These transformations have increased the forest's susceptibility to large, severe fires, epidemic attack by insects and disease, and have affected habitat quality for rare plants.

Plant communities in the watershed have also been affected by more direct human influences such as mining, logging, agriculture, road building and residential development. Shelterwood, clearcut, selection, and seed tree harvest methods occurred on BLM lands from the 1950s through the late 1990s. Table I-2 summarizes harvest acres and methods on BLM lands by decade.

Table I-2: BLM Timber Harvest In Sucker Creek Watershed by Decade

Decade	Harvest Method	Acres	Timber Sale Names	
1950s	Clearcut	48	Low Divide Little Grayback Old Little Grayback	
	Shelterwood	5		
	DECADE TOTAL	***53***		
1960s	Clearcut	444	Bear Creek Bear Creek East Bear Creek West Bear Grapes Bear Remains Cedar Flat Salvage Claim Ridge Deer Creek 4 Demo Tartar Demo Tartar 11-1a Golden Sucker	Grayback Test Little Grayback Low Divide Salvage Sucker Creek Sucker Creek Salvage Tartar Gulch Unnamed O&C sales Urn Aim W. Fork Williams Cr. Yeager Creek
	Shelterwood	65		
	Selective cut	309		
	Mortality Salvage	217		
	Seed tree cut	19		
	DECADE TOTAL	***1,054***		
1970s	Shelterwood	122	Bare Nelson Bear Cave Ridge Bear East Bear Grapes Bear Grapes Test Bear Head Bear Remains Claim Ridge Demo Tarter French Flat Road Golden Sucker Golden Sucker 1-2A	Grayback Test Kelly Creek Little Grayback Low Divide Salvage Robinson Hill Rev. Robman Serpentine Flat Sucker Creek Mobile Thompson Reserve Urn Aim Yeager Leftover
	Selective cut	795		
	Mortality salvage	146		
	Seed tree cut	30		
	Overstory removal	3		
	DECADE TOTAL	***1,096***		
1980s	Clear cut	368	Bear Grapes Bear Grapes Test Demo Tartar Demo Tartar 11-1a Grayback Test	Mary's Lode Robman Urn Aim Urn Aim 26-5
	Shelterwood	57		
	Overstory Removal	72		
	DECADE TOTAL	***497***		
1990s 1990s	Clear cut	100	Bare Nelson Golden Sucker Golden Sucker 13-3 Golden Sucker 1-2A	
	Selective cut	154		
	Overstory removal	22		
	DECADE TOTAL	***276***		
2000-	*DECADE TOTAL*	0		

Table I-2: BLM Timber Harvest In Sucker Creek Watershed by Decade			
Decade	**Harvest Method**	**Acres**	**Timber Sale Names**
2004			

Plant communities (associations) with the same climax dominants are referred to as plant series. The Sucker Creek watershed contains at least four major plant series (USDA, Forest Service. 1996): Douglas-fir, Douglas-fir/Tanoak, White-fir, and Riparian/Hardwood. Port Orford-cedar (POC) is a minor component of the forested landscape. POC root disease has infected stands in the watershed. An isolated Brewer spruce stand is found in the upper reaches of Little Grayback Creek.

K. SPECIES AND HABITATS

1. Terrestrial

a. Special Status Plants

Approximately one-fifth of the watershed has been surveyed for Special Status (SS) and Survey and Manage (S&M) vascular plants. Most of these surveys have occurred in silvicultural units. Very little BLM land has been surveyed for non-vascular or fungi species. Only the Sucker Creek Restoration project and a small right-of-way have been surveyed for these species.

The predominant plant series in the watershed is Douglas-fir/Tanoak. SS and S&M species occur predominately in this series. Only three species have been found during surveys to date. These are *Cypripedium fasciculatum, C. montanum* and *Erythronium howellii*. The watershed is a stronghold for *Allotropa virgata*, which was taken off the S&M list due to its common occurrence in non-late successional habitat. It has never been on the BLM SS species list. Anecdotal evidence shows that the species occurs frequently with matsutake, a much sought after special forest products mushroom.

b. Wildlife

There are 2,000 acres of the NWFP's designated 122,526 acre East IV / Williams-Deer Late-Successional Reserve (LSR) in the watershed. These LSR acres encompass 34% of the BLM lands in the watershed. LSR objectives include protecting and enhancing late-successional and old-growth forest ecosystems and habitats.

Vegetative and soil diversity in the Sucker Creek watershed provides potential habitat for a variety of sensitive species, though few formal wildlife surveys have been conducted. More than 200 vertebrate and thousands of invertebrate species may occur in the watershed. This includes potential habitat for 47 vertebrate Bureau special status species (16 mammals, 18 birds, and 13 reptiles and amphibians) See Chapter 3, Current Condition, for a complete list of sensitive species. Other vertebrates of concern include cavity nesting species, band-tailed pigeons and neotropical migrant birds.

Of the 47 special status species, most are associated with older forest habitats. However, other important habitats include riparian, oak stands, meadows, and special habitats such as caves, cliffs and talus. See Chapter 5, Synthesis and Interpretation, for habitat trends.

The threatened northern spotted owl (*Strix occidentalis*) is the only ESA listed wildlife species known to nest in the watershed. There are two spotted owl 100-acre cores on matrix lands (one core is only

partially in the Sucker Creek watershed) and one core in LSR in the watershed. Two additional spotted owl sites have part of their home range in the watershed. In 1992, prior to the implementation of the NWFP, the USFWS designated 53,380 acres as critical habitat for the northern spotted owl (CHU # OR-72) which includes 2,000 acres in the Sucker Creek watershed.

Bald eagles (*Haleaeetus leucocephalus*), an ESA designated threatened species, have been observed in the Sucker Creek watershed, and it is likely they forage here also. There are no known bald eagle nest sites in the watershed.

2. Aquatic Species

The Illinois River and its tributaries are important spawning and rearing habitats for anadromous and resident salmonids. The Illinois River contains an important portion of (and can be considered a stronghold for) the remnant native wild fish populations/habitats in the Rogue Basin (East Fork Illinois River Watershed Analysis 2000). Sucker Creek is an anadromous fish stream which flows into East Fork of the Illinois River. Sucker Creek is one of the most important anadromous fish watersheds in the Rogue River basin. The watershed has substantive snowpack most years and good cold water flow with good numbers of salmonid spawning during many years (USDA 2005).

There are approximately 365 miles of streams in the watershed across all ownerships. Habitat factors such as stream temperature, water quantity in the summer, number and depth of pools, large woody material, riparian complexity, road / stream crossings and sedimentation are key determinants of salmonid survival and fish productivity. Stream temperature may be the factor most affected by riparian area conditions, past disturbance, and flow modifications. Salmonid rearing requires a water temperature of 58ºF for optimal survival. Stream temperature primarily depends on exposure to direct sunlight with higher sunlight exposure leading to increased water temperatures. Riparian shade is determined by factors such as canopy cover, aspect, and channel valley form (V-shaped vs flat).

3. Fluvial Streams

Cutthroat trout, winter steelhead, coho, fall chinook and Pacific lamprey are found in the watershed. These cold water species require a complex habitat, especially in early life stages. Coho salmon can be considered an indicator species for the health of an aquatic ecosystem. Cutthroat and steelhead typically have a wider range of distribution and are found higher in the tributaries than coho and chinook. Factors limiting salmonid production include inadequate summer stream flows; high water temperatures; erosion and sedimentation; lack of large woody material in the stream and riparian area; lack of rearing and holding pools for juveniles and adults, respectively; stream channelization in canyons and lowlands; and blocked migration corridors.

Most streams on BLM land in the watershed have had some stream and aquatic habitat surveys completed. The Oregon Department of Fish and Wildlife (ODFW) conducted an aquatic inventory on a section of Sucker Creek for fish habitat in 2002. Several additional streams in the watershed have been surveyed by ODFW, BLM, or the Forest Service.

L. FIRE MANAGEMENT

Fire has been a key natural disturbance factor in the watershed. The watershed is dominated by three fire regimes described in greater detail in Chapter 3. Twenty-six percent of the watershed is in fire regime I; 66%, fire regime III; and 6%, fire regime IV (Atzet et al. 2004). The majority of the area has

historically experienced a low to mixed severity fire regime. More than 40% of the watershed's fire regime is mixed severity with a frequency of 35-100+ years (Atzet et al. 2004). Stand replacing fires that may "reset" large areas (10,000-100,000 acres) are rare. Subsequent mixed intensity fires are important for creating landscape heterogeneity. In these landscapes a mix of stand ages and size classes is a characteristic feature; the landscape is not dominated by one or two age classes. Approximately 56% of the watershed, mostly in the western portion which is dominated by private ownership, is in a low severity fire regime due to vegetation type associated with frequent (0-35 years) fires of low intensity. In a low severity fire regime most of the dominant trees resist low intensity fire through adaptations such as the early development of thick bark, which limits overstory mortality. Low severity fire regimes promote ecosystem stability (systems are more stable with fire than without) (Agee 1990). Frequent, low severity fires keep sites open so that they are less likely to burn intensely even under severe fire weather conditions.

Fire regime modification has occurred in the Pacific Northwest due to prolonged fire exclusion. This has increased fuel loads and fuel continuity resulting in more severe fire effects (Agee 1993) (McKelvey 1996). The historic pattern of frequent, low intensity fire has ended. Dead and down fuel and understory vegetation are no longer periodically removed and fuels are increasing. The longer interval between fire occurrences creates higher intensity stand destroying events rather than the historic low intensity stand maintenance fires.

It is important to recognize that each vegetative type is adapted to its particular fire regime (Agee 1981). Therefore, historic vegetative types that existed prior to Euro-American settlement cannot be maintained in the present fire regime that has resulted from fire exclusion. For example, decades of fire exclusion contributed to the effects of the 2002 Biscuit Fire (Biscuit Fire Recovery Project Final Environmental Statement page III-3 2004). That fire burned almost 500,000 acres and was contained approximately seven miles west of the Sucker Creek watershed.

M. AIR RESOURCES

Factors that affect air quality include weather and emission sources. Atmospheric stability affects emission dispersal. Stable air prevents mixing and traps pollutants at the ground level. Unstable air facilitates mixing and dispersal of pollutants. Seasonal patterns in weather and emissions influence air quality. Late fall and winter can produce stable air patterns between storm events which inhibit dispersion by reducing atmospheric mixing. During the winter, vehicles produce more carbon monoxide, and wood stoves produce fine particulate (PM_{10} and $PM_{2.5}$). These factors combine to produce a higher pollution level for these pollutants during winter (Oregon Dept. Env. Quality (ODEQ) 1993).

Atmospheric ventilation is usually better during spring and summer when fewer carbon monoxide and particulates are produced (ODEQ 1993). Summer air quality is impacted during relatively poor ventilation periods. Ozone concentrations reach peak levels during sunny warm periods of poor ventilation. Ozone and smog are the major concerns in the summer season.

Pollution that impacts the Illinois Valley is classified in two categories: area and mobile sources (ODEQ 1993). Area sources are relatively small individual sources of pollution, usually spread over a broad geographic area that collectively contributes emissions. Area sources include wood stoves, slash and field burning, forest fires, backyard burning, and dust emissions from roads and agricultural tilling. Mobile sources include motorized vehicles (including off-highway), boats, and aircraft. Depending

on the time of the year, the major impact to air quality in the Illinois Valley is smoke. Pollutants of concern include fine particulates (PM_{10} and $PM_{2.5}$) and carbon monoxide (CO).

N. HUMAN USES

Most of the watershed was publicly owned in the mid 1800s. Current land ownership patterns in the watershed were molded in the late 1800s and early 1900s. The first large scale transfer of public lands from federal ownership was to the state of Oregon following statehood in 1859.

In order to further develop the west, Congress passed laws enabling settlers to develop and obtain ownership of the public lands. These included Donation Land Claim patents, entry under the Homestead Acts, military patents and mineral patents. In addition to these types of deeds, land was deeded to the Oregon and California Railroad (O&C), with some of those lands being sold to private individuals. In reviewing the master title plats for the Sucker Creek watershed, it is apparent that ownership of much of the low elevation lands were originally deeded from the United States to private individuals through the above acts of Congress.

Current human use of the watershed includes tourism, agriculture, dispersed recreation, timber harvest, mining, and special forest products. The larger Illinois Valley area is rich in wineries, which attracts visitors from all over the region. Recreational use of BLM lands in the watershed is dispersed and includes off-highway vehicles (OHVs), hunting, hiking, horseback riding, and mountain biking. There are many non-designated trails and foot paths in the area. The area has a rich mining history, the evidence of which remains today.

II. KEY ISSUES

This section will focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions in the watershed. Key issues, summarized in Table II-1, help focus the analysis on the unique elements of the watershed. A short narrative discussing the relevance of each key issue in the watershed follows this table. The issues are not presented in order of importance.

Table II-1: Key Issues

Key Issues	Related Core Topic
Fire	Vegetation, Species and Habitats, Human Uses
Erosion and Sediment	Erosion Processes
Water Quality and Quantity	Hydrology, Stream Channel, Water Quality, Species and Habitats
Fisheries	Stream Channels, Species and Habitats, Water Quality
Aesthetics and Access	Human Uses
Habitat	Vegetation, Species and Habitats
Cultural Resources	Human Uses, Vegetation, Stream Channels

A. FIRE

The historic fire regime has been altered due to fire exclusion and other management practices. Approximately 860 acres (15%) of the BLM land in the watershed is in the National Fire Plan's Illinois Valley "Community at Risk" (CAR); 3,530 acres (61%) are in the wildland urban interface (WUI) area outside of the CAR; and 1,410 acres (24%) are outside of both. Effective fire suppression in the watershed over the past four decades has resulted in the exclusion of most natural wildfire. Approximately 86% of the watershed is at high or moderate risk of wildfire. Management activities such as hazardous fuel reduction can reduce the potential for uncharacteristic wildfires which Jackson and Josephine Counties have experienced the last four years. Some local fires which exhibited uncharacteristic behavior were Quartz 2001, Squires 2002, Biscuit 2002, and Deer Creek 2005. Collaboration with local agencies and the public has resulted in the completion of the Josephine County Integrated Fire Plan and the Illinois Valley Community Fire Plan. Mixed land ownership, WUI areas, and recreation use increase the complexity of fire prevention, protection, fuels management, and hazard reduction activities.

B. EROSION and SEDIMENT

In December 1996 and January 1997, heavy rainfall combined with snowmelt resulted in saturated soils and very high peak flows. Forest roads with saturated soils triggered landslides primarily on Forest Service land (the Bear Creek slide was on private land). Unstable soils, bedrock, and vegetation slid into streams contributing large amounts of bed load material and fine sediment. The bed load material is currently working its way down Sucker Creek in pulses and has caused the stream to widen and braid.

A lack of road maintenance and undersized drainage culverts have resulted in road failures which likely contribute sediment to the stream network. Poorly maintained roads also create runoff generated sediment.

C. WATER QUALITY AND QUANTITY

Reduced summer low flow due to water withdrawals has been a long term problem in this watershed (USDA 1998) and contributes to increased stream temperatures (Brown 1985). Because there are no federal water withdrawals on Sucker or Grayback creeks, the issue of water rights is outside of Forest Service and BLM authority.

Management activities in the watershed have increased solar exposure which has contributed to high summer water temperatures. On the main stem of Sucker Creek, mining is responsible for the greatest reduction of stream shade. For the tributaries of Sucker Creek, the greatest management related shade loss is due to riparian timber harvest (USDA 1998).

During storms, management-created sediment sources can increase sediment beyond the transport capacity of a stream, contributing to channel widening. A wide, shallow stream heats up faster than a narrow, deeper stream with the same discharge (Brown 1972). The principal processes that deliver sediment in the watershed are slope and road failures as well as bank failures due to placer mining.

D. FISHERIES

Coho salmon in the Sucker Creek watershed are part of the Southern OR/Northern CA (SONC) Coho Evolutionarily Significant Unit (ESU) which was listed as threatened in 1997 (Fed. Reg./Vol. 62, No. 87). Most of the coho in this ESU are in the Rogue River Basin, with the largest remaining populations in the Illinois River (Stouder et al. 1997). The majority of wild coho spawning in the Rogue Basin spawn in the Upper Illinois River. Sucker Creek produces an estimated 30% or more of the coho in the Illinois River (USDA 1997). The lower portion of Sucker Creek is low gradient and has potential for coho and chinook habitat. In 1997, the Governor's Salmon Recovery Science Team designated Sucker Creek as a core area for coho salmon protection and restoration. The lower portion of Sucker Creek flows mostly through private agricultural land. Agricultural factors influencing fish habitat and water quality include lack of riparian overstory vegetation, over-allocation of water (low summer flows), increased stream temperature, and potential fish barriers at water withdrawal points. Historic mining ditches may intercept flows and increase the drainage network. Connectivity is important for fish seeking cool water refuge.

Core areas were designated by the State of Oregon to protect and enhance critical habitat and meet federal obligations under the Endangered Species Act (Rogue Valley Council of Governments 1997). Core areas are defined as reaches or watersheds that are of critical importance to the maintenance of salmon populations that inhabit those basins.

Because this is a Tier 1 Key Watershed, restoration of water quality to maintain or improve anadromous fish habitat is emphasized. Key watersheds serve as crucial refugia for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species. They have the highest priority for restoration (NWFP p. C-7). The RMP (p. 23) requires that there be "no net increase of roads".

E. AESTHETICS AND ACCESS

The watershed receives high recreational use from those driving to Oregon Caves National Monument on Highway 46, which travels through the watershed and offers views of the surrounding BLM lands. The area is VRM III and IV (USDI 1995). Other main travel routes include Bear Creek, Little Grayback Creek and Grayback Creek roads which are used for dispersed recreation such as hunting, OHV riding and special forest product collection. The Forest Service's Grayback Campground is adjacent to Highway 46. Due to fragmented land ownership patterns, the BLM has acquired reciprocal right-of-way agreements to traverse private lands to access BLM parcels. In turn, the BLM has released rights and authority over existing roads Rights-of-Ways and land parcels in the Sucker Creek watershed. There are many active mining claims along Sucker Creek on BLM lands. Road maintenance and road decommissioning objectives may conflict when balancing resource protection with access needs (recreation, fire suppression, timber, and special forest products).

F. HABITAT

Habitat issues in this watershed include fragmentation, static forest succession, noxious weeds, and susceptibility to disease. There are two unique habitat features in this watershed: 1) the high percentage of Douglas-fir/tan oak plant association and 2) a portion of the watershed is in the East IV/ Williams-Deer LSR and plays an important role in connectivity for wildlife species.

Logging, mining, agriculture and land development has led to a fragmented landscape and low connectivity in some plant associations. The quantity and distribution of late-successional forest habitat has also been heavily modified by these activities and a long history of fire suppression. Fire exclusion has resulted in static forest succession and has reduced species diversity. Habitats in the watershed are also threatened by encroachment on native vegetation by noxious weeds such as scotch broom (*Cytisus scoparius*). This watershed is also susceptible to diseases such as the POC root disease *Phytophthora lateralis.* There is infected POC in the watershed.

The percentage of Douglas-fir/tan oak plant association has increased in the watershed. Late-successional forest habitat in the watershed is characterized by mature trees (>21" dbh (see Vegetative Condition Class)), canopy closure >60%, complex vertical structure, and snags and down wood. Douglas-fir/tan oak dominated sites in this watershed have a heavy understory of tan oak preventing more light dependent species such as ponderosa pine, sugar pine, and Douglas-fir from regenerating and thriving in the mid-level understory.

There is a small percentage of late-successional forest on BLM land in the watershed. While 2,000 acres of the Sucker Creek watershed are in the East IV / Williams-Deer Late-Successional Reserve (LSR), only 2% percent of BLM land in the watershed has old-growth characteristics and 52% is in the mature forest seral stage.

BLM lands west of the East IV/ Williams-Deer LSR play an important role in habitat connectivity to the Illinois Valley. Late-successional forest connectivity is low in some areas in the watershed. Whereas riparian reserves typically aid in connectivity, 50% of the riparian reserves in the watershed lack mature forest characteristics.

G. CULTURAL RESOURCES

There have been four cultural resource surveys completed on BLM lands in the Sucker Creek

and Althouse Creek watersheds covering approximately 1,055 acres. Twelve sites and two isolates are currently recorded in the Sucker Creek watershed. Eleven sites are historic sites related to mining and three are prehistoric (two are isolates). Historic sites represent a full range of local mining history. Historic documentation supports the high probability of numerous cultural sites existing in the watershed. The mining site chronology extends from the discovery of gold in Sailor's Gulch in the early 1850s to more recent prospecting and includes sites representing all the important technological developments associated with hydraulic and lode mining.

III. CURRENT CONDITION

A. CLIMATE

The Sucker Creek watershed has a marine influenced Mediterranean climate with cool, wet winters and warm, dry summers. Most of the precipitation is in the form of rain. About 17.5% of the BLM portion of the watershed is above 3,000' elevation and is in the transient snow zone (TSZ). The TSZ is where shallow snow packs accumulate and melt throughout the winter in response to alternating cold and warm fronts. Average annual precipitation ranges from 56" to more than 66". The driest portion of the watershed is in the west, and the wettest is in the southern portion at higher elevations. Precipitation levels increase in the Forest Service part of the watershed with larger portions of TSZ and snow zones.

B. SOILS

1. Erosion Processes

Erosion hazard is an indication of a soil's susceptibility to particle or mass movement from its original location. Particle erosion hazard for concentrated water flow assumes a bare soil surface condition. If the soil is protected by vegetation, litter, or duff, such that no mineral soil is exposed, concentrated flow erosion is not likely. Stream bank erosion is a function of lack of riparian vegetation and exposure to peak stream flows. Mass movement erosion is a function of the mass strength of the soil mantle and underlying geologic material. Large plant root strength plays a role in the susceptibility to mass movement. Most soil and highly weathered rock is weakest at high moisture levels.

a. Concentrated Flow

The dominant erosion process is concentrated flow erosion. This form of erosion occurs when water accumulates on the soil surface predominately where there is little or no protective organic material. As the water flows down slope it builds energy and detaches soil particles that travel as sediment in the flowing water. Sediment is deposited when flow rates diminish.

Areas that are particularly susceptible to concentrated flow erosion include soils of variable parent materials on steep slopes. The following general soil groups fall into this category: Steep slope, high erosion hazard soils, 72F (Speaker-Josephine gravelly loams, 35 to 55% south slopes), 6F / 7F (Beekman-Colestine complex, 50 to 80% slopes), and 44F / 45F (Jayar gravelly loam, 35 to 70% slopes) (see Map 20 for general soil types). These soils have gravelly loam surface textures and high erosion hazard due to slope steepness, which give flowing water high erosive energy as it increases in velocity running down slope.

Conditions that are most conducive to concentrated flow erosion include road drainage outlets, unprotected road ditches, areas of bare soil usually created by ground disturbing activities or fire, wheel ruts on natural surface roads, and highly altered ground surface created by OHVs or other motorized equipment. Areas of high road density, which often have more intense ground disturbance than would naturally occur, are commonly prone to this type of erosion.

An example of concentrated flow is on BLM Road 39-7-24.2, segment A, which has rills and ruts due to steep road grades, inadequate surface drainage, and worn road surfacing. On Forest Service land, a plugged culvert on Windy Creek accounted for 66% of the total sediment from roads during the 1996/1997 winter storms. This was one of a number of road failures that occurred on Forest Service land that contributed high amounts of sediment to streams by diverting stream flow onto road surfaces and forcing the large concentrated flow onto surfaces that would then rapidly erode (USDA 2005).

b. Stream Bank Erosion

Stream bank erosion, common in the watershed, is the loss of stream banks through sloughing, block failure or scouring by high stream flows. Stream bank erosion is usually associated with loss of root strength and changes in stream flow energy.

In this watershed, stream bank erosion occurs as a result of high peak stream flow combined with exposed deep, fine, and medium-textured soils that make up the stream banks where stream channels are generally "U" shaped or where wide channels are associated with floodplains. The January 1997 storm, a 30-40 year storm event, showed how high peak stream flows could cause stream bank erosion where bank protection and root strength are reduced. Also, heavy stream bed loads have diverted stream flow against vulnerable stream banks and caused bank erosion and channel widening, which have added to the bed load. Sucker Creek has an overly wide channel on most of the lower 13 miles of stream, (Rosgen F4 channel type) with a width to depth ratio that averaged 33:1 in 1998 (USDA Forest Service 2005).

c. Mass Movement (Mass Wasting)

Forms of mass movement that may occur in the watershed include debris slides and earth flows. These usually occur rapidly and during periods of deep saturation such as the latter half of winter and early spring. A debris slide is a moving mass of soil, rock, and plant material that leaves a steep, concave scarp. Soils most susceptible to debris slides are those formed in deep colluvial material. Earth flows are characterized by over-thickened clay rich soils that, when saturated, ooze slowly down slope. Soils most susceptible to earth flow are deep, clayey soils formed in metamorphic parent material.

There have been no surveys of mass movement features on BLM land. However, a large debris slide occurred in 1997 that overwhelmed the Bear Creek Road (road 39-7-21) in section 16. The slide, which originated on private lands, deposited a sizable amount of vegetation, soil and rock into Bear Creek. It temporarily dammed Bear Creek and currently backs up Bear Creek with a natural high water outlet. Forest Service lands with steep slopes and granitic soils in the Tannen, Grizzly, and Deadhorse drainages and on the ridge between Sucker Creek and the Left Fork have a high mass movement failure potential. (USDA 1998).

2. Road Densities

Average road density in this watershed is 3.4 miles/mile^2. On BLM land, road density averages 4.5 miles/mile^2. On non-BLM land (including Forest Service) road density is 3.3 miles/mile^2.

Road density on non-federal land is 7.1 miles/mile^2. Generally, these represent moderate road road densities when considering hydrologic effects with the exception of private land road density which is high. Section by section, road density varies substantially. These figures were generated through GIS; actual road density may vary and could be higher due to unofficial roads not recorded in the database.

C. HYDROLOGY

Stream and riparian surveys were completed in 2004 for all perennial and intermittent streams on BLM land in the watershed. Several vegetative, hydrologic, and geographic parameters were measured including duration of flow, large woody material, and potential large wood. Thirty-one miles of streams were categorized according to a functional rating: Proper Functioning Condition (18%), Functional at Risk, Upward Trend (68%); Functioning at Risk, Downward Trend (11%), Functioning at Risk, Trend Not Apparent (3%); and Nonfunctional (0%).

1. Stream Types and Channel Form

Map 10 includes those streams for which hydrologic data is available. It shows approximately 352 miles of streams: 186 miles of perennial streams (53%) and 166 miles (47%) of intermittent streams. All BLM streams were surveyed (30.6 miles). Perennial streams constituted 14.7 miles (48%) of the total streams on BLM lands. Such a high ratio of perennial to intermittent stream miles is uncommon and may be due to a large amount of perennial springs feeding upland streams. Other streams shown on the map are ephemeral with very short duration, storm related, flows.

Perennial streams exhibit year round flow. Intermittent streams show evidence of defined channels, scour and deposition. Perennial and intermittent streams have a major influence on downstream water quality. Much of the perennial and some parts of intermittent streams support fish populations (see Aquatic section). Beneficial uses of these streams include irrigation and aquatic species and wildlife habitat.

Channel form varies with landform. Generally, on the gentle valley bottom from the mouth of Sucker Creek to where it enters T39S, R7W, Section 25, the stream channel is broad with a flood plain on one or both sides. Upstream, the flood plain narrows and is occasionally confined by steep side slopes. The gradient steepens to roughly 2-3%. The channel narrows to a “U” shape with occasional narrow flood bands on one or both sides. Tributary channels are steeper (>4%) and V-shaped in draws on upland slopes.

2. Large Wood

Large woody debris is ≥16” dbh (key pieces are ≥24” dbh) and can be in or suspended above stream channels. Large wood dissipates stream energy, slows channel erosion and is a key component of headwater streams. Key pieces are generally more stable instream and may serve as a point to accumulate smaller pieces of wood. Forest stands along all streams on BLM land generally have large enough trees to provide a future source of large woody debris. However, the amount of large woody debris has been reduced as a result of timber harvest and stream cleaning (i.e. the historical practice of removing debris jams to improve fish passage). Low levels of woody debris contribute to reduced channel stability and increased sediment movement

during storm events (USDI 1995).

Portions of Sucker Creek in sections T40S, R7W, sections 1, 12, and 13, have the greatest potential for improvement through instream placement of large wood. On Little Grayback Creek, the greatest potential for stream restoration through large wood placement is in T39S, R7W, sections 13 and 24. Reaches in these sections have less than one piece of large wood for a 200' reach but do have 8 or more trees ≥16" dbh as a potential source of future large wood. Potential restoration sites should be reviewed on a site-by-site basis to determine specific areas that would benefit most from large wood placement.

D. WATER QUALITY / QUANTITY

Water quality varies throughout the watershed. The Oregon Department of Water Quality (DEQ) has monitored or collected water quality data from various sources on the streams and water bodies throughout the state. This information is captured in DEQ's 1988 Oregon Statewide Assessment of Nonpoint Sources of Water Pollution, and has been periodically updated and compared to standards. This has led to listing of some streams as "water quality limited".
DEQ's 1998 303(d) list included the segment of Sucker Creek from its mouth to Grayback Creek as water quality limited due to high summer water temperature (fish rearing requires 64ºF), flow modification (instream water rights are often not met at USGS gage 14375100), and habitat modification (insufficient pool depth and frequency and low levels of large instream wood).

A Water Quality Management Plan (WQMP) was completed for the Grayback-Sucker Creek watershed in 1998 to address the above issues and determine the best course of action to restore water quality (USDA 1998). The plan outlines recovery and restoration goals and objectives for stream temperature, flow modification, and habitat modification. As a result of the WQMP, streams in the watershed do not appear on the 2002 303(d) list; however, are still water quality limited because of stream temperatures (DEQ 2004). All future actions in the watershed will follow the recommendations of the WQMP.

1. Water Temperature

Summer stream temperature in Sucker Creek has been monitored by BLM since 1998 (Appendix G includes data from 1998 – 2004). The monitoring site is in T40S, R7W, section 1 (elevation approximately 2000'). The 7-day average daily maximum temperature of approximately 66°F generally occurs in late July to mid-August. The highest recorded stream temperature (67.8°F) occurred on August 9, 2001. Stream temperatures generally drop down to the upper 40s / lower 50s by October.

Many factors contribute to elevated stream temperature in the watershed. Natural conditions that can elevate stream temperature are hot summer air temperatures, low-gradient valley bottoms, south aspects, below normal precipitation (contributing to low flows), and wildfire and flood (loss of riparian vegetation). Human disturbances include water withdrawals, channel alterations and removal of riparian vegetation through logging, mining, grazing or residential clearing (USDI 1998a). Stream shade, channel form (high channel width-to-depth ratio), and stream flow are the three management factors contributing to water temperature problems in Sucker Creek.

Mining activities, including placer mining in the channel and on the floodplain, account for the greatest reduction of stream shade on the main stem of Sucker Creek. For the tributaries, the greatest loss of shade from management activities is due to riparian timber harvest (USDA 1998). The eastern portion of section 12, which is in an LSR, contains riparian reserves on perennial and intermittent tributaries that exhibit ideal LSR characteristics and act as important cold water inputs for the lower, fish-bearing reaches of the watershed. These reaches should be used as a model for other riparian areas in the watershed. Refer to the WQMP for additional recovery goals and recommendations for active and passive restoration of the shade component.

Changes in channel form may affect water quality. Channel widening from sediment input increases water temperature due to increased solar radiation; wide, shallow streams heat up faster than narrow, deep streams with the same discharge (Brown 1972). Channel widening due to sediment inputs is an issue for Sucker Creek and is discussed further in the Stream Channels section of this document.

2. Stream Flow

Stream flow in tributary streams fluctuates with seasonal variation in precipitation. Generally, tributary streams respond more quickly to a storm than the mainstem stream; however, on Sucker Creek, powerful high flows occur on the main stem in response to upland rain events. This is due in large part to the sheer size of the drainage area: 83.9 mi^2 just below the confluence with Little Grayback Creek (USDI 2000). In terms of main stem hydrologic response, the watershed is dominated by Forest Service land with a sizable amount of transient snow zone that is subject to rain-on-snow events. As a result, Sucker Creek likely has the highest peak flows in response to storm events compared to other watersheds in the Illinois Valley.

a. Peak Flow

Maximum peak flows generally occur December through February. The maximum flow between 1967 and 1987 on Sucker Creek, 500' downstream from Little Grayback Creek, was 8,550 cfs on January 15, 1974 (USDI 2000). In December 1964, a maximum of 19,300 cfs was estimated from the floodmark and slope-area measurement 0.7 mi. upstream of the gage (USDI 2000).

Upland disturbances can result in increased magnitude and frequency of peak flows which may result in accelerated stream bank erosion, scouring and deposition of stream beds, and increased sediment transport. The natural disturbance having the greatest potential to increase the size and frequency of peak flows is a severe, extensive wildfire.

In this watershed, the primary human disturbances that potentially affect the timing and magnitude of peak flows include roads, soil compaction (due to logging and agriculture), vegetation removal (timber harvest and conversion of sites to agricultural / residential use), and channel modification from mining activities. Quantification of these effects on stream flow in the watershed is not available. Roads quickly intercept and route subsurface and surface water to streams. The road-altered hydrologic network may increase the magnitude of increased flows and alter the timing of when runoff enters a stream (causing increased peak flows and reduced low flows). This effect is more pronounced in areas with high road densities and where roads are in close proximity to streams (USDI 1998a). Road density is discussed in the soils section of

this chapter.

Soil compaction resulting from skid roads, agriculture and grazing also affects the hydrologic efficiency in a watershed by reducing the infiltration rate and causing more rainfall to quickly become surface runoff instead of moving slowly through the soil to stream channels (USDI 1998a). The extent of compaction in this watershed has not been quantified for BLM and private lands. Overall, however, as there has been tractor logging and road building on BLM and non-BLM lands, some soil compaction is likely.

Vegetation removal reduces water interception and transpiration and allows more precipitation to reach the soil surface and drain into streams or become groundwater. Rates of hydrologic recovery are site-specific and depend on many factors, including the type and extent of disturbance, soils, climate, and rates of revegetation (USDI 1993). Extensive removal of vegetation in the TSZ is of particular concern due to alterations of the stream flow regime and resultant increased peak flow magnitudes (USDI 1998a), however the TSZ occupies only 17.5% of the non-Forest Service part of the 5th field watershed. Hydrologic analysis regarding extent of early seral vegetation, compacted area, TSZ, and road density by 6th field subwatershed has not been performed for the Sucker Creek watershed.

b. Low Flow

Low flows due to water withdrawals have been identified as a water quality limiting factor in Sucker Creek. Stream flow directly affects water temperature with temperatures tending to increase as flows decrease. There are 29 points of diversion on federal lands in the watershed. Existing instream rights are not often met at USGS gage 14375100 (located on Sucker Creek immediately below Little Grayback Creek) (Oregon DEQ 1998). Instream rights are summarized in Table III-1.

Table III-1: Insteam water rights for Sucker Creek

May 16 – June 30	80 cfs
July 1 – October 31	54 cfs
November 1 – May 15	135 cfs

For the period of record between 1965 and 1987, a minimum discharge of 12 cfs was recorded on October 20, 1974 at gage 14375100 on Sucker Creek below Little Grayback Creek. At the lowest flow point, near river mile 2.6, the average summer low flow is approximately 2 cfs. Oregon Water Trust has permanent water rights from the mouth of Sucker Creek to river mile 2.6 for 0.16 cfs (USDA 1998).

3. Domestic Water

There is little information available about domestic water use in the watershed. Wells are the predominant source for drinking water in this rural watershed. There are no groundwater studies for this area. Water quality and quantity is variable. Quantity varies also due to the nature of the bedrock and limited fracturing that would allow occurrence of aquifers. There are no authorized uses of public lands to transport water in the watershed.

E. STREAM CHANNELS

During storm events, management-related sources can increase sediment inputs beyond the transport capacity of a stream, contributing to channel widening. During the 1997 flood, harvest-related landslides and road failures contributed large amounts of sediment to the stream system. Forest Service surveys completed later the same year on Sucker and Grayback Creeks identified width-depth ratios and Rosgen stream type (see Table III-2, below). The surveys indicate considerable channel widening on Sucker Creek in the mining areas upstream of Grayback Creek to Yeager Creek likely due to sediment input, unstable banks due to placer mining, and natural disturbance (USDA 1998). The WQMP recommends actively restoring the channel form on Sucker Creek in the mined flat above the confluence with Cave Creek.

Rosgen (1996) developed a system of stream classification that is useful in assessing various types of streams based on their sensitivity to disturbance and their recovery potential. The classifications are symbolized by a combination of letters and numbers. The first letter represents the stream type (Table III-2); the number represents the channel material (bedrock = 1, boulder = 2, cobble = 3, gravel = 4, sand = 5, silt/clay = 6).

Table III-2: Rosgen Stream Classification

Stream Type	Description	Landform / Soils / Features
Aa+	Very steep, deeply entrenched, debris transport, torrent streams.	Very high relief. Erosional, bedrock or depositional features; debris flow potential. Deeply entrenched streams. Vertical steps with deep scour pools; waterfalls.
A	Steep entrenched, cascading, step / pool streams. High energy / debris transport associated with depositional soils. Very stable if bedrock or boulder dominated.	High relief. Erosional or depositional and bedrock forms. Entrenched and confined streams with cascading reaches. Frequently spaced, deep pools in associated step / pool bed morphology.
B	Moderately entrenched, moderate gradient, riffle dominated channel, with infrequently-spaced pools. Very stable plan and profile. Stable banks.	Moderate relief, colluvial deposition, or structural. Moderate entrenchment and width / depth ratio. Narrow, gently sloping valleys. Rapids predominate with scour pools.
C	Low-gradient, meandering, point-bar, riffle / pool, alluvial channels with broad, well defined floodplains.	Broad valleys with terraces, in association with floodplains, alluvial soils. Slightly entrenched with well-defined meandering channels. Riffle / pool bed morphology.
D	A braided condition with excessive bedloads. There is a high amount of surface water exposed to solar radiation. Depth is relatively shallow. Sections of Type D are not stable, usually due to excessive load of sediment created from an upstream source during high flows.	Broad valleys with terraces, in association with floodplains, alluvial soils. Slightly entrenched with well-defined meandering channels. Riffle / pool bed morphology.
F	Entrenched meandering riffle / pool channel on low gradients with high width / depth ratio.	Entrenched in highly-weathered material. Gentle gradients, with a high width / depth ratio. Meandering, laterally unstable with high bank erosion rates. Riffle / pool morphology.

Based on aerial photo interpretation, much of the lower broad valley bottom part of Sucker Creek is stream type C or straightened type which may be a type F. Table III-3 indicates how streams of these types typically perform.

Table III-3: Rosgen Management Interpretations of Various Stream Types

Stream Type	Sensitivity to Disturbance	Recovery Potential	Sediment Supply	Stream Bank Erosion Potential	Vegetation Controlling Influence
AA+3,4	very low	excellent	low to very low	low	negligible
A2	very low	excellent	very low	very low	negligible
A3	very high	very poor	very high	high	negligible
A4	Extreme	very poor	very high	very high	Negligible
B4	Moderate	excellent	moderate	low	Moderate
B5	Moderate	excellent	moderate	moderate	Moderate
B6	Moderate	excellent	moderate	low	Moderate
C3	Moderate	good	moderate	moderate	very high
C4	Very high	good	high	very high	very high
D4	Very high	poor	very high	very high	Moderate
F5	Very high	poor	very high	very high	Moderate

F. VEGETATION

BLM vegetation data was collected in 1997 (Appendix F). The plant series listed below were identified and mapped in the Sucker Creek watershed. Basal area (BA) provides a relative measure of site productivity. An area that can support 200 ft^2/acre of basal area is, for example, more productive than an area that can support 100 ft^2/acre of basal area. Basal area in a plant series considers all species; it is not limited to the tree species that a series is named for. The following discussion indicates the relative productivity of each of the series in the watershed based on basal area average.

a. Douglas-fir

Douglas-fir is the most common tree species in southwestern Oregon. Sites in the Douglas-fir series have an average basal area of 254 ft^2/acre (Atzet and Wheeler 1984). Douglas-fir tends to produce conditions that favor fire wherever it occurs. This species is self-pruning, often sheds its needles and tends to increase the rate of fuel buildup and fuel drying (Atzet and Wheeler 1982).

b. White Fir

Sites in the white fir series are also considered productive with basal area averaging more than 341 ft^2/acre (Atzet and Wheeler 1984). The white fir series is widespread, diverse, and productive (Atzet and McCrimmon 1990). White fir's thin bark provides little insulation during low intensity underburns until tree diameter reaches at least eight inches, Moreover, the shade tolerant nature of white fir, which allows branches to survive close to the ground, makes the lower crown a ladder to the upper crown (Atzet and Wheeler 1984). Due to fire suppression, white fir occupancy has increased.

c. Ponderosa Pine

Basal area in the ponderosa pine series averages approximately 170 ft^2 /acre. This series is relatively rare as ponderosa pine does not often play the role of a climax dominant (Atzet and

Wheeler 1984). This series tends to occupy hot, dry aspects that burn frequently. Ponderosa pine regeneration is restricted by reducing the number of fire events. Due to the success of fire suppression, overall cover of ponderosa pine has decreased (Atzet and Wheeler 1982). In this watershed the ponderosa pine series is often intermixed in the Douglas-fir and Douglas-fir/tanoak series.

d. Tanoak

Tanoak sites are productive. Average total basal area for this series is 262 ft^2/acre (Atzet and Wheeler 1984). This series occurs where soil and atmospheric moisture are plentiful. The series occurs most frequently on cooler aspects with fine textured soils (Atzet and Wheeler 1984). Fire is the principal inhibitor of dominance of individual tanoak trees (Tappeiner et al.1990). Due to fire suppression, overall presence of this species has increased in the watershed. There is a high percentage of tanoak dominated sites within the watershed that has negatively affected conifer regeneration within mixed conifer stands. Poor stocking of conifers exists within these stands due to fire exclusion, past management practices (select cutting w/out planting), and competition.

e. White Oak

The white oak series is present as inclusions in larger mapping units. It occurs at low elevations and is characterized by shallow soils. Average basal area is 46 ft^2/acre. Although white oak is usually considered a xeric species, it also commonly occurs in very moist locations such as flood plains, on heavy clay soils, and on river terraces. On more productive sites, white oak is out-competed by species that grow faster and taller (Stein 1990). Water deficits significantly limit survival and growth (Atzet and McCrimmon 1990). White oak has the ability to survive as a climax species as it is able to survive in environments with low annual or seasonal precipitation, droughty soils, and where fire is a frequent (Stein 1990). The natural fire regime of this series is one of high frequency and low intensity. Due to fire suppression over the last 70 years, this species has decreased in the watershed.

f. Port-Orford Cedar

The Port-Orford cedar (POC) series is present as inclusions in larger mapping units throughout the watershed. POC requires high daytime humidity and is associated with stream channels, lower slope positions, or other areas that meet the humidity criteria. POC tolerates the chemical composition of ultramafic soils and competes well there as long as humidity criteria are met. Productivity on ultramafic soils is lower than on non-ultramafics. Basal area averages 166 ft^2/acre on ultramafic soils compared to 401 ft^2/acre on non-ultramafic soils (Atzet and Wheeler 1984). POC is susceptible to an exotic pathogen, *Phytophthora lateralis* (PL), which is present on Forest Service, BLM lands, and likely on private lands in the watershed. Areas with POC downstream from or adjacent to PL infestations are considered at risk. There are infected and uninfected POC sites.

g. Vegetation Summary

Tables III-5 and III-6 summarize the extent of each of these plant series and vegetation condition class in the Sucker Creek watershed on other than Forest Service lands (There is no **Table III-4**). Plant series acres for Forest Service lands are a data gap.

Table III-5: Major Plant Series on Non-Forest Service Lands

Plant Series	BLM Acres (%)	Non-Federal Acres (%)	BLM + Non-Federal (%)
Douglas-fir	1,462 (25.2)	3,247 (35.4)	4,709 (31.4)
Douglas-fir/Tanoak	3,335 (57.6)	3,455 (37.6)	6,790 (45.3)
White fir	977 (16.9)	127 (1.4)	1,104 (7.4)
Riparian/Hardwood	8 (0.1)	609 (6.6)	617 (4.1)
Developed, Vegetated	7 (0.1)	1,505 (16.4)	1,512 (10.1)
Nonvegetated	6 (0.1)	227 (2.5)	233 (1.6)
Nonforest	0	13 (0.1)	13 (0.1)
Total	**5,795**	**9,183**	**14,978**

Data Source = BLM GIS

Table III-6: Vegetative Condition Class On Non-Forest Service Lands

Vegetative Condition Class	BLM Acres (%)	Non-Federal Acres (%)	BLM + Non-Federal Acres (%)
Grass / Forbs	0	0	0
Shrub	67 (1.2)	6 (0.1)	73 (0.5)
Hardwood dominated	254 (4.4)	528 (5.7)	782 (5.2)
Early (stand age < 10 years)	109 (1.9)	0	109 (0.7)
Seedling/Sapling (< 5” dbh)	716 (12.4)	0	716 (4.8)
Poles (5-11” dbh)	360 (6.2)	1,067 (11.6)	1,427 (9.5)
Mid (11-21” dbh)	1,598 (27.6)	5,170 (56.3)	6,768 (45.2)
Mature (> 21” dbh)	2,606 (45.0)	38 (0.4)	2,644 (17.7)
Non-Vegetated	86 (1.4)	473 (5.1)	559 (3.7)
Developed/Vegetated	0	1,902 (20.7)	1,902 (12.7)
Total	**5,796**	**9,184**	**14,980**

Data Source = BLM GIS

Table III-7 summarizes plant series data combined with vegetative condition class. Additional analysis of site specific vegetative conditions will be necessary to prescribe forest management activities.

Table III-7: Dominant Vegetation Type

Dominant Vegetation	BLM Acres (%)	Non-Federal Acres (%)
Hardwood	254 (4.4)	528 (5.7)
Hardwood/Conifer	4,409 (76.1)	6,526 (71.1)
Douglas-fir	26 (0.4)	0 (0.0)

Table III-7: Dominant Vegetation Type		
Dominant Vegetation	**BLM Acres (%)**	**Non-Federal Acres (%)**
Douglas Fir/White Fir	254 (4.4)	143 (1.6)
White Fir	86 (1.5)	0 (0.0)
Mixed Conifer	615 (10.6)	0 (0.0)
Shrub	67 (1.2)	6 (0.1)
Nonvegetated	86 (1.4)	473 (5.1)
Grass	0 (0.0)	1,508 (16.4)

G. SPECIES AND HABITATS

1. Rare Plant Species and Habitats

a. Special Status Species

Federally listed plant species, species proposed for listing, candidate species and species of concern under the ESA by the U.S. Fish and Wildlife Service (USFWS) are protected under federal law on federal lands; no protection is provided on private lands. The goals are to protect the viability of known populations, their habitat (including any designated critical habitat), and take reasonable conservation actions so that they can be removed from protection under the ESA.

State-listed Oregon (STO) species are listed or proposed for listing under the Oregon Endangered Species Act as endangered or threatened. These species are protected on federal land and conservation measures are developed in conjunction with the Oregon Department of Agriculture.

Bureau-sensitive Oregon (BSO) includes federal and state listed species and all species designated by the Oregon Natural Heritage program (ONH) as State Rank 1. The management goal is to conserve populations and habitats and avoid the need to list the species under the ESA.

Bureau assessment Oregon (BAO) species have an ONH State Rank of 2. These species are afforded some protection, but less than that for BSO species due to their local abundance and availability of habitat. The goal is to manage where possible so as not to elevate their status to any higher level of concern.

Bureau tracking Oregon (BTO) species are not special status species, but are of local concern or interest. Populations and locations are tracked during surveys to assess potential changes to species status.

Only a small portion of BLM lands in the watershed has been surveyed for special status plants. Approximately 1,472 acres (25% of BLM acres in the watershed) have been surveyed for special status vascular plants and 13 acres (0.2%) for non-vascular plants and fungi. Based on current surveys and informal inventories, 12 populations of BSS vascular and non-vascular populations have been found. For the most part, these surveys have occurred in previously harvested units

where habitat was substantially disturbed in the 1980s and 1990s. The small number of populations that have been found may be related to where surveys have occurred. The majority of our surveys occur in proposed project areas, typically early to mid seral forested stands with low habitat diversity.

It is likely additional species and new sites will be found as surveys occur in other areas and during different times of the year. Not all rare plants are discovered during the course of surveys. Some populations are overlooked or missed and some populations are not present certain years due to varying environmental influences and plant morphological conditions.

Table III-8 below lists the BSS plant species that occur in the Sucker Creek watershed. See Map 19 for locations. Howell's fawn lily is a bottom land serpentine endemic. Clustered lady's slipper, mountain lady slipper and firecracker flower are upland conifer associated species.

Table III-8: Bureau Special Status Species

NACODE	Species	Bureau Status	Heritage List Rank	Sites on Medford District	Sites in Sucker Creek Watershed
CYFA	*Cypripedium fasciculatum* (Clustered lady's slipper)	BSO*	2	>600	7
ERHO10	*Erythronium howellii* (Howell's fawn lily)	BSO	1	>150	1
CYMO2	*Cypripedium montanum* (Mountain lady's slipper)	BTO*	4	>170	3
DIID	*Dichelostemma ida-maia* (Firecracker flower)	BTO	4	2	2

* Species considered Survey and Manage as of the 2001 FEIS to Amend Survey and Manage Mitigation Measures Standards and Guidelines

As shown in the above table, the number of known sites for *Cypripedium fasciculatum*, *C. montanum* and *Erythronium howellii* constitute less than 1% of the known sites on Medford District.

Survey information gathered since the inception of the Northwest Forest Plan confirms increased population numbers for both *C. montanum* and *C. fasciculatum*. The known population numbers on Medford District are greater than 600 for *C. fasciculatum* and greater than 170 for *C. montanum* (Geographic Biotic Observations Database, Medford BLM, 2005). The global range of *C. fasciculatum* spans eight states in the western United States: Wyoming, Colorado, Utah, Montana, Idaho, Washington, Oregon, and California. *C. fasciculatum* ranges from the northern Cascades of Washington to the Santa Cruz Mountains of the central California coast. It occurs in mountainous areas from the coastal and interior far west to the interior west and the mid Rocky Mountain Range (Vance 2005). *C. montanum* has a wider range than *C. fasciculatum*; it ranges from southern Alaska, British Columbia and western Alberta south to Montana, Idaho, Wyoming and northern California (USDI/USDA 1998). Neither species is continuous throughout its range.

Both species can be found in a variety of habitats other than late successional. *C. fasciculatum* can be found in dry to damp soil conditions where a rich organic layer exists. While it can be found in mature forests, it is most frequently found in mixed successional stages (Vance 2002).

Most often it grows as scattered individuals or small groups, although large clumps do occur (Coleman 1995). *C. montanum* has adapted to multiple habitats in both moist and dry conditions. Occasionally plants can be found in full sun, though usually they are in at least partial shade. Both species can be found on roadcuts (Coleman 1995).

Recently the Oregon Natural Heritage program downlisted *C. fasciculatum* from a ranking of 1 (endangered or threatened throughout its range) to 2 (endangered or threatened, but stable or more common elsewhere) due to its global ranking of 4 (the species is not considered rare and apparently is secure, but with cause for long-term concern, usually with more than 100 occurrences) (NatureServe website 2005). *C. montanum* has a global ranking of 5 (demonstrably widespread, abundant and secure).

The *Erythronium howellii* sites found in Sucker Creek watershed represent less than 1% of the known sites for this species on the Medford District. The transition between forests and serpentine openings provide excellent edge habitat for *E. howellii*. This species has a very narrow range encompassing only the southern end of the Illinois Valley and a small portion of Del Norte County in northern California. The majority of the known populations exist in the East Fork Illinois watershed on BLM land. Populations occur in canopy closures ranging from 10-60%. Many of these populations are along edges or in openings, but some also extend deeper into open forested stands. This is most likely because the forest edge has expanded. That is, populations that were once on the edge are now under forest canopy due to conifer encroachment. The species appears to tolerate canopy openings, but it is unknown how much ground disturbance can be tolerated.

The *Dichelostemma ida-maia* sites in this watershed are the only known sites on Medford District making it one of the more rare Bureau Tracking species. It is found in open woods, grassy hillsides, and roadsides from Douglas County to northwestern California. It is seldom seen in Oregon.

b. Noxious Weeds and Non-Native Plants

Most of the weeds identified below are commonly found in the watershed's bottom lands as a result of ranching, farming, past mining, and other development. Most weed sources can be traced back to use of the plant for agricultural or horticultural purposes or contaminated crop seeds. On public lands weeds are commonly introduced and spread along roads during road work or by seeding of poorly selected species to revegetate disturbed areas. The same areas surveyed for special status plant species were also surveyed for weeds. However, noxious weed reporting was limited to species lists and sites were usually not mapped.

Noxious and exotic weeds found in this watershed include scotch broom (*Cytisus scoparius*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), white sweet clover (*Melilotus alba*), St. John's wort (*Hypericum perforatum*) and meadow knapweed (*Centaurea pratense*). These species are found along roadsides and in heavily disturbed areas such as harvest units and mined areas. The white sweet clover was most likely planted as a soil stabilizer on mine tailings along Sucker Creek.

c. Habitats

Habitat types can be very clear and definitive; however, at times there is blending and "fusion", or transitional zones where characteristics of two or more habitat types are combined and co-exist. The habitat types identified here are most likely to be associated with rare plant species although rare species may not strictly adhere to these habitats. Additional inventory work and habitat correlation studies are needed to determine the quality and quantity of these habitats.

Serpentine. Sucker Creek watershed has serpentine soils, though not to the extent found in the Illinois River or Althouse watersheds. The watershed has dry serpentine habitats suitable for several endemic special status species. The plants could be found in forest openings, rock outcrops, grasslands or barrens. The species inhabit these ultramafic soils sites because of adaptations and specializations developed over time to mineral imbalances in the soil. The only serpentine associated Special Status Species known in Sucker Creek watershed is *Erythronium howellii*.

Serpentine areas may be disturbed or destroyed by road construction, timber harvest, mining, OHVs or other related activities. Some low elevation serpentine barrens were intensively disturbed by hydraulic mining in the 1930s. These areas, especially in areas with mine tailings, may never fully recover.

Riparian. Perennial riparian habitat are riverine forests, stream banks, spring-fed seeps and meadows. While serpentine fens have not been found in the Sucker Creek watershed, riparian habitats may still be suitable habitat for at least the California pitcher plant (*Darlingtonia californica*) and California lady's slipper (*Cypripedium californica*). These species are not restricted to serpentine soils. Neither has been found during surveys. The clustered lady's slipper (*Cypripedium fasciculatum*) is commonly found on stream terraces and occurs in this watershed. Riparian habitats have been disturbed in the Sucker Creek watershed primarily through mining, skid trails and OHV use.

Forest. Douglas-fir forests, primarily the Douglas-fir/tanoak plant series, are scattered throughout the watershed and have enough overstory to shade microsites which provide habitat for the rare orchids already found in the watershed. Prime habitat for Howell's fawn lily is along edges adjacent to serpentine openings. These forested habitats carry the legacy of effects from timber harvest, mining, wildfire and fire suppression. Other impacts include recreation and road building.

d. Special Areas

The Illinois Valley Botanical Emphasis Area was established in the 1994 Medford RMP and occupies approximately 141 acres of BLM in the Sucker Creek watershed. This botanical area was established due to the preponderance of special status species. Actions including timber harvest are allowed if they do not conflict with the habitat needs of these plants (RMP 1994). Management recommendations have not been established for this botanical area. Serpentine habitat quality is variable, mostly due to development, OHVs and historical mining.

A small portion (186 acres or 10%) of the Brewer Spruce Research Natural Area (RNA) is in the

Sucker Creek watershed. This RNA was designated to protect and provide study opportunities for the uncommon Brewer spruce (*Picea brewerianai*), a paleoendemic species growing at the northernmost reaches of its range. Because this RNA is located at some of the higher elevations in the region and gets little visitation, habitat in the RNA is relatively stable. The remainder of the RNA outside of the watershed gets more visitation.

2. Wildlife

a. Special Status Species and Habitats

1) Habitats

Wildlife habitats in southwest Oregon are complex. Terrain, climate and vegetation combine to create the diversity of habitats found from the valley floor to the peaks of the Siskiyou Mountains. Habitats in the Sucker Creek watershed include meadows and fields on the valley bottom, riparian areas, and a variety of other unique areas. The Sucker Creek Watershed is dominated by mixed conifer and mixed conifer/ hardwood forests, including some late-successional forest habitat.

BLM lands in the watershed include 2,000 acres of designated spotted owl critical habitat (Critical Habitat Unit OR-72). These same 2,000 acres are also part of the East IV/ Williams-Deer Late-Successional Reserve.

The relatively small amount of serpentine areas in the watershed are characterized by edaphic endemic plants, complex vegetative patterns, shrub dominated communities and Jeffrey pine forests. Vegetation series occurring on these sites do not have the potential for attaining late-successional or old growth conifer forest habitat conditions.

Wildife in the watershed include those adapted to a particular habitat (specialists) and those that utilize many different plant communities to fulfill their needs (generalists). Because habitat requirements vary greatly, a single dominant vegetative structure will not meet the needs of all species, and may not meet the need of any one species during all phases of the year. Habitats of particular interest in the watershed include late-successional forest, meadows, pine stands, oak woodlands, and riparian habitat. All of these habitats have been impacted by natural processes and human activity.

Valleys. The watershed is characterized by numerous drainages with limited areas of valley habitat and relatively steep forested hillsides. Almost all valley bottom habitat is on private lands while BLM lands provide the transition from the valley to the uplands. Development, agriculture and mining are prevalent in the watershed. Most of the limited flat terrain has been developed and undisturbed native valley habitat is scarce.

Fire exclusion may adversely affect the remaining undisturbed valley habitat. Because lower intensity fires are important to the maintenance of many plant communities, its exclusion has contributed to a reduction in the quantity and quality of habitats including oak woodlands, meadows, conifer forests and chaparral. These habitats have been identified as four of the five critical habitats by the Oregon/Washington neotropical bird working group. A basic assumption is that further losses of these habitats would have an adverse impact on neotropical migrant

birds. Valley habitat provides primary nesting habitat for acorn woodpeckers *(Melanerpes formicivorous)* and western bluebirds *(Sialia mexicana)* as well as winter range for blacktail deer *(Odocoileus hemionus)*. Smaller mammals using this habitat include raccoon *(Procyon lotor),* ringtail *(Basariscus astutus),* and grey fox *(Urocyon cinereoargenteus).*

Uplands. Most federal lands in the watershed are above the valley floor and are dominated by coniferous forests that range in age and structure and contain a significant component of hardwood trees, particularly tanoak. Numerous species of conifers, hardwoods, shrubs, and herbaceous plants contribute to structural and vegetative diversity within these stands. Many of the hardwoods are berry and mast producers that offer a rich food source for wildlife. Mast crop producers include California black oak *(Quercus kelloggii)*, Oregon white oak *(Quercus garryana)*, tanoak *(Lithocarpus densiflorus)*, and California hazel *(Corylus cornuta)*. Berry producing plants such as Pacific madrone *(Arbutus menziesii)* and manzanita *(Arctostaphylos spp.)* are also important crop producers for wildlife.

Coniferous forest habitats in the uplands include late-successional forests and riparian areas that add diversity to the landscape. Natural disturbances such as fire, wind damage, insects and disease have contributed to the diversity and structure within these late-successional forest habitats.

Currently, many private lands and county lands are in early seral or pole stages with little mature forest. Many of these stands are the result of past timber harvest and are structurally different from natural stands. The shift from older to younger forests has benefited generalists and early seral species but not those species that depend on late-successional forest habitat. Additionally, past forest management practices and private land ownership patterns have created fragmented late-successional stands which may not provide interior forest conditions.

To facilitate mining and timber harvest, numerous roads were constructed throughout the uplands. For species such as black bear, areas with low road densities offer important refugia from disturbance. Roads decrease the effectiveness of a number of habitats. Areas with high road densities contribute to disturbance and fragmentation of late-successional forest patches. Roads also lead to increased vehicular/human disturbance and provide access for poaching.

Riparian/Aquatic. Riparian areas are one of the most heavily used habitats in the watershed. Many life cycle requirements of animals are met in these areas. Aquatic and amphibious species are intrinsically tied to these habitats, as are the species that feed on these animals. Riparian habitats have been heavily impacted by mining, road building and logging. The riparian zone on private lands varies from mature conifer stands to bare stream banks. Most of the private riparian is dominated by hardwoods and young conifers. Riparian areas on federal lands are generally in better condition than those on private land due to past private land activities such as mining and timber harvest.

The amount of water flowing into Sucker Creek strongly influences the usefulness of streams to aquatic species. During low flows, water withdrawals can determine the absence or presence of many aquatic species such as the foothill-yellow legged frog (*Rana boylii*), tailed frog (*Ascaphus truei*), and Pacific giant salamander (*Dicamptodon tenebrosus*) , which are found in the Sucker Creek watershed. These species indicate areas of relatively high stream quality.

Specialized / Sensitive Habitats. Special and unique habitats include the following: 1) naturally scarce habitats (caves, springs, mineral licks, etc.), 2) rare habitats due to human influence on the environment (low elevation old-growth, oak/grasslands, etc.) and, 3) rare habitats due to the influence of natural cycles (snags, meadows, bogs, etc.). Often, these habitats receive a higher level of use by wildlife than surrounding habitats, or are essential for certain aspects of a particular animal's life history (e.g., hibernation). The Sucker Creek watershed contains a number of unique habitats. Maintenance of these habitats will determine the presence of many sensitive species. Sensitive habitats in the watershed are discussed below.

Late-successional forests and late-successional habitat are characterized by different stand parameters. For example, late-successional forests include forest stands greater than 80 years old. Vegetation class descriptions are based on average tree diameter and do not include many of the attributes used to describe late-successional forest habitat elements such as downed material, snags and understory structure that are key to their use by some species and which are not always present in 80+ year stands; at 80 years, a forest will not have the complexity or diversity characteristics of an older forest.

According to the vegetation condition class summary for the watershed, mature forests comprise approximately 3,040 acres of BLM lands. This equates to approximately 5% of the 62,496 acre watershed and 52% of BLM lands in the watershed.

Late-successional forest habitat is often characterized using other descriptors such as multi-storied canopy, high canopy closure (>60%), large trees, snags and large down logs. McKelvey 1 and 2 ratings for Northern Spotted Owl habitat quality are sometimes used as well. Based on this criterion, there are 650 acres of BLM and private lands of late-successional forest habitat, approximately 11% of the BLM lands in the Sucker Creek watershed. The current late-successional habitat on BLM lands is scattered throughout the Sucker Creek watershed. The largest contiguous patches of McKelvey 1 and 2 are found in T40S, R7W sections 1, 11, and 13. The Sucker Creek watershed is located in the East Illinois/ Williams-Deer LSR. At the time the Southwest Oregon Late-Successional Reserve Assessment was written in 1995, only 7% of the East Illinois/ Williams-Deer LSR provided interior late-successional habitat. Most likely, this percentage has decreased slightly due to harvest activities since 1995.

Due to the wide variety of niches, mature and old growth forests have a greater diversity of wildlife species than do younger forested stands. The size of these forest patches and their connectivity largely determine their suitability for many wildlife species such as the Pacific fisher (*Martes pennanti*), American marten (*Martes americana*) and northern spotted owl (*Strix occidentalis*).

On BLM lands in the Sucker Creek watershed, late-successional habitat/old growth forest patches occur infrequently and their distribution is fragmented. Past management activities such as timber harvesting, mining, agriculture and home developments have reduced the current quantity and distribution of late-successional habitat. Small, fragmented stands may offer refugia for species with limited home ranges, but do not provide optimal habitat for species with larger home ranges and may also be too small to support the maximum diversity of species. Large stands (>80 acres) are very important contributors to maintaining the biodiversity of the watershed. In heavily fragmented environments, larger predators that naturally occur at low densities are lost first (Harris and Gallagher 1989).

Irregular shapes and small size patches increase the amount of edge associated habitat in a stand. This has the effect of reducing interior forest conditions. Generally, 50 to 80 acres of unbroken forest is required to provide these conditions. Stands smaller than this may be unsuitable habitat conditions for many late-successional forest-dependent species and stands of this size may be too small to support some wide-ranging late-successional species. Stands with a high level of "edge" no longer function as interior forest and do not provide suitable habitat for species sensitive to edge effects.

Meadows in the Sucker Creek watershed are typically associated with the valley floor or high elevations on USFS lands. Earlier in the century, many natural meadows were converted to agricultural land by homesteaders. Currently the greatest threat to this habitat is tree encroachment due to disruption of the natural fire cycle. Meadows are the primary habitat for a number of species such as California vole (*Microtus californicus*) and the western pocket gopher (*Thomomys mazama*) and are the primary feeding location for species such as the great grey owl (*Strix nebulosa*), American black bear (*Ursus americanus*) and many neotropical bird species.

Big game winter range in the Sucker Creek watershed is defined as land found below 2,000 feet in elevation although it may extend higher in elevation on southern exposed slopes. Ideally, these areas offer a mixture of thermal cover, hiding cover and forage. The watershed is in poor condition due to fire exclusion. Much of the winter range has had no fire for more than 50 years. As plants become older, they lose their nutritional value, become woody and less palatable, and often form dense impenetrable stands which impede the ability of animals to browse. This is particularly true of buckbrush (*Ceanothus cuneatus*), an important forage plant. The Sucker Creek watershed is not located in an RMP designated Elk Management Area or Big Game Winter Range Area.

Deer fawning areas are critical for successful maintenance of deer populations. Key components include quality forage, water, cover, and gentle warm slopes. These areas should be free from human disturbance. Fawning areas on federally-administered lands are found in many small meadows scattered throughout the watershed, and in areas with southern exposures. On private lands throughout the watershed, fawning areas can be found. However, disturbance and development have influenced the quality of these sites.

Dispersal corridors aid in gene pool flow, natural reintroduction and successful pioneering of species into previously unoccupied habitat. Animals disperse across the landscape for a number of reasons including food, cover, mates, refuge, and to locate unoccupied territories. The vast majority of animals must move during some stage of their life cycle (Harris and Gallagher 1989).

Generally, dispersal corridors are located in saddles, low divides, ridges, and along Riparian Reserves. Without such corridors, many isolated wildlife habitats would be too small to support the maximum diversity of species. Numerous ridgelines and low divides in the watershed allow for localized dispersal between drainages as well as regional dispersal.

Dispersal corridors provide hiding and resting cover. Without corridors connecting habitat, many isolated wildlife habitats could be too small to support the maximum diversity of species. Connectivity is particularly important for certain fur bearers, such as fisher and marten (USDA

and USDI, 1994), and species such as the northern spotted owl (*Strix occidentalis*), which depend on higher levels of canopy closure to successfully move between habitats without becoming victims of predators such as great horned owls (*Bubo virginianus*) and red-tailed hawks (*Buteo jamaicensis*) (Forsman et al. 1984). Movement of northern spotted owls between large areas is thought to be crucial to long-term population viability (Thomas, et al, 1990).

This watershed is in the East IV/ Williams-Deer LSR. The development and maintenance of large connected patches of late-successional forest is an objective of this LSR. The East IV/ William-Deer LSR provides important habitat connections, such as the high elevation forest between the eastern Illinois valley mountains and the coastal part of the Siskiyou Mountains. Parts of the LSR also connect the Rogue and Illionois River Valleys. However, there is a lack of older forest connections directly to the west of the East IV/ Williams-Deer LSR, which includes the BLM lands in the Sucker Creek watershed (USDA, USDI, 1995). BLM lands in the Sucker Creek watershed provide some limited late-successional connectivity adjacent to the East IV/ Williams-Deer LSR in T39S-R7W sections 11 and 15, as well as in T40S-R7W sections 1, 12, and 13.

Riparian Reserves serve as important dispersal corridors across the landscape because they often provide late-successional habitat. The eastern portion of Section 39-7W-12, which is in the LSR, contains existing late-successional forest stands to provide dispersal in riparian reserves. There are riparian reserve areas outside of the LSR that may also aid in connectivity. These areas may not contain all late-successional habitat characteristics, but they generally provide adequate hiding and resting cover necessary for dispersal.

Mine adits play a critical role in the life history of many animals, providing shelter from environmental extremes, as well as seclusion and darkness. Mines are the primary habitat for species such as the Townsend's big-eared bat *(Corynorhinus townsendii)*, a state Critical and Bureau-Sensitive species. Other species such as the bushy-tailed woodrat *(Neotoma cinerea)* and the cave cricket *(Ceuthophilus spp.)* use caves as their primary residence. These sites are also used seasonally for a number of species such as ringtails, roost sites for other bat species and den sites for porcupine *(Erethizon dorsatum)*. A number of mine adits are located on BLM lands in the watershed. Townsend's big-eared bats have been confirmed in adits associated with the Tip Top mine.

2) Wildlife Species

The high diversity of vegetative communities and consequent high diversity of habitats in the watershed potentially provide for a wide variety of animal species. Relatively few formal surveys for wildlife have, however, been conducted in the watershed. Distribution, abundance, and presence for the majority of species are unknown.

There are over 200 vertebrate and thousands of invertebrate wildlife species that might occur in the Sucker Creek watershed This includes potential habitat for 47 vertebrate special status species (16 mammals, 18 birds, and 13 reptiles and amphibians), as well as 9 invertebrate special status species. Of the 56 special status species potentially occurring in the watershed, most are associated with older forest habitats. However, other important habitats include riparian, oak stands, meadows, pine savannahs and special habitats such as caves, cliffs and talus (see Chapter V, Synthesis and Interpretation, for habitat trends). Current status is shown in Tables III-9 / 10.

Additional species of interest, but without special status are potential inhabitants of the watershed.

Federal agencies are responsible for the active management of special status species and their habitats. The following special status protection categories serve as guidelines for special status species management and their habitats.

Listed and proposed listed species are those species that have been formally listed under the Endangered Species Act by the USFWS as endangered or threatened or officially proposed for listing. The goal is to enhance or maintain critical habitats and increase populations of threatened and endangered species on federal lands. This goal also includes restoration of species to historic ranges consistent with approved recovery plans and federal land use plans after consultation with federal and state agencies.

Candidate and Bureau-Sensitive species are federal or state candidates and those species considered by the BLM to be of concern for becoming federal candidates. The goal is to manage their habitat to conserve and maintain populations of candidate and Bureau-sensitive species at a level that will avoid endangering species and the need to list any species by either state or federal government as threatened or endangered.

State listed species and their habitats are listed under the Oregon Endangered Species Act. Conservation will be designed to assist the state in achieving their management objectives.

Bureau-Assessment species are those species considered by the state BLM office as important species to monitor and manage, but not on as crucial a level as candidate or Bureau-sensitive species. The goal is to manage where possible so as not to elevate their status to any higher level of concern.

BLM tracking species are not currently special status species, but their locations are tracked during surveys to assess future potential needs for protection.

a) Special Status Species

In this watershed, the Northern Spotted Owl is the only species listed under the Endangered Species Act known to reproduce in the area. Bald Eagles likely forage in the watershed, particularly along the lower areas of the watershed. There are also Bureau special status species (Sensitive, tracking and assessment) and NWFP buffer species (NWFP, C-49).

Tables III-9 and III-10 list known and potential special status species found in the watershed, along with status and level of survey as of September, 2006. This list includes species listed under the ESA, proposed for listing, and candidate species being reviewed by the USFWS. State listed species as well as Bureau assessment species and NWFP-ROD “buffer" species are also listed. Table III-9 is based on the March 14, 2005 OR/WA BLM Special Status Species list and includes species whose range falls within the Grants Pass Resource Area.

Table III-9: Special Status Species (Vertebrates)

Common Name	Scientific Name	Status*	Presence	Habitat quality	Survey Level on BLM (as of 9/2006)

Table III-9: Special Status Species (Vertebrates)

Common Name	Scientific Name	Status*	Presence	Habitat quality	Survey Level on BLM (as of 9/2006)
Red tree vole	*Aborimus longicaudus*	BT	suspected	Medium	none to date
Fisher	*Martes pennanti*	FC,BS	suspected	low	Limited
California wolverine	*Gulo gulo luteus*	BS,ST	unknown	low	Limited
American marten	*Martes Americana*	BT,SV	unknown	low	Limited
Ringtail	*Bassacriscus astutus*	BT,SU	present	medium	Limited
Peregrine falcon	*Falco peregrinus*	BS,SE, BOCC	migratory	Low	none to date
Bald eagle	*Haliaeetus leucocephalus*	FT,ST	Present	Low	incidental sightings
Northern spotted owl	*Strix occidentlis*	FT,ST	Present	Medium	Limited surveys
Marbled murrelet	*Brachyramphus marmoratus*	FT	Unknown	Low	none to date
Northern goshawk	*Accipiter gentilis*	BS,SC	suspected	Low	None to date
Lewis' woodpecker	*Melanerpes lewis*	BA,SC,BOCC	Present	low	incidental sightings
White-headed woodpecker	*Picoides albolarvatus*	BS,SC,BOCC	unknown	low	None to date
Flammulated owl	*Otus flammeolus*	BS,SC, BOCC	unknown	low	None to date
Purple martin	*Progne subis*	BS,SC	unknown	low	None to date
Great gray owl	*Strix nebulosa*	BT,SV	unknown	low	None to date
Western bluebird	*Sialia mexicana*	BT,SV	Present	medium	None to date
Acorn woodpecker	*Melanerpes formicivorus*	BT	unknown	medium	None to date
Black-backed woodpecker	*Picoides arcticus*	BS,SC	unknown	low	None to date
Bank swallow	*Riparia riparia*	BT,SU	migratory	low	None to date
Olive-sided flycatcher	*Contopus cooperi*	BT,SV,BOCC	suspected	medium	None to date
White-tailed kite	*Elanus leucurus*	BA	unknown	medium	None to date
Willow flycatcher	*Epidonax traillii brewsteri*	BT,SV	unknown	low	none to date
Rufous hummingbird	*Selasphorus rufus*	BOCC	unknown	medium	None to date
Townsend's big-eared bat	*Corynorhinus townsendii*	BS,SC	present	Medium	Limited surveys
Fringed myotis	*Myotis thysanodes*	BA,SV	suspected	Medium	Limited surveys
Yuma myotis	*Myotis yumanensis*	BT	suspected	Medium	Limited surveys
Long-eared myotis	*Myotis evotis*	BT,SU	suspected	Medium	Limited surveys
Long-legged myotis	*Myotis volans*	BT,SU	suspected	Medium	Limited surveys
Silver-haired bat	*Lasionycterus noctivagans*	BT,SU	suspected	Medium	Limited surveys
Pacific pallid bat	*Antrozous pallidus*	BA,SV	unknown	Low	Limited surveys
Brazilian free-tailed bat	*Tadarida brasiliensis*	BT	unknown	Low	Limited surveys
California myotis	*Myotis californicus*	BT	Unknown	Low	Limited surveys
Hoary bat	*Lasiurus cinereus*	BT	Unknown	Low	Limited surveys
Western gray squirrel	*Sciurus griseus*	BT,SU	present	High	none to date
Northwestern pond turtle	*Clemmys marmorata*	BS,SC	unknown	low	none to date
Foothill yellow-legged frog	*Rana boylii*	BA,SV	present	Medium	Limited surveys
Northern Red-legged frog	*Rana aurora*	BT,SU	suspected	medium	none to date
Clouded salamander	*Aneides ferreus*	BT,SU	suspected	High	none to date
Southern torrent salamander	*Rhyacotriton variegatus*	BT,SV	unknown	low	none to date
Black salamander	*Aneides flavipunctatus*	BA,SP	unknown	low	none to date
Sharptail snake	*Contia tenuis*	BT,SV	suspected	Medium	none to date
California mountain kingsnake	*Lampropeltis zonata*	BT,SV	suspected	Medium	none to date
Common kingsnake	*Lampropeltis getulus*	BT,SV	suspected	Medium	none to date
Del Norte salamander	*Plethodon elongatus*	BT,SV	suspected	Medium	none to date
Siskiyou Mountain's salamander	*Plethodon stormii*	BS,SV	Unknown	Low	None to date
Western toad	*Bufo boreas*	BT,SV	suspected	Low	none to date
Tailed frog	*Ascaphus truei*	BT,SV	present	Medium	Limited surveys

*STATUS ABBREVIATIONS:
FT--Federal Threatened
FP--Federal Proposed
ST--State Threatened
FE--Federal Endangered
FC – Federal Candidate
SP--ODFW Peripheral or Naturally Rare
SU--ODFW Undetermined
SC--ODFW Critical
SV--ODFW Vulnerable
BS--Bureau Sensitive
SM--Survey and Manage
BT -Bureau Tracking
BA- Bureau Assessment
SE--State Endangered
BOCC – US Fish and Wildlife Service Birds of Conservation Concern list- specific to Grants Pass Resource Area (2002)

Table III-10: Special Status Species (Invertebrates)

Common Name	Presence	Status**	Survey Level (as of 9/2006)
Oregon Megomphix Snail	Unknown*	BT	None to date
Oregon Shoulderband Snail	Unknown*	BS	None to date
Chase Sideband Snail	Unknown*	BS	None to date
Cooley's Acalypta Lace Bug	Unknown *	BT	None to date
Franklin's bumblebee	Unknown *	BS	None to date
Gray-blue Butterfly	Unknown *	BT	None to date
Coronis Fritillary Butterfly	Unknown *	BT	None to date
Mardon Skipper	Unknown *	FC	None to date
Siskiyou (Chloealtis) short-horned grasshopper	Unknown*	BS	None to date

* = Suspected on Medford District BLM, unknown if range extends into this watershed
** STATUS: BS = Bureau Sensitive; BT=Bureau Tracking; FC=Federal Candidate

b) Threatened or Endangered Species

Northern Spotted Owl (Threatened) - There are two Known Spotted Owl Activity Centers (KSOAC) on BLM matrix lands (one KSOAC is only partially in the Sucker Creek watershed). One-hundred acres of the best spotted owl habitat have been retained at these sites. There is one historic site in the East IV/ Williams-Deer LSR on BLM lands in the Sucker Creek watershed. Two additional spotted owl sites on BLM lands have part of their home range in this watershed. BLM lands in the watershed are also likely used for foraging and dispersal. In 1992, prior to the implementation of the NWFP, the USFWS designated 53,380 acres as critical habitat for the Northern Spotted Owl (CHU # OR-72) and which includes 2,000 acres on BLM lands in the Sucker Creek watershed. CHU OR-72 provides important east-west and north-south intra-provincial (Klamath Mountains Province) connectivity in an area of high fragmentation. This CHU is also an important link for the Highway 199 Area of Concern (USDA,USDI 2003).

Surveys for Northern Spotted Owls have been conducted since the mid-1970s on BLM lands on the Medford District. However, many of these early surveys were opportunistic, and few surveys have been conducted in the Sucker Creek watershed the past decade.

The USFWS uses thresholds for suitable habitat around spotted owl sites as an indication of a site's viability and productivity. These thresholds have been defined as 50% of the area in 0.7 mile of the center of activity (approximately 500 acres) and 40% of the area in 1.3 miles (approximately 1,388 acres).

To evaluate this in the watershed, forest conditions based on the McKelvey model were mapped using aerial photo interpretation, ground truthing and roadside reconnaissance. The McKelvey Rating System is based on a model that predicts spotted owl presence based on habitat availability. Stands were examined for criteria such as canopy layering, canopy closure, snags, woody material and other features. Biological potential of a stand to acquire desired conditions is also taken into consideration. The McKelvey Rating System uses the following six classes:

Class 1- Spotted owl nesting, roosting, and foraging habitat
Class 2- Spotted owl roosting and foraging
Class 3- Currently does not meet 1 or 2 criteria
Class 4- Will never meet 1 or 2 criteria
Class 5- Currently does not meet 1 or 2, but meets dispersal
Class 6- Will never meet 1 or 2 but meets dispersal

The BLM portion of the Sucker Creek watershed encompasses 5,801 acres (9% of the watershed). There are 650 acres of BLM land classified as suitable spotted owl habitat (McKelvey rating #1 and #2). The suitable spotted owl on BLM lands is scattered throughout the Sucker Creek watershed. The largest contiguous patches are found in T40S, R7W sections 1, 11 and 13. On private land in the watershed, there are only 31 acres meeting McKelvey 1 criteria, and no acres that meet McKelvey 2 criteria (Table III-11; Map 9).

Spotted owls are known to disperse through a wide variety of forest types, although their success can vary greatly depending on the condition of the forest. The more closely their dispersal route vegetation resembles suitable habitat the more likely spotted owls will successfully complete the journey (Thomas et al. 1990). Dispersal habitat for spotted owls (McKelvey #5 & 6) is defined as stands that have a canopy closure of 40% or greater, and are open enough for flight and predator avoidance. In the watershed, there are currently 2,594 acres of BLM land and 29 acres of private land of dispersal habitat. The majority of the dispersal habitat on BLM lands in the Sucker Creek watershed classify as mature forest with a potential to become suitable spotted owl habitat. These areas are primarily found north of Sucker Creek.

Table III-11: McKelvey Rating Classes for the Sucker Creek watershed

McKelvey Class	BLM Lands		Non-federal Lands		BLM + Non-federal Lands	
	Acres	% of watershed	Acres	% of watershed	Acres	% of watershed
1	400	0.6%	31	< 0.1%	431	0.7%
2	250	0.4%	0	0	250	0.4%
3	2019	3%	4230	6.7%	6249	10%
4	533	0.8%	4859	7.3%	5392	8.6%
5	2389	3.8%	29	< 0.1%	2418	3.8%
6	205	0.3%	0	0	205	0.3%

*This information was collected during the summer of 1997, and may not reflect current condition. Federal acres managed by the Forest Service are not included in this table.

Marbled murrelet (Threatened) critical habitat was designated by the USFWS in May 1996. No land in the Sucker Creek watershed was identified as critical habitat. There are no known nest locations in the watershed, and the species is unlikely to occur in the watershed.

Nesting habitat for the marbled murrelet consists of older forested stands with trees that have large moss-covered limbs and high (70+%) canopy closure. This habitat is further defined by its distance from the coast. Based on years of intensive surveys, in 2002 the Fish and Wildlife Service changed the distance from the coast for required surveys. The survey zones are now more restricted and surveys are no longer required 50 miles from the coast. Sucker creek is outside of the required survey zone (USDI, 1-7-02-TA-6401, 2002).

Based on BLM inventory data information and field verification of McKelvey rating, approximately 400 acres of suitable marbled murrelet habitat are found on lands managed by the BLM in the watershed. This land, for the most part, corresponds with spotted owl suitable/optimal habitat (McKelvey #1). However, as mentioned above the Sucker Creek watershed is beyond the new inland boundary of marbled murrelet nesting habitat.

It is unknown if the stands in the watershed that contain components for marbled murrelet would be used by them. These sites are generally warmer and drier then those lands located closer to

the coast that are occupied by nesting murrelets.

Bald Eagle (Threatened) - At this time, there are no known nest sites documented in the watershed. Bald eagles have been observed in T40S, R7W, Section 1 during the winter months. The area along the creek represents potentially suitable winter and foraging habitat. Nesting habitat may occur on mature forests in sight of the creek. Preferred nesting habitat consists of older forests, generally near water, with minimal human disturbance.

Fisher (Candidate) - are found in mature and old growth forests with higher canopy layers (40-70%), and appear to be closely associated with riparian areas in these forests. They mainly use large living trees, snags and fallen logs for denning. Fishers have been observed in Grants Pass Resource Area primarily in the Williams drainage and in Deer Creek. Little information is available as to distribution and density. Remote camera surveys have been conducted at one location on BLM lands in the Sucker Creek watershed, but no fishers were detected. T40S, R7W sections 12, and 13 may provide the best suitable fisher habitat on BLM lands in the watershed. These sections have larger contiguous patches of mature forest and fewer roads than other sections in the watershed

c) Other Species of Concern

Peregrine falcons nest on ledges located on cliff faces. There are no known historic or current peregrine falcon nests on BLM lands in the Sucker Creek watershed. The nearest known historic nest is approximately one mile north of the Sucker Creek watershed.

Neotropical migratory birds inhabit the watershed. Neotropical migrants are species of birds that winter south of the Tropic of Cancer and breed in North America.

More than twenty years of Breeding Bird Surveys (BBS), Breeding Bird Census (BBC), Winter Bird Population Study, and Christmas Bird Counts indicate that many species of birds are declining precipitously. This is particularly true for birds that use mature and old-growth forest either in the tropics, in North America or both (DeSante & Burton 1994). Rates of decline are well documented for birds on the east coast of North America but less so on the west coast.

Among the explanations for these declines is the belief that an area effect occurs, in which certain interior dwelling bird species fail to breed because the available breeding habitat is too small. Larger habitat blocks therefore may provide an important habitat function in serving as a “source” for breeding birds. This occurs when there is enough suitable habitat to recruit new individuals into the populations faster than individuals are lost, potentially providing for migration into unoccupied habitat.

In 1992 the BLM signed a multi-agency agreement called "Partners in Flight." The purpose of this program is to establish a long-term monitoring effort to gather demographic information. This monitoring will establish the effects that deforestation and forest fragmentation have on temperate breeding bird populations on the scale of the continental United States and Canada.

The Sucker Creek watershed contains a number of neotropical migrants that utilize various habitats. Studies conducted on the Medford District have found that they comprise between 42% and 47% of the breeding species occurring in lower elevation forests dominated by Douglas-fir

(Janes 1993). In higher elevation forests dominated by white fir, neotropical migrants are less abundant contributing to a smaller portion of the bird species present.

For neotropical migrants, habitats of particular concern include valley brush fields, old-growth, riparian, and oak woodland communities. Depending on the season, neotropicals often use more than one habitat type. Overall, 46% of neotropical migrants are habitat generalists using four or more habitat types, while 34% are habitat specialists utilizing only one or two habitats.

Unusual sightings - The rocky terrain and mine shafts found in the Sucker Creek watershed provide suitable habitat for ringtail cats. These nocturnal animals are frequently seen along river corridors and there has been an observation of a ringtail on BLM lands in the Sucker Creek watershed.

Game species in the Sucker Creek watershed include: blacktailed deer, black bear, mountain lion, wild turkeys, Ruffed Grouse, Blue Grouse, grey squirrels, and Mountain and Valley Quail. Management of game species are the responsibility of the Oregon Department of Fish and Wildlife. The entire watershed is open to hunting during the appropriate season for game species. Information from the ODFW indicates that blacktailed deer populations are stable overall and meeting department goals. There are no BLM records of elk sightings in the watershed.

Black bear populations are extremely hard to monitor due to their secretive nature. The population in the watershed appears to be stable. Cougar populations throughout Oregon appear to be stable and have relatively high population densities in southwest Oregon. Grouse and quail populations are cyclic and largely influenced by weather. Long-term trends appear to be stable. Wild turkeys have been introduced and populations appear to be expanding.

In general, game species are generalists that benefit from edge habitats. Past land management practices both on private and federal lands have increased the overall amount of forest edge in the watershed. At the same time, road density has also increased. Roads affect the suitability of all habitat types. Studies have shown that high road densities have adverse affects on deer and elk populations and lead to increased poaching opportunities. The road density is 3.4 miles per square mile on the BLM lands in the Sucker Creek watershed. Unroaded areas offer better refugia for deer and other game species.

Band-tail pigeons *(Columba fasciata)* are suspected to occur in the watershed. Throughout their range, they have shown a precipitous decline in population since monitoring began in the 1950's (Jarvis and Leonard 1993). These birds are highly prized as a game species and restrictive hunting regulations have not led to an increase in bird populations. Habitat alteration due to intense forestry practices may partially explain their decrease in population (Jarvis and Leonard. 1993).

Band-tail pigeons are highly mobile and utilize many forest habitat types. Preferred habitat consists of large conifers and deciduous trees interspersed with berry and mast producing trees and shrubs. In the spring and fall, large flocks migrate through the resource area. The birds use higher elevation habitats to feed on blue elderberries, manzanita berries, and Pacific madrone berries. Fire exclusion has adversely impacted these food sources.

Snag and down wood dependent species are of special concern. Snags and down logs provide essential nesting/denning, roosting, foraging, and hiding cover for at least 100 species of wildlife in western Oregon (Brown et al. 1985). These species include a variety of bats, woodpeckers, owls, and salamanders. Past silviculture and agricultural practices have degraded habitat for these species which use snags and downed logs. In areas previously harvested, silviculture focused on even-aged stands which are typically low in residual snags and down logs. Fire suppression also reduced the amount of snags in the watershed. Fires, insects and other disturbance are important generators of snags. Species associated with habitat generated from disturbance events have also declined.

Exotic species have become established in the watershed and compete with native species for food, water, shelter and space. Bullfrogs (*Rana catesbeiana*) compete with native frogs and consume young western pond turtles (*Clemmys marmorata*). Opossums (*Didelphis virginiana*) occupy a similar niche with native stripped skunks (*Mephitis mephitis*) and raccoons (*Procyon lotor*). They also consume young birds, amphibians and reptiles. Other introduced species include European starlings (*Sturnus vulgaris*), ring-necked pheasants (*Phasianus colchicus*) and turkeys (*Meleagris gallopavo*). These species can negatively impact native flora and fauna.

3. Aquatic Habitats and Species

a. General

In the Rogue River Basin, the Illinois River and its tributaries are important spawning and rearing habitats for both anadromous and resident salmonids. The Illinois River constitutes an important portion of the remnant native wild fish population/habitat in the Rogue River Basin. Thus, the Illinois River Watershed is believed to be the stronghold for wild anadromous fish populations in the Rogue Basin. Sucker Creek is the principal producer of salmonid fish in the Upper Illinois (above Cave Junction) (USDA, 1997). Although Sucker Creek is an important fish-bearing stream in the Illinois River Watershed, it has been altered through water withdrawal, loss of riparian vegetation, and mining operations. The Illinois River Basin, including Sucker Creek, has had declining salmonid populations for decades. The lower gradient reaches of Sucker Creek, which have a high potential for biological productivity, are among the most altered by mining, harvest and flood repair work from past storm events (USDA 1998). Factors outside of the Sucker Creek watershed which have an effect on anadromous populations include, but are not limited to, downstream and ocean conditions, fishing, and predation (USDA, 1997).

There are approximately 365 miles of streams in the entire watershed including private and USFS land. There are an estimated 186 miles of perennial streams, 166 miles of intermittent streams and 13 miles of ephemeral draws in the entire watershed (See Map 10). The majority of BLM land, including the riparian reserves, is heavily dominated by the Douglas-fir plant series.

Large woody material contributes to riparian and stream habitat by providing shade and retention of detritus for terrestrial and aquatic insects. Large woody material is important for creating the habitat complexity needed to rear juvenile anadromous fish and to provide cover for adults during migration. Off-channel habitat areas in unconfined and lower gradient streams provide

refuge areas for coho salmon when they migrate downstream. Properly functioning off-channel habitat areas have frequent active side-channels related to large wood and geomorphology. Stream meander is also important for dissipating stream velocity and increasing winter refuge habitat for juvenile fish, especially for coho salmon. Pool habitat is of particular significance to juvenile salmon during all stages of their life cycle.

Adult and juvenile fish production can be limited by migration barriers such as roads and culverts. Yearling juvenile fish can move miles in one watershed, especially during summer months when they seek cool waters.

Roads located next to streams can disconnect streams from the floodplain, impede stream meander and act as heat sinks. Certain kinds of timber harvesting and the presence of roads can accelerate surface water runoff and erosion of sediment into the streams, resulting in decreased macroinvertebrate and fish production. The density and length of road distribution can be major factors in determining the level of sediment production. Excessive sedimentation, especially if delivered at the wrong time intervals, can delay adult migration and spawning, and suffocate eggs in redds. Suspended sediment can cause gill damage and secondary infections on over-wintering juvenile fish which have been stressed from the lack of sufficient over-winter habitat to allow escape from high water velocities.

When under stress from water temperatures exceeding 70ºF, salmonid fish populations may have reduced fitness, greater susceptibility to disease, decreased growth and changes in time of migration or reproduction. When water temperature exceeds 75ºF for extended periods of time, mortality can occur. Salmonid rearing requires a water temperature of 58ºF for optimal survival.

The cumulative effect of past land use and management activities has been a substantial alteration of the timing and quantity of erosion and changes in stream channels, both of which have affected fish habitat and production. Streams and riparian areas on federal lands are in better condition than streams on non-federal lands. Thus, public lands in the watershed play an important role in the survival of salmonids as they provide cool water and large woody material to fish habitat lower in the system, and provide refugia during summer months when water temperatures are lethal in the valley segments.

The Medford District RMP (p. 50) identifies Sucker Creek as having a number 1 priority for potential fish habitat improvement projects (USDI, 1995). This priority level indicates a high potential for increasing fish production capability in a cost-effective manner. The RMP (p. 50) also suggests acquiring block ownership, among other items, to improve watershed management for State of Oregon and American Fisheries Society sensitive fish species (coho and winter steelhead) and to prevent the decline of other priority fish species in other watersheds. The Upper Sucker Creek watershed was one of the areas listed for land acquisition needed to improve fish production (USDI, 1995).

Gold mining occurred for at least the past 120 years in the BLM portion of Sucker Creek in section 1. This area is in the Key Watershed. The BLM conducted a mining reclamation project from 2000-2003 in Sucker Creek to restore stream processes and aquatic systems, and repair highly degraded fish and riparian habitat at the two heavily mined sites which are now withdrawn from mineral entry. Fish habitat and stream conditions will continue to improve at these locations.

The Illinois Valley Soil and Water Conservation District has conducted stream restoration projects in the Illinois Valley, including the Sucker Creek watershed. These projects, some funded by BLM, have included improving points of diversion, removal of gravel push-up dams, and bank stabilization.

b. Stream Habitat Conditions

Side channels -
Side channels are critical to over-wintering juvenile salmonids, especially coho. Side channels have been reduced from historic levels in Sucker Creek (USDA 1997). Conditions such as road construction, a lack of large wood material, stream channelization, and agricultural development have led to reduced side channels. However, beaver activity may have enhanced the development of side channels and ponding (USDA 1995). Current beaver activity has been observed in Sucker Creek in T40S-R7W section 1 (Personal Comm. 2001-2004, Messerle)

Temperature -
Summer water temperatures are too warm for salmonid fish in the lower reaches of Grayback and Sucker Creeks. See Table III-12 for the range of temperatures preferred by salmonids in respect to different life stages. If mean daily water temperatures reach 69.8°F [21°C] or greater salmon and trout feeding behavior may decrease or cease (Hokansen et al. 1997). In addition warm water conditions favor non-native redside shiners which compete with salmonids (USFS 1997).

Table III-12: Preferred Temperature Ranges for Salmonids (°Fahrenheit)

	Cutthroat	Steelhead	Coho	Fall Chinook
Incubation	----	----	40-56	41-58
Rearing	----	50-55	54-57	54-57
Migration	----	----	45-60	51-67
Spawning	43-63	39-49 36-68 (resident)	40-49	42-57

Source: Meehan 1991

Flow modification -
Summer low flows in Sucker Creek is a limiting factor for fish use in the mainstem of Sucker Creek, primarily in the lower reaches on private land. Below Little Grayback Creek, water withdrawal has the greatest effect on low flows (USDA 1995). A reduction of stream flows causes many negative effects to fish habitat including an increase in water temperature.

ODFW acquired an instream water right for Sucker Creek from the mouth of Sucker Creek to the confluence of Grayback Creek. The right is 80 cfs from May 16 to June 30, 54 cfs from July 1 to Oct. 31, and 135 cfs from November 1 through May 15. The priority date for these rights is 1989, which is relatively late. Older rights receive water first and newer (or later rights) cannot be considered to be protective of fish during dry water years. Grayback Creek also has an

instream water right which ranges from 9.8 cfs to 4.2 cfs. This right has a 1991 priority date, which is also too new to provide much protection during dry years. Due to the recent priority dates of these instream water rights, they are often not met (USDA, 1998). The Water Quality Management Plan states these instream rights do not meet the optimum flows in Sucker Creek for September and October. Optimum flows are those deemed adequate to maintain fish life at current levels and prevent further degradation (USDA, 1998).

Sucker Creek -

The Oregon Department of Fish and Wildlife (ODFW) conducted a physical habitat survey in 2002 on Sucker Creek (Table III-13). Conditions are summarized based on the ODFW habitat benchmark standards (ODFW 2002) (Table III-14).The survey began at the confluence of Grayback Creek and ended at the confluence of Cohen Creek. Reach 1 began at the confluence of Grayback Creek and extended 2.2 miles slightly downstream of the northern border of section 12. Access was denied in Reach 2, so a survey was not conducted. Reach 3 began in the south eastern corner of section 12 and ended at the confluence of Cohen Creek. Reach 1 had riffle as the dominant stream habitat with gravel and cobble as the primary stream substrates. The average stream gradient of Reach 1 was 1.8%. Reach 3 had riffle and scour pools as the dominant stream habitat types. Fine sediment (31%), gravel (38%), and cobble (26%) were the primary stream substrates. The average stream gradient was 2.0 %.

Table III-13: Sucker Creek ODFW Habitat Survey Summary

Stream Reach	Reach #1	Reach #2	Reach #3
Fish Bearing (Y/N)	Y	Y	Y
Avg. Gradient (%)	1.8%	-	2.0%
Pool Area (% total Stream Area)	21%	-	25%
Pool Frequency (channel widths between pools)	5.6	-	8.2
Complex Pools (pools w/ wood complexity > 3/km)	3.4	-	4.1
Width/Depth Ratio (active channel based)	23.8	-	16.9
% Gravel Area in Riffles	38%	-	40%
Silt-Sand-Organics (% Area)	**21%**	-	**31%**
hade (Reach Average, %)	62%	-	74%
LWD Pieces/100m Stream Length	**9.8**	-	**9.3**
LWD Volume/100m Stream Length	**4.9**	-	**8.3**
LWD Key Pieces (>60cm dia. and >10m long)/100m	**0.2**	-	**0.5**
Riparian Conifers (Number >20" dbh/1000 ft Stream Length)	**46**	-	**61**
Riparian Conifers (Number >35" dbh/1000 ft Stream Length)	**0**	-	**0**

Bold = Undesirable Source: ODFW 2002

Table III-14: ODFW Habitat Benchmarks

Habitat Type	Undesirable (U)	Desirable (D)
Pool Area (% total Stream Area)	<10	>35

Table III-14: ODFW Habitat Benchmarks

Habitat Type	Undesirable (U)	Desirable (D)
Pool Frequency (channel widths between pools)	>20	5-8
Complex Pools (pools w/ wood complexity > 3/km)	<1.0	>2.5
Width/Depth Ratio (active channel based)	>30	<15
% Gravel Area in Riffles	<15	≥35
Silt-Sand-Organics (% Area)	>20	<10
Shade (Reach Average, %)	<60	>70
LWD Pieces/100m Stream Length	<10	>20
LWD Volume/100m Stream Length	<20	>30
LWD Key Pieces (>60cm dia. and >10m long)/100m	<1	>3
Riparian Conifers (Number >20" dbh/1,000 ft Stream Length)	<150	>300
Riparian Conifers (Number >35" dbh/1,000 ft Stream Length)	<75	>200

Source: Moore, 1997

Pools, especially complex pools that provide cover, are important habitat for juvenile and adult fish. Pool frequency is an important indicator for fish habitat. It is determined by counting the number of active channel width measurements between each pool. Pool frequency and the number of complex pools were at desirable levels in the two reaches surveyed (#1 and #3). The fact that pool frequency was at desirable levels suggests the reaches surveyed had good refuge areas for fish during low and high flow periods. Pool area for the two reaches was at adequate levels. Reach #1 was closer to the undesirable level, while reach #3 was closer to the desirable level. The survey found a desirable number of complex pools in the 2 reaches surveyed. However, the large woody debris volume, key pieces, and total number of pieces in both reaches were at undesirable levels. Large woody debris in the stream provides cover and complexity. Levels of conifers in the riparian area were low, indicating a lack of future large woody debris recruitment. In both reaches conifer levels in the riparian area for trees >20" and >35" were at undesirable levels. The average shade in both reaches was at desirable levels, indicating there are trees adjacent to the stream channel. Percent gravel in riffles is an indicator of potential spawning gravel for salmonids. Both reaches had desirable levels of gravel in riffles. However the silt, sand and organic percent area was undesirable in both reaches.

The BLM hydrology crew conducted a habitat survey in Sucker Creek in September 2004 (Table III-15). The ODFW physical habitat protocol was used. This survey was conducted on BLM land in T40S-R7W-Section 1. Reach 1 started near a mining site near BLM boundary and extended 1,974 feet upstream. Reach 2 started at the reduction of floodplain and extended 1,593 feet upstream. Reach 3 started at a beaver channel and extended 500 feet upstream. Reach 4 started 60 feet upstream of a large debris jam and extended 475 feet upstream to a split channel with a bedrock wall on the left bank.

Table III-15: Sucker Creek Habitat Survey Summary

Stream Reach	Reach	Reach	Reach	Reach

	#1	#2	#3	#4
Fish Bearing (Y/N)	Y	Y	Y	Y
Avg. Gradient (%)	2.3%	2.7%	2.2%	1.8%
Pool Area (% total Stream Area)	24%	**7%**	19%	**8%**
Pool Frequency (channel widths between pools)	3.7	6.3	8.4	7.9
Complex Pools (pools w/ wood complexity > 3/km)	1.2	**0.0**	**0.0**	**0.0**
Width/Depth Ratio (active channel based)	25.5	23.3	**30.0**	**120.0**
% Gravel Area in Riffles	25%	41%	20%	43%
Silt-Sand-Organics (% Area)	17%	5%	16%	4%
LWD Pieces/100m Stream Length	**1.8**	**0.4**	**1.3**	**0.2**
LWD Key Pieces (>60cm dia. and >10m long)/100m	**0.1**	**0.1**	**0.6**	**0.2**

Bold = Undesirable Source: BLM 2004

The following benchmarks were identified on the BLM Sucker Creek habitat survey. Pool frequency for reach 2 and 4 were found to be desirable, but pool area and amount of complex pools were undesirable. Pool frequency and pool area were found to be fair for reaches 1 and 3. Complex pools were undesirable for all reaches but reach 1. Width to depth ratios were found to be undesirable in reaches 3 and 4 and fair in 1 and 2. The stream had desirable and fair amounts of gravel in riffles, and silt, sand and organics. All amounts of LWD were found to be undesirable.

Bear Creek –

Coho are present along the lower reaches of Bear Creek. The Water Quality Management Plan notes Bear Creek had been field identified as very critical to coho habitat. A landslide occurred in the late 90's along BLM Rd 39-7-21 in section 16. Bear Creek has since carved out a channel through the slide material, but a large slow water area formed upstream of the slide. This area has formed nice rearing habitat for juvenile coho. (Personal Comm. 2005, Messerle)

Little Grayback Creek –

BLM hydrology crew conducted a habitat survey in Little Grayback Creek in September 2004 using the ODFW physical habitat protocol. The results are summarized in Table III-16.

Table III-16: Little Grayback Creek ODFW Habitat Survey Summary

Stream Reach	Reach #1	Reach #2
Fish Bearing (Y/N)	Y	Y
Avg. Gradient (%)	6.5%	11.2%
Pool Area (% total Stream Area)	23%	19%
Pool Frequency (channel widths between pools)	5.1	5.5
Complex Pools (pools w/ wood complexity > 3/km)	8.27	2.5
Width/Depth Ratio (active channel based)	6.4	9.3
% Gravel Area in Riffles	25%	**14%**
Silt-Sand-Organics (% Area)	6%	4%
LWD Pieces/100m Stream Length	23.3	**9.2**
LWD Key Pieces (>60cm dia. and >10m long)/100m	4.6	2

Bold = Undesirable Source: BLM 2004

The pool areas in both reaches were closer to the desirable end of the ODFW habitat benchmarks, but were not at the desirable level. Pool frequencies and complex pools in both

reaches were at the desirable level. The width/depth ratio in both reaches is in the desirable level. Reach one was closer to the desirable side for gravel in riffles and had desirable levels of silt, sand, and organics. Reach two was at undesirable levels of gravel in riffles, but was at desirable for silt, sand and organics. The reach is at desirable levels for pool frequencies, complex pools, and large woody debris. Reach one had desirable levels for total number of large woody debris pieces, and key pieces. Reach two had undesirable levels of total number of pieces of large woody debris, while the number of key pieces was not at the desirable level. Reach one, which as a lower gradient than reach two should provide good fish habitat for steelhead and cutthroat. The gradient is somewhat high for coho, but would not exclude them.

Cave Creek -
The first approximately 0.20 miles of Cave Creek is low gradient with good spawning habitat for coho (Personal Comm. Messerle 2001-2002). Cave Creek has a 15 foot high water fall located approximately 0.5 mile upstream from the mouth. Past the waterfall the channel enters a steep v-shaped canyon (USDA, 1995).

c. Large Woody Material

The 2002 ODFW habitat survey found undesirable levels of large woody debris in the surveyed portions of Sucker Creek. In addition, numbers of conifers in the riparian area were undesirable. The survey shows at the time there were not only undesirable levels of large woody debris instream, but also a lack of future large woody debris recruitment. The 2004 habitat survey conducted in Little Grayback Creek (reach #1) found desirable levels of total number of large woody debris pieces and key pieces. Reach #2 of this survey showed undesirable levels of total number of large woody debris pieces and key pieces.

The lack of large wood is attributed to 1) direct removal by mining, and salvage following the 1964 flood; 2) logging and riparian clearing for agriculture; 3) bank stabilization which inhibits channel shifting; and 4) interception of wood by bridge abutments and midslope roads (USDA 1997).

Large wood is an important component of stream habitat. It plays a critical part in determining the productivity of the stream. It is an important determinate of stream hydraulics, microsite habitat conditions, feeding substrate, and pool and drop creation. The Southwest Oregon Late-Successional Reserve Assessment (LSRA) has listed desirable minimum levels for coarse woody material (outside of the stream channel) after stand-replacement (fire with timber salvage) and non-stand replacement (commercial thinning) events (see page 138 of the LSRA) (USDA-USDI 1995). There are 2000 acres of LSR in the BLM administered portion of the Sucker Creek watershed. The reference above is cited because the LSR standards, along with the ODFW benchmarks for instream conditions, may be applied to Riparian Reserves.

The USFS placed fish habitat improvement structures in Grayback Creek and Cave Creek in the late 1980's to improve habitat for coho salmon and rainbow trout respectively (USDA 1997).

The BLM conducted a restoration project from 2000-2003 in T40S-R7W section 1 which among other activities included placing large woody material in Sucker Creek.

d. Macroinvertebrates

Macroinvertebrate surveys were conducted in the Sucker Creek watershed for BLM in 1994, 1997, 1998 and 2002 by Aquatic Biology Associates, Inc. Two locations were sampled in Sucker Creek. The lower site on Sucker Creek was sampled at the same location in 1998 and 2002. The upper site in Sucker Creek was sampled at two slightly different locations, approximately 0.5 miles apart. Macroinvertebrate surveys were also conducted in 1994, 1997, and 2002 in Little Grayback Creek.

Key factors have led to the majority of the samples receiving low to moderate macroinvertebtate scores for erosional, margin, and detritus habitat. The lack of large, instream wood decreases the ability of the stream to retain detritus and nutrients upon which the macroinvertebrates are dependent. Additionally, without large wood to dissipate energy from high peak flows, macroinvertebrate populations are vulnerable to winter scour.

1998 Lower Sucker Creek Section 1 -
Sensitive or threatened and endangered taxa were absent. The survey noted more rare or small stream taxa would be expected to occur at this site. Long-lived taxa richness in all three habitat types was low, which indicates disturbance to substrates is probably high, and habitat complexity and retention mechanisms are not optimal. The survey also noted summer water temperatures are high enough to be lethal to many cold water invertebrate biota and the low numbers of cold water invertebrate biota indicates water temperatures are borderline supportive of salmonids. Abundance and richness of tolerant invertebrate richness and dominance was low. Highly tolerant taxa associated with lentic, lower gradient or riverine habitats were occasional in the survey. The most significant factors limiting the integrity of the benthic invertebrate community listed in the survey include:

- High energy system with periodic high scour and resorting of substrates.
- Low overall habitat complexity. Mostly erosional habitat with little stepping to dissipate hydraulic energy.
- No bole wood to be seen in the channel to create habitat complexity and dissipate hydraulic energy
- Low detritus retention capabilities.

2002 Lower Sucker Creek Section 1 –
The total bioassessment scores declined slightly in all three habitat types from 1998 to 2002. The survey noted the extended drought as the probable cause. The most significant factors from this year's survey limiting the integrity of the benthic invertebrate community listed in the survey include:

- Low roughness, with wide, shallow, open areas.
- Medium to high scour and resorting of substrate with low retention.
- Medium embeddedness.

1998 Upper Sucker Creek Section 12 -
Sensitive or threatened and endangered taxa were absent. The survey noted more rare or small stream taxa would be expected to occur at this site. Long-lived taxa richness in all three habitat types was low-moderate, which indicates disturbance to substrates may be high, and habitat complexity and retention mechanisms are not optimal. The survey also noted summer water

temperatures are high enough to be lethal to many cold water invertebrate biota and the low numbers of cold water invertebrate biota indicates water temperatures are non-supportive of salmonids. Abundance was low and richness was low-moderate of tolerant invertebrate richness and dominance. Highly tolerant taxa associated with lentic, lower gradient or riverine habitats were occasional in the survey. The most significant factors limiting the integrity of the benthic invertebrate community listed in the survey include:

- High periodic disturbance from scour and resorting during flood events.
- Low overall habitat complexity, particularly hydraulic stepping.
- Low amounts of bole wood to create habitat complexity and dissipate hydraulic energy.
- Low detritus retention capabilities.

2002 Upper Sucker Creek Section 12 –

This is the same general site which was sampled in 1998. Total bioassessment scores rose slightly to moderate in all three habitat types. Temperature, flow and shading were noted as not being a problem at this site. Sampling showed low overall habitat complexity, with wide, shallow areas and little hydraulic stepping.

1994 Little Grayback Creek Section 24 –

Sensitive or threatened and endangered taxa were absent. The surveyors expected to see more small stream taxa at this site, than was found. A high number of long-lived taxa richness in all 3 habitat types was found. This indicates that flow is perennial, disturbance to substrates is not high, and habitat complexity and retention mechanisms are good. The cold water invertebrate biota indicates water temperatures are fully supportive of salmonids. Cold water biota richness was high, though abundance was borderline. Tolerant (to higher temperature) invertebrate richness and dominance was very low. A tolerant water penny beetle was found in the margin habitat. Very highly tolerant taxa associated with lentic habitats or lower gradient and warmer basin/valley streams and rivers were absent.

1997 Little Grayback Creek Section 24 –

More rare or small stream taxa would have been expected to occur at this site but only one was present. A high number of long-lived taxa were found, indicating flow is perennial, disturbance to substrates is not high, and habitat complexity and retention mechanisms are close to optimal. A difference in the 1994 survey from the 1997 survey was the cold water biota. The 1997 survey noted cold water invertebrate biota abundance was low-moderate indicating water temperatures were borderline supportive of salmonids. Two taxa of highly tolerant taxa associated with lentic, lower gradient or riverine habitats were present, although over all abundance and richness was low for tolerant invertebrate. Overall in-channel habitat complexity was moderate. Siltation was low to moderate. The survey noted this was a high energy site, dominated by heavily armored large boulders.

2002 Little Grayback Creek Section 24 –

A moderate declining trend was seen in total scores in all three habitat types, though the stream margin habitat scores have been more variable. The decline in the detritus habitat total scores is notable. The most significant factors limiting the integrity of the benthic invertebrate community listed in the survey include:

- Rocks highly armored and embedded with sand and fine gravel. Little crevice space or refugia.

- High periodic disturbance from scour and resorting during flood events.
- Low amounts of bole wood to create habitat complexity and dissipate hydraulic energy.

Table III-17: Macroinvertebrate Condition on Sucker Creek

Stream	Date	Erosional Habitat	Margin Habitat	Detritus Habitat
Sucker Creek T40S R7W section 1 (lower)	1998	54.0 (Low)	71.4 (Moderate)	72.9 (Moderate)
Sucker Creek T40S R7W section 1 (lower)	2002	50.8 (Low)	66.3 (Low)	65.6 (Low)
Sucker Creek T40S R7W section 12 (upper)	1998	57.3 (Low)	70.4 (Moderate)	68.8 (Low)
Sucker Creek T40S R7W section 1 (upper)	2002	58.9 (Low)	76.5 (Moderate)	78.1 (Moderate)
Little Grayback Creek T39S R7W section 24	1994	79.8 (Moderate)	75.5 (Moderate)	85.4 (High)
Little Grayback Creek T39S R7W section 24	1997	77.4 (Moderate)	60.2 (Low)	75.0 (Moderate)
Little Grayback Creek T39S R7W section 24	2002	72.6 (Moderate)	65.3 (Low)	65.6 (Low)

Table III-18: Macroinvertebrate Bioassessment Scores

	Erosional Habitat (%)	Margin Habitat (%)	Detritus Habitat (%)
Very High	90-100	90-100	90-100
High	80-89	80-89	80-89
Moderate	60-79	70-79	70-79
Low	40-59	50-69	50-69
Very Low	< 40	< 50	< 50

Source: Aquatic Biology Associates 1994, 1997, 1998, 2002

e. Special Status Species

The coho salmon (*Oncorhynchus kisutch*) is the only federally ESA listed (threatened) fish in the Sucker Creek watershed. Table III-19 lists factors and mechanisms affecting coho mortality.

Table III-19: Summary of Environmental Factors and Potential Mechanisms of Mortality Affecting Freshwater Habitat Capacity and Related Density-independent Survival (By Life Stage) of Coho Salmon

Life Stage	Factors affecting population productivity	Potential mechanisms affecting survival
Egg to emergent fry	Substrate stability, amount of fine sediment in spawning gravels, spawning gravel permeability, water temperature, peak flows	High flow events cause loss of eggs due to streambed scour and shifting; reduced flow and dissolved oxygen (DO) levels to eggs due to high sedimentation cause increased mortality; high fine sediment levels cause entombment of fry; increased temperatures advance emergence timing, thereby affecting survival in next life stage; anchor ice reduces water exchange in redd causing low DO levels and/or eggs to freeze.
Emergent fry to September parr	Flow dynamics during emergence period, stream gradient, number of sites	Loss of emergent fry occurs due to being displaced downstream by high flows; advanced emergence timing causes fry to encounter higher flows; high gradient and lack of suitable colonization sites for emergent fry

	suitable for fry colonization, predators, temperature[1], nutrient loading[1]	cause fry to move downstream increasing risk of predation; stranding and excessive temperature promote disease and cause mortality; temperature and nutrient changes affect growth thereby affecting other causes of density-independent loss.
September parr to smolt	Fall and winter flows, number of accessible winter refuge sites, temperature, predators	Displacement during high flows; stranding and death due to dewatering; loss of predators; loss due to poor health associated with winter conditions[1]

1 Effects likely have both density-independent and dependent components. (Adapted from National Marine Fisheries Service 1997)

Table III-20 lists special status and federally-threatened aquatic species in the Sucker Creek watershed.

Table III-20: Special Status and Federally-Listed Aquatic Species

Species	Status
Winter Steelhead Klamath Mountain Province ESU	Ruled not warranted for federal listing (4/01) Bureau Assessment Species in Oregon Oregon Natural Heritage Program* Status List 2
Fall Chinook Salmon Southern Oregon Coast/California Coast	Ruled not warranted for federal listing (9/99) Bureau Sensitive Species in Oregon Oregon Natural Heritage Program* Status List 2 State of Oregon critical
Cutthroat Trout	Ruled not warranted for federal listing (4/99)
Coho Salmon Southern Oregon/Northern California	Federally Threatened Critical Habitat Designated (Endangered Species Act) Essential Fish Habitat Designated (Magnusun-Stevens Act) Oregon Natural Heritage Program* Status List 1 State of Oregon Critical
Pacific Lamprey	Bureau Tracking in Oregon Oregon Natural Heritage Program* Status List 4 State of Oregon Vulnerable

* Oregon Natural Heritage Program Status:
List 1: Taxa that are threatened with extinction or presumed to be extinct throughout their entire range
List 2: Taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon.
List 3: Species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
List 4: Taxa which are of concern, but are not currently threatened or endangered.

(USDI, 2005)

f. Fish Distribution

Stream surveys verifying salmonid distribution have been conducted by ODFW, BLM and the USFS on many streams in the watershed. Total use by species for the entire watershed includes: fall chinook 11 miles, coho 22 miles, winter steelhead 36 miles, and cutthroat 47 miles. (See Maps 11 and 12, Salmon and Trout Distribution)

Both resident and anadromous salmonid population trends have been in decline for decades and are considered to be at depressed population levels throughout the Illinois River basin (USDA; USDI 1997). Historically, ODFW harvest data was the only measure of anadromous fish population levels in the Illinois River basin. As a result of declining population levels, ODFW presently limits fishing in the entire Illinois River basin (USDA, 1995).

Anadromous salmonids present in the watershed are: fall chinook (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and winter steelhead (*O. mykiss*). Key factors noted as

limiting production of steelhead and coho included degraded habitat, extended drought conditions and water withdrawals (ODFW 1992).

Resident salmonids in the watershed include rainbow trout (*O. mykiss*) and cutthroat trout (*O. clarki*).

Chinook salmon in Sucker Creek are fall-run and belong to the Southern Oregon and Northern California coastal chinook Evolutionary Significant Unit (ESU), which was proposed for listing on March 9, 1998. In September 1999, the National Marine Fisheries Service (NMFS) identified this ESU as not warranted for listing under the Endangered Species Act. The USFS Regional Forester, however, designated chinook salmon and other salmonids in the Pacific Northwest Region as sensitive for Forest Service management purposes (FC 2670-1920; August 20, 1997)

The Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265 as amended through October 11, 1996 was passed to provide for the conservation and management of fisheries. This act designated Essential Fish Habitat for chinook.

Coho salmon in Sucker Creek watershed are part of the Southern Oregon / Northern California (SONC) Coho ESU, which was federally listed as threatened on May 6, 1997 (Fed. Reg./Vol. 62, No. 87). The ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California. Most of the coho in this ESU are in the Rogue River, with the largest remaining population in the Illinois River (Stouder et al. 1997). Sucker Creek produces an estimated 30% or more of the coho in the Illinois River (USDA, 1997). Sucker Creek provides habitat designated by NMFS as critical to the recovery of the SONC ESU (May 5, 1999 Federal Register Notice). Currently, summer water temperatures in the valley limit coho production from reaching historical levels (USDA, USDI 1997).

Habitat designated by NMFS as critical to the recovery of SONC coho encompasses accessible reaches of all rivers (including estuarine areas and tributaries) between the Mattole River in California and Elk River in Oregon, inclusive. Critical habitat includes all waterways, substrate, and adjacent riparian zones below long standing, naturally impassible barriers (*e.g.*, natural waterfalls in existence for at least several hundred years). Adjacent riparian zones have been redefined by NMFS as part of critical habitat designation and are now based on a functional (rather than quantitative) description. Based on NMFS criteria, critical habitat includes riparian areas which provide: shade; sediment, nutrient or chemical regulations; stream bank stability; and large wood or organic matter. It is important to note habitat quality is intrinsically related to the quality of riparian and upland areas and of inaccessible headwater or intermittent streams which provide key habitat elements crucial for coho in downstream reaches. More detailed critical habitat information (*e.g.*, specific watersheds, migration barriers, habitat features, and special management considerations) for this ESU can be found in the May 5, 1999 Federal Register notice. (Fed. Reg. /Vol. 64, No. 86)

Essential Fish Habitat for coho was designated by the Magnuson-Stevens Fishery Conservation and Management Act.

Steelhead trout in the Sucker Creek watershed are winter run and belong to the Klamath Mountains Province ESU. Listing for this steelhead ESU was ruled not warranted for listing by

the Endangered Species Act in April, 2001. Activities such as logging and road building have impacted steelhead habitat along the southern Oregon coast where watersheds are particularly unstable. The winter steelhead population in Illinois River has declined based on catch records. Sport harvest declined from 2,500 fish in the 1970s to less than 200 fish in 1992. Irrigation withdrawals have had a major impact to steelhead production in the Illinois River basin. This was particularly severe during the recent drought.

Resident cutthroat *(Onchorhynchus clarki clarki)* **and rainbow trout** *(Onchorhunchus mykiss irideus)* are distributed throughout many of the reaches of all tributaries above and below anadromous fish barriers. The Southern Oregon / California Coast ESU of cutthroat trout was ruled not warranted for listing in April, 1999. The Illinois River trout population appears to be much smaller than observed in the 1950s.

The USFS noted in their 1997 Watershed Analysis the Oregon Department of Fish and Wildlife (ODFW) at the time was stocking Bolan Lake with rainbow trout. It is unknown at this time if ODFW is currently stocking Bolan Lake. Rainbow trout were historically planted in East and West Tannen Lakes. These lakes are located on USFS land in the upper portion of Sucker Creek watershed.

Pacific lamprey (*Lampetra tridentatus),* an anadromous species, is believed to use Sucker Creek and maybe some tributaries for spawning. The juveniles rear in tributaries until they are ready to migrate to the ocean. Little is known about lamprey in the Illinois Watershed or Rogue basin, although it is assumed their distribution overlaps steelhead.

A Pacific lamprey redd density survey was conducted in the Illinois River Basin in 2000-2001. Sucker Creek was surveyed from the mouth to the confluence with Left Fork Sucker Creek. Grayback Creek was surveyed to approximately river mile 2.3. Redds were found throughout Sucker Creek, extending to just past the confluence with Grayback Creek. Redds were not found in Grayback Creek (Bennet and Nawa 2000-2001).

Western brook lamprey (*Lampretra richardsoni)* are also believed to inhabit Sucker Creek. Distribution is assumed to overlap steelhead distribution

Reticulate sculpin (*Cottus perplexus*) and **coast range sculpin** (*Cottus aleuticus*) are found in the Sucker Creek watershed. Their range overlaps steelhead distribution.

Klamath Smallscale Sucker *(Catostomus rimiculus),* a native species, are believed to use Sucker Creek.

Umpqua Pikeminnow (*Ptychocheilus umpquae*), a non-native species, is assumed but not verified to be present in Sucker Creek to the middle of section 29.

Brown Bullhead *(Ameiurus nebulosus)*, a non-native species, is assumed but not verified to be present occur in Sucker Creek.

Redside shiner (*Richardsonius balteatus)* are present in the Sucker Creek watershed (USFS 1997). The redside shiner is an exotic species thought to inhabit the mainstem of Sucker with

characteristically higher temperatures and lower flows than the upstream reaches. Redside shiners were first identified in the lower Illinois River at the base of Illinois River falls in May 1960 (USDA 1995). These fish compete directly with juvenile salmonids and are able to reduce trout production up to 54% in warm water (66.2º to 71.6ºF) (Reeves 1987).

Eastern brook trout *(Salvenlinus confluentus)* are also present in the Sucker Creek watershed (USFS 1997). Historically, Bolan Lake was stocked with Eastern brook trout. Eastern brook trout have been observed in the lower reach of Cave Creek in years past (USDA, 1972) but they have not been seen recently (USFS 1997). Brook trout are also an introduced species.

g. Fish Passage Barriers

Fish barriers can be defined as any physical, chemical or biological factor which prohibits upstream or downstream migration of juvenile or adult fish. Examples are dams, culverts, low water flow, temperature, waterfalls, and predation. Maintaining and improving connectivity with upstream reaches of Sucker Creek and its tributaries is important due to the summer low flow and high temperature conditions in portions of the watershed. (See Hydrology Water Temperature Section) If water temperatures reach 73.4°F [23°C] for even short periods of time (hours) the result is movement into colder water refugia by Pacific salmonid trout (Neilsen et al. 1994).

The BLM conducted a culvert inventory in 2002. Table III-21 indicates the culverts with fish passage problems located on BLM land in the Sucker Creek watershed. It should be noted this list does not include culverts on private which could pose problems for fish passage. The two culverts on Bear Creek limit adult and juvenile passage at certain flows. Coho habitat exists upstream of some of these culverts.

Table III-21: Impediments to Fish Passage on BLM Lands

Priority for Replacement	Stream Name	T-R-S, Road Number, Mile Post	Miles of Habitat above culvert			Drop to Stream in Winter (ft.)
			Coho	Steelhead	Cutthroat	
1	Bear Creek	39-7-16, 39-7-21, 1.8	0.5	0.5	0.5	0.2
2	Little Bear Creek	39-7-16, 39-7-21, 1.6	0.15	0.2	0.2	3.0
3	Bear Creek	39-7-16 39-7-21, 2.23	0.2	0.2	0.2	2.0
4	Bear Creek	39-7-21-01, 39-7-21, 0.86	1.47	1.47	1.47	0.2

The BLM replaced one culvert on Bear Creek and one culvert on Little Grayback Creek with bottomless arches to improve fish passage in 2003 and 1999, respectively.

H. FIRE MANAGEMENT

Ecosystems are dynamic entities whose basic patterns and processes are shaped and sustained on the landscape not only by natural successional processes, but also by abiotic disturbance such as fire, drought, and wind. Such forces are often unpredictable temporally and spatially, maintaining a mosaic of successional stages over natural communities, thus influencing the range of natural variability of ecosystem structure, composition, and function (Kaufmann et al. 1994). Fire as one of these forces is complex: the results are often not repeatable, and the conclusions are often contradictory (Pyne 1996).

Fire has always played an integral part in the creation of the forest environment in the Pacific Northwest (Agee 1981) as well an important part of shaping plant communities in southwestern Oregon (Atzet and Wheeler 1982). Overall, the Sucker Creek watershed subject area can be considered a fire-dependent ecosystem with numerous fire-adapted species of plants and animals noted. Fires and ecosystems have interacted throughout time, and as described by Mutch (1994), fires provide: nutrient cycling, plant succession and wildlife habitat regulation, biological diversity, reduced biomass, and insect and disease population control.

When looking at the historic landscape, human development, and values placed on the landscape, several elements of wildland fire should be considered. These elements include historic fire regime, condition class, fire hazard, fire risk, and values at risk. All of these elements can play a significant role in determining management direction for a given area.

Fire regimes are the manifestation of the biological, physical, climatic and anthropogenic components of an ecosystem as reflected in the fire frequency (how often a fire occurs), fire intensity (rate of energy released), fire size, seasonality (season of occurrence), and severity (type of fire – e.g., crown, surface, ground). This is a relationship that perpetuates itself in a circular and stable pattern. The biotic components are an expression of the fire regime which, in turn, maintains the pattern and occurrence of fire. However, when any components of the ecosystem are modified, the fire regime is prone to change.

Several classifications and descriptions of fire regimes occur on a national and regional scale (Heinselman 1981; Davis and Mutch 1994; Agee 1981). For the purposes of this document, classifications and descriptions based upon the above and developed by the Oregon BLM State Office and the Pacific Northwest Region of the Forest Service will be utilized. One cautionary note is the realization that simplification emerges from categorization, exceptions abound, and combinations of fire regimes are likely to apply to single ecosystems. The following seven fire regime categories have been developed for Oregon and Washington:

I	0-35 years, low severity.
II	0-35 years, stand-replacing, non-forest
III	35-100+ years, mixed severity
IV	35-100+ years, stand-replacing
V	>200 years, stand-replacing
VI	No fire
VII	Non-forest

Natural areas in the Sucker Creek watershed subject area fit into three of these classes. Identification of the fire regime along with a general discussion on plant community, fire type, and fire severity follows:

I **0-35 years, low severity**.
Typical climax plant communities include ponderosa pine, eastside/dry Douglas-fir, pine-oak woodlands, Jeffery pine on serpentine soils, oak woodlands, and very dry white fir. Large stand-destroying fires can occur under certain weather conditions, but are rare events (i.e., every 200+ years).

III. **35-100+ years, mixed severity**
This regime usually results in heterogeneous landscapes. Large, stand-destroying fires may occur but are usually rare events. Such stand-destroying fires may "reset" large areas (10,000-100,000 acres) but subsequent mixed intensity fires are important for creating the landscape heterogeneity. In these landscapes, a mix of stand ages and size classes are important characteristics; generally the landscape is not dominated by one or two age classes.

IV. **<50 years, mixed severity**
Potential plant communities include mixed conifer, very dry westside Douglas-fir, and dry grand fir. Lower severity fire tends to predominate in many events.

The persistence of certain species in southwestern Oregon through the millennia can be attributed to their adaptations to fire (Kauffman 1990). Adaptations for fire survival are adaptations to a particular ecosystem and its specific fire regime. If the regime is altered, the capacity for that species to survive in the environment may be greatly changed. Hence, if an area has a fire regime that experienced frequent fire, and through suppression that regime has been altered, the hazard of catastrophic fire has been increased, posing a greater risk to adjacent land and land values.

Ecosystems have been dramatically changed due to fire exclusion and other human activities such as grazing and timber harvest (Kaufmann et al. 1994). The extent and impact of this change due to fire exclusion can often be correlated to the fire regime itself. With the aggressive program of fire suppression for the last 100 years, a regime that would be visited by fire every 100 to 300 years may not be impacted as much as an area with a shorter historical fire regime. Thus, a fire regime characterized by long return interval crown fires and severe surface fires would be impacted less by fire exclusion than a regime of frequent, light surface fires with a 1 to 25 year return interval. Detrimental effects in the longer return-interval fire regimes will take longer to appear.

Historically, wildland fire burned frequently across most of the Illinois Valley landscape. In recent decades the nature of fire on these lands has changed due to effective fire suppression policies. A consequence of this has been continued fuel accumulation which has resulted in significant changes in land condition as well as wildland fire behavior. Effects of fire exclusion have created vegetation and fuel conditions that can produce wildfires with a higher potential to be of a large and uncharacteristic nature, and a resultant greater level of difficulty in suppression, leading to high severity results. Old, dense stands covering a large portion of the landscape can dramatically increase the size and severity of wildfires (Barrett et al. 1991) and insect epidemics (Mutch 1994). Increases in both the vertical (ladder fuels) and horizontal continuity (dead and down material) exist throughout the watershed. Greater levels of dead and down material

increase the fire intensity, and with ladder fuels present, provide great opportunity for fire starts to reach the forest canopy resulting in stand replacing crown fires.

1. Fire Regime Condition Class

A series of fire regime condition classes have been developed to describe how far from normal the historic fire regime currently is considering key ecosystem components (Hardy et al. 2000). This coarse scale assessment quantifies land condition, the result of fire exclusion, and other influences (timber harvesting, grazing, insects and disease, and the introduction and establishment of non-native plant species). Changes to key ecosystem components have been identified such as species composition, structural stage, tree or shrub stand age, and canopy closure. This analysis attempts to quantify the extent of the fire management problem and the degree of required restoration and maintenance treatments. Table III-22 summarizes the three fire condition classes, attributes of each class, and general management options.

Table III-22: Fire Regime Condition Class

Fire Condition Class	Attributes	Example of Management Options
Condition Class 1	- Fire regimes are in or near an historical range. - The risk of losing key ecosystem components is low. - Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. - Vegetation attributes (species composition and structure) are intact and functioning in an historical range.	Where appropriate, these areas can be maintained in the historical fire regime by treatments such as fire use.
Condition Class 2	- Fire regimes have been moderately altered from their historical range. - The risk of losing key ecosystem components has increased to moderate. - Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This change results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. - Vegetation attributes have been moderately altered from historic ranges.	Where appropriate, these areas may need moderate levels of restoration treatments, such as fire, manual or mechanical treatments, to be restored to the historical fire regime.
Condition Class 3	- Fire regimes have been significantly altered from their historical range. - The risk of losing key ecosystem components is high. - Fire frequencies have departed (either increased or decreased) by multiple return intervals. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. - Vegetation attributes have been significantly altered from historic ranges.	Where appropriate, these areas need high levels of restoration treatments, such as hand or mechanical treatments. These treatments may be necessary before fire is used to restore the historical fire regime.

The majority of the Illinois Valley can be classified as fire condition class 2 and 3.

2. Wildland-Urban Interface

The wildland urban interface exists where people and their developments meet or intermix with wildland fuels. Illinois Valley and much of the Sucker Creek watershed subject area are in the wildland/urban interface. The Illinois Valley has also been identified as a Community at Risk under the National Fire Plan (Federal Register 2001). As such, special attention is placed at a regional and national level to all wildland/urban interface communities in the vicinity of Federal lands that are at high risk from wildfire. A community is a defined area where residents live and are provided services such as fire protection, water, law enforcement, etc. High-risk exists

where there is land condition that is characterized by high risk fire regimes. For example Fire Regime Condition Classes 2 and 3 are considered high risk fire regimes.

3. Fire Hazard, Wildfire Ignition Risk, Values at Risk

Fire hazard, wildfire ignition risk, and values at risk are conditions that are used to better understand and plan for potential fire management problems and to identify opportunities to manage the watershed to meet goals, objectives and desired future conditions. Wildfire occurrence can often prevent the successful achievement of short-term and mid-term land management goals and objectives. Stand-destroying wildfire can prevent the development of mature and late-successional forest conditions as well as convert existing mature forests to early seral forests.

Data was collected in the subject area in the Sucker Creek watershed for hazard, ignition risk, and values at risk for loss from wildfire (Tables III-23 through III-27; Appendix A, Maps 14-18). Rating classification criteria are summarized in Appendix E.

a. Fire Hazard

Effects of fire exclusion have created vegetation and fuel conditions that can produce wildland fires with a higher potential to be of a large and uncharacteristic nature and a greater level of difficulty in suppressing. Increases in both the vertical (ladder fuels) and horizontal continuity (dead and down material) can be noted throughout the watershed. Greater levels of dead and down material increase the fire intensity, and with ladder fuels present, provide great opportunity for fire starts to reach the forest canopy resulting in stand-killing crown fires. This can further impact the means in which prescribed fire is applied to the landscape.

Hazard is based on the fires ability to spread and the ease of suppression once a wildland fire has ignited. The actual hazard rating used in this analysis is based on weighted values of five elements: ladder fuel presence, fuel model, slope, position on slope, and aspect.

Ladder fuel presence determines the ease of a fire moving from a surface fire into the crown canopy. This impacts the ability to easily suppress a fire. Fuel model is based on the 13 fuel models in the Fire Behavior Prediction System as developed by the USFS Fire Science Laboratory. The fuel models can predict the rate of spread, flame length, fireside intensity, heat per unit area, and other elements of concern in the suppression of wildland fire. Slope impacts the rate of spread as fire travels faster up steeper slopes then it does on flat terrain. Location of a fire start on the slope impacts the ability of a fire to spread. Fire spread is mainly up slope to the ridge and back down the opposite side, with slower backing down slope spread. Aspect impacts fire spread; southern aspects are drier and promote more active fire behavior whereas northern aspects are typically moister with lower levels of fire behavior. Table III-23 summarizes the acres in each hazard class.

Table III-23: Hazard Classification

Ownership	Acres	High Hazard		Moderate Hazard		Low Hazard	
		Acres	% of	Acres	% of	Acres	% of

Table III-23: Hazard Classification

		High Hazard		Moderate Hazard		Low Hazard	
			ownership		ownership		ownership
BLM	5,795	2,944	51%	2,668	46%	183	3%
Non-Federal	9,184	5,417	59%	3,268	36%	499	5%
Total Subject Area	14,979	8,361	59%	5,936	40%	682	4.5%

Based upon the previous mentioned criteria, only 4.5% of the land in the area addressed in this watershed subject area is at a low hazard condition with half being in a high hazard condition. The primary factor is exclusion of the natural fire process.

b. Fire Risk

Fire risk is defined as the source of ignition. Human actions greatly influence the pattern of fire occurrence and the number of fires in the subject area. The subject area as a whole has a high risk of human-caused ignition along Sucker Creek and in the urban interface. Human uses that create ignition risk include residential, industrial (light manufacturing, timber harvest, mining/quarry operations), recreational, tourist, and travel activities. Human use in the watershed is high. The human-caused fire occurrence pattern for the watershed subject area would generally be a fire starting at low elevations or along roads and being suppressed before it could burn up to the ridges.

Lightning occurrence in the subject area has been moderate with 45% of the fire starts resulting from lightning in the past 36 years. The watershed typically experiences at least one lightning storm event every two to three summers. Multiple fire starts may result from these storms.

Historical fire occurrence on BLM and private lands was reviewed based on available data of fires where management action was taken and a fire report was completed between 1968 and 2004. While data is available prior to 1968, it is incomplete for analysis purposes. During the 36 year time period, 56 fires occurred in the subject area (Table III-24). No fire exceeded 10 acres in size during the 36 year period.

Table III-24: Fire Occurrence 1968-2004 Sucker Creek Subject Area

Cause	Total Number of Fires	Yearly Average Number of Fires
Human	31	.9
Lightning	25	.7
Total	56	1.6

Forty-five percent of the analysis area is a high risk category with only 13% in a low risk category. Human presence and use in the watershed produces high risk for wildfire occurrence. Table III-25 summarizes the acres in each risk class.

Table III-25: Risk Classification

Ownership	Acres	High Risk		Moderate Risk		Low Risk	
		Acres	% of Ownership	Acres	% of Ownership	Acres	% of Ownership
BLM	5,796	1,459	25%	3,565	62%	772	13%
Non-Federal	9,184	5,239	57%	2,767	30%	1,178	13%
Total Subject Area	14,980	6,698	45%	6,332	42%	1,950	13%

c. Values at Risk

Values at risk are the resource and human value components of the watershed. Property and resources that could be negatively impacted by fire are the basis for value. Known special status plant and animal sites are included. The subject area has approximately one-third of its area in the high category for values. This is due largely to the amount of private land, especially residential areas, and the high wildlife, recreational, and other forest resource values in the watershed. Table III-26 summarizes the values at risk classification in the watershed.

Table III-26: Values at Risk Classification

Ownership	Total Acres	High Values at Risk		Moderate Values at Risk		Low Values at Risk	
		Acres	Ownership	Acres	Ownership	Acres	Ownership
BLM	5,796	1,706	30%	3,380	58%	709	12%
Non-Federal	9,185	2,922	32%	5,077	55%	1,186	13%
Total Subject Area	14,981	4,628	31%	8,457	56%	1,895	13%

d. Areas of High Hazard, Risk and Value at Risk

When high hazard, risk and values at risk converge on the same piece of land, there is reason for concern. The analysis area has 6% of the area with a rating of high for all three factors. These are areas that have a priority for management review and action to reduce the hazard and consider actions to be taken to reduce the risk. Table III-27 summarizes where high hazard, risk, and values converge.

Table III-27: Areas of High Rating in Hazard, Risk, and Values at Risk Classification

Ownership	Acres	High Ratings in All Three Categories: Hazard, Risk, Values at Risk	
		Acres	Ownership
BLM	5,796	12	0.2%
Non-Federal	9,184	923	10%
Total Subject Area	14,980	935	6%

I. AIR RESOURCES

Air quality in the Illinois Valley is good with limited local emission sources and generally good wind dispersion. Existing sources of emissions include occasional construction and logging equipment, light industry, vehicles, road dust, residential wood burning, campfires, and prescribed fire. Emissions are limited with greatest impacts occurring during times of heavy wildfire activity in the region, usually in late summer. For example, during the 1987 Silver Fire, over a 57 day period, over 53 million pounds of respirable particulate matter may have been produced (Hardy 1992). Winter and occasionally late summer temperature inversions commonly develop in the Upper Illinois Valley and have the potential to trap smoke, reducing its dispersal.

Historically, EPA's National Ambient Air Quality Standards (NAAQS) for particulate mater (PM) tended to focus emission control efforts on “coarse” particles (those larger than PM25). Before 1987, EPA's PM standards focused on “Total Suspended Particles”, including particles as large as 100 micrometers in diameter. The EPA revised the standards in 1987 to focus control on PM10 in response to new science showing that it was the smaller particles capable of penetrating deeply into the lungs that were associated with the most adverse health effects.

Grants Pass and Medford are the closest designated non-attainment areas to the Sucker Creek watershed subject area. These are areas where air quality standards are typically not met. Other population centers around the Upper Illinois Valley where minimizing smoke impacts is an issue include Cave Junction, Takilma, Kerby, and Selma. Class I areas in the region include the Kalmiopsis Wilderness, the Red Buttes Wilderness, and Mountain Lakes Wilderness on the Rogue-Siskiyou National Forest, and Crater Lake National Park.

Oregon Department of Environmental Quality (in cooperation with the USFS) has one nephelometer in the Illinois Valley near Cave Junction at the Illinois Valley Airport. A nephelometer is an optical instrument that measures visibility and scattering coefficient (b_{scat}) of ambient air by directly measuring the light scattering due to particles and atmospheric gases. This nephelometer operates year round and was installed in 1999 with a primary purpose to monitor any impacts from area prescribed burns. Nephelometer data for this site is used for comparison purposes and not to determine compliance with the NAAQS. Limited light scatter (b_{scat}) data analyzed from January 2000 to September 2001 show the highest levels occurring primarily in November with high levels from late October into early February. Small spikes were noted for one prescribed burn that occurred in the area at the end of March 2000, where smoke was documented heading towards the Cave Junction area.

Visibility is monitored in federal Class I areas during the summer season. Wildland fires occurring in the summer have the greatest impact to visibility in the Illinois Valley. Shifts in past prescribed burning practices from summer and early fall have improved visibility impairment over the 1982-84 baseline levels. Currently, prescribed burn activity in this area occurs during the months of March through May and October into December.

Light scattering has been measured in Grants Pass since 1991. Measurements through 1993 show peak 1-hour and 24-hour averages occur in December and January. This impact is primarily the result of wood burning stoves and atmospheric stability that occurs during this time of the year.

The principal impact to air quality in the Illinois Valley and surrounding area is expected to be the temporary visibility impairment caused by smoke from wildland and prescribed fires. Potential short duration (single day to several weeks), high level PM10 and PM2.5 emissions would be expected from major wildfire events in the local area or region. Prescribed burning PM10 emissions would not be expected to exceed PM10 standards. If this did occur, it most likely would be highly localized and no more than a single day in duration.

Nearby, Grants Pass continues to be classified as a non-attainment area for fine particulate (PM10). Grants Pass last exceeded the PM10 24-hour average standard in 1987. Difficulty in meeting the PM10 standard was due primarily to effects from residential wood heating. Maximum levels recorded between 1987 and 1993 occurred in December and January, with the exception of 1987 when September had the maximum level due to widespread large fires burning at the time. Maximum levels have never been reached in the spring and summer months.

Grants Pass continues to be classified as a non-attainment area for carbon monoxide 1-hour average and 8-hour average standards. Grants Pass last exceeded the 1-hour standard in 1990 and the 8-hour standard in 1991. Maximum averages all occurred from December through February. Maximum levels have never been reached during the spring and summer months. A request for re-designation as an attainment area for CO is planned.

Wildfires have the potential to emit large quantities of smoke over long periods of time and at uncontrollable times. While prescribed fire produces smoke, smoke management guidelines manage the quantities, duration, and timing of prescribed burns.

Prescribed burning is constrained July 4 through Labor Day by the Oregon Visibility Protection Plan. The Medford District BLM has traditionally completed prescribed burning operations by the middle of May, and does not resume burning until October. Potential impacts from prescribed burning smoke could occur from other federal and private burning west of the coastal crest and north of the Medford District, where conditions allow a broader burn season in the spring and earlier resumption in the fall. However, almost no prescribed burning is conducted in July and August in the vicinity of the Illinois Valley. The largest potential impact to air quality during this period is from residual smoke resulting from wildland fire in the region or in the immediate vicinity. Historically, long lasting, large wildland fires that produce larger volumes of smoke during the months of August and September have been common in this region.

As per the Clean Air Act, as amended, the State of Oregon met or exceeded national ambient air quality standards prior to 1994. The Oregon Smoke Management Program (OSMP), a part of the required State Implementation Plan (SIP), identifies strategies for minimizing the impacts of smoke from prescribed burning on the densely-populated, designated, non-attainment, and smoke sensitive areas in western Oregon. Particulate matter with a size of 10 microns or less (PM10) is the specific pollutant addressed in the SIP. Particulate matter at the 2.5 micron level and less is scheduled to be the new criteria pollutant once the Environmental Protection Agency has established its rules and regulations. For comparison of particulate matter size, a human hair is about 70 micrometers in diameter (EPA 1998).

Burning wildland vegetation causes emissions of many different chemical compounds (e.g., NO_x, CO and various organic compounds). The components and quantity of emissions depend in part on the types of fuel burned, their moisture content, and the temperature of combustion.

Complex organic materials may be absorbed into or onto condensed smoke particles. Tests indicate that, on average, 10% of smoke particles from wildland and prescribed fires are PM10, and 70% are less than PM2.5 (Ottmar 2001).

Visibility conditions are affected by scattering and absorption of light by particles and gases. The fine particles most responsible for visibility impairment are sulfates, nitrates, organic compounds, soot and soil dust. Fine particles are more efficient per unit mass than coarse particles at scattering light. Light scattering efficiencies also go up as humidity rises, due to water adsorption on fine particles, which allow the particles to grow to sizes comparable to the wavelength of light. Naturally occurring visual range in the West is between 120 to 170 miles.

Visibility is an important public welfare consideration because of its significance to enjoyment of daily activities in all parts of the country. Protection of visibility as a public welfare consideration is addressed nationally through the secondary PM NAAQS which are equivalent to the primary PM NAAQS. Visibility protection is particularly important in the 156 mandatory Class I Federal areas.

J. HUMAN USE

1. Socioeconomic Overview

The Sucker Creek watershed is located in the southern portion of Josephine County. The county has a population of 75,726. For Josephine County, the percent of the population age 65 and older is 20%, exceeding the state average of 12.8%. The unemployment rate has been considerably higher than the state average and wages have been among the lowest in the state. Josephine County ranks among Oregon's highest for poverty. College educated individuals comprise 14% of the population, compared to 25% for the state. Cave Junction, the closest town to the watershed, has a population of 1,363. Educationally, 7.6% of the population has a bachelor's degree or higher. The per capita income is $10,556 and the median family income is $22,500. Twenty eight percent of the individuals live below the poverty level. (U.S. Census Bureau, 2000)

The county timber harvest fell by 67% between 1988 and 1994 (Reid 1996). Employment is primarily in manufacturing, followed by the combination of health, education, and public administration, and then by retail and wholesale trade (Illinois Valley Community Response Team, undated). The historical dependence on a resource extraction economy including logging and mining is apparent. Eco-tourism and new industrial centers have been targeted as primary goals in recent regional strategic plans for community development (Illinois Valley CRT 1995; USDI 1998b.) The Illinois Valley has been designated an Enterprise Community due to high unemployment, poverty and economic dependence on timber products. This has led to an infusion of federal and state grants for infrastructure and other aspects of economic development. Much of the economic development has taken the form of tourism, especially eco-tourism in the development of outdoor recreation opportunities.

There are no major towns located in the watershed. Caves Highway (Highway 46) travels through the subject area along Sucker Creek to Oregon Caves National Monument. Roads in the subject area off of Highway 46 include Bear Creek, Little Grayback Creek, Robinson Road and

FS Road 4612. The majority of the residences in the watershed are located in the western portion of the watershed, off Holland Loop, Robinson Road and Garner Road. Scattered residences are also located along Caves Highway.

The Sucker Creek watershed is used by people for water (for domestic, irrigation, and recreational uses); mining, (especially gold); timber; mushroom and other special forest products harvesting; agricultural uses; and other recreational uses such as hiking, camping, hunting, and Off Highway Vehicle (OHV) riding.

2. Recreation

a. Dispersed Recreation

Dispersed recreation on BLM lands in the watershed includes off-highway vehicle (OHV) use, hunting, mountain biking, hiking, horseback riding and driving for pleasure. There are a host of non-designated hiking, horseback riding and Off Highway Vehicle (OHV) trails in the watershed. These are not currently mapped.

There are three OHV land designations. In the subject area per the RMP, OHV use is limited to designated roads and trails on 2,332 acres. These limited areas are in the Port-Orford-Cedar disease infestations, the Illinois Valley Botanical Emphasis Area, the Late-successional Reserves and riparian reserves. On 3,748 acres, OHV casual use is permitted. There are 189 acres closed in the subject area, in the Brewer Spruce Research Natural Area. Of these closed acres, 46 acres have been published as closed in the Federal Register. See map 13 for locations of OHV allocations.

b. Developed Recreation

BLM/Private

There is no developed recreation on BLM lands in the watershed. Kerby Peak Trail is located just outside of the watershed on the northeast slopes of Little Grayback Peak, in the Brewer Spruce Research Natural Area. An unofficial trailhead for Kerby Peak Trail is located in the FS lands in the watershed off FS056, on FS054. This road is a natural surface road, with parking for two to three vehicles. This portion of the Kerby Peak Trail has been brushed but not constructed yet. It currently runs along the ridge on an old trail on the ridge to Rabbit Lake and eventually will connect with Kerby Peak. There is one private campground (Country Hills Resort) which is located along Sucker Creek in the watershed.

Forest Service

At present, this watershed has the highest use of and demand for developed campgrounds and facilities on the Siskiyou National Forest. Most of the developed use, as well as the dispersed use occur along watercourses, which have resulted in several issues surrounding the riparian habitat. Two types of recreation sites are available in the watershed: developed (established facilities) and dispersed (scattered, undeveloped areas). The developed sites are used more than dispersed sites. Three developed campgrounds are found in the watershed: Bolan Lake, Cave Creek, Grayback. Several small, undeveloped campsites are dispersed through the watershed. Some of these have been used since the late 1800's. (Draft Grayback Sucker Watershed Analysis, October 1997).

3. Special Forest Products

Special forest product removal from the watershed includes mushroom harvesting, firewood collection, and pole products. Permitting for special forest products has been reduced in watersheds with Port Orford-cedar root disease. Most of the mushroom harvest in the Illinois River basin has occurred in the Grayback/Sucker Watershed. Social and ecological conflicts have arisen from the commercial mushroom harvest. Local pickers often distrust migrant pickers, feeling that their harvest practices can disrupt duff and remove developing spores. Migrant pickers are competing with local pickers for a limited seasonal resource worth thousand of dollars. Resource managers and other citizens are working to resolve the questions and conflicts related to the mushroom harvest at the local level. The effects of different mushroom harvest practices have not been quantified. (Draft Grayback Sucker Watershed Analysis, October 1997)

4. Roads

Most roads in this watershed were constructed to support timber management and mining. Roads located on private lands, are typically natural surfaced and lack appropriate drainage structures. The mid-slope and low-elevation natural surface roads can be a source of erosion and sedimentation of streams.

Road construction and improvement across BLM lands stemmed primarily from timber management mandates. Road conditions vary depending on the degree/type of use, road surface type, soil type, maintenance, and road standards. Many of the roads located on BLM lands are insloped, aggregate surfaced road with ditch relief culverts. Limited funding and declining timber harvest activities have resulted in some BLM roads not being maintained to current road maintenance level standards. As road maintenance activities are deferred, roads fall into a further state of disrepair. Some of the BLM roads in the watershed are in need of road renovation / reconstruction work which is more extensive than road maintenance. BLM roads are continually evaluated for decommissioning or improvement needs / potential.

Prior to 1992, road drainage culverts on BLM land in the Sucker Creek watershed were designed to accommodate a 25 to 50 year flood event or were sized based on channel width and stream flow. Culvert designs did not consider native and anadromous fish passage for all life stages. Concentrated water flow through many of these structures was too great to allow fish movement upstream. Scour at the exit of these structures created pools and, over time, drops developed which restricted all movement of fish beyond these points and greatly reduced spawning habitat. Contemporary culverts are designed to accommodate bed load and debris transport for a 100-year flood event and to assure passage of native and anadromous fish (NWFP and RMP guideline). Existing culverts are periodically evaluated for future replacement needs to meet this standard to meet the 100-year flood event.

Road density and road surface type vary in the watershed. Table III-28 summarizes road mileage based on different surface types and ownerships in the full watershed. There are a total of 41 miles of roads on BLM land in the watershed with an average road density of 4.4 miles per square mile on BLM lands.

Table III-28: Summary of BLM Mileage by Surface Type

Road Ownership	Surface Type	Miles	Total
BLM	Natural (NAT)	14	4%
BLM	Pit Run Rock (PRR)	5	2%
BLM	Grid Rolled Rock (GRR)	1	1%
BLM	Aggregate Base Coarse (ABC)	18	5%
BLM	Unknown various types	3	1%
BLM	Bituminous Surface Treatment (BST)	0	0%
Private & Other Agencies	Bituminous Surface Treatment (BST)	18	5%
Private & Other Agencies	Unknown / Various Types (UNK)	275	82%
Total Road Miles		**334**	

5. Minerals and Mining

a. Minerals

1) Geology and Mineral Production History

The BLM lands in the watershed are primarily mapped as volcanic rocks of Triassic and Paleozoic age (Smith et al. 1982). Some areas within the watershed are also mapped as Triassic and Paleozoic metasedimentary rocks. This group of rocks is referred to as the Applegate Group. Within the region of southwestern Oregon, the volcanic rocks or the Applegate Group contains the largest percentages of gold-quartz veins. These occurrences are unrelated to massive sulfide deposits. Locally these rocks have been altered and metamorphosed to zeolite and low-grade greenschist (Page et al. 1983).

A small amount of watershed is mapped as Jurassic shale, mudstone and sandstone of the Illinois Valley (Smith et al. 1982). These rocks typically would not be mineral in character.

The mineral production history in the watershed includes two historic lode – or hard rock/underground mines and five placer, or free gold mines (State of Oregon 1952). The lode mines were the Cohn Ledge and the Rainbow. The Cohn Ledge is thought to be the oldest hard rock mine in southern Oregon. There are five historic placers; the California Placer, the Ajax, the Edmonds Mine, the Yeagher and the Four Star Placer. All these mines were primarily for gold. In 1942, War Production Board Order L-208 brought about a curtailment of gold mining and production virtually ceased.

2) Mineral Potential

The area is considered moderate to low for mineral potential. Potential is defined as the occurrence of a mineral resource, rather than if a deposit could be economically extracted.

The area has had intermittent exploration and the host rocks are favorable. However known deposits are depleted or low grade. Exploration could be stimulated by higher prices or new methods of mineral extraction (Smith and Peterson, 1985). There are also a few known deposits

of gold, silver, copper, zinc, and lead in the area. These sites are listed under mineral production history.

The area contains no know deposits of iron, manganese, molybdenum, tungsten, mercury, antimony, arsenic, cobalt, iron, titanium, nickel, uranium, barite, clay, coal, diatomite, feldspar, gypsum, limestone, marble, oil shale, olivine, pumice, silica, or talc (Smith and Peterson, 1985).

b. Mining

1) Current Mining Claims and Regulations

There are two types of claims, which can be located on BLM lands for the production of minerals. These are lode and placer claims. A lode claim is when the operator is tunneling into the ground to remove rock, and then separate the precious metals from the rock. A place claim is typically within a stream deposit, and the precious metal (typically gold) if free from the country rock.

On lands administered by the BLM, there are three levels of mining operations that may occur. The lowest impact level of operations is considered casual use. Casual use operations include those operations that usually result in only negligible surface disturbance. These types of operations no mechanized earthmoving equipment or explosives, and do not include residential occupancy. No administrative review of these types of operations is required. The extent of casual users is not known.

The next level of mining is for exploration and requires a notice of intent to operate (NOI). A NOI requires the filing of a mining notice pursuant to the BLM Surface Management Regulations (43 CFR 3809). The NOI informs the BLM of the level of operations that will occur, the type of disturbance at the location of the operations, the type of equipment to be used in the mining operations, and the reclamation plans following the completion of the mining activities. A reclamation bond is required before mining may commence as outlined in the mining notice.

The third level of mining operations is for production and requires the claimant to file a plan of operations. The review of plans of operations involves a NEPA environmental review. A reclamation bond is required to be submitted before approval of a plan of operations. There have been no mining plans submitted for operations proposed to occur on the BLM-administered lands in the watershed.

There are four mining claims within the watershed area. As stated above, none of these claims on BLM managed lands are operating at a NOI or plan of operations level.

The rights of mining claimants for activities on unpatented claims are outlined in Appendix B.

In addition to federal laws, mining claimants must comply with state laws where applicable. Requirements include:

1 The State Department of Environmental Quality monitors and permits dredging activities and activities where settling ponds are used.

2 The Department of Geology and Mineral Industries (DOGAMI) permits all activities over one acre in size and ensures reclamation is completed in a timely manner. DOGAMI requires reclamation bonds where applicable.

3 The Division of State Lands permits in stream activities where the removal or displacement of material is anticipated and where the movement of a stream channel is planned. DSL also permits dredging in anadromous fish bearing streams.

4 The Department of Fish and Wildlife (ODFW) monitors turbid discharges from mined sites. ODFW also recommends preferred dredging periods for operations in anadromous fish bearing streams. ODFW also approves variances for operations outside the preferred work periods where applicable. Dredging in the Illinois River and tributaries is allowed between June 15 and September 15 annually.

2) Mining Related Occupancies

If mining claim occupancy is proposed by the operator/claimant, the use is reviewed by the BLM's Authorized Officer. The occupancy must be determined to be reasonably incident to mining and reviewed in a manner similar to a plan of operations. No occupancy may occur until the proposed occupancy is reviewed and written permission is issued by the authorized officer pursuant to the BLM Mining Claim Use and Occupancy Regulations (43 CFR 3715).

There are currently no mining related occupancies in the watershed.

6. Cultural Resources

Approximately 1,055 acres were surveyed in 2006 as part of the Althouse/Sucker Cultural Resource Survey. This survey included lands in the Althouse and Sucker Creek watersheds. Twelve sites and two isolates are recorded in the Sucker Creek watershed. Eleven of those sites are historic, one prehistoric and the two isolates are prehistoric. Historic sites represent a full range of local mining history. The mining site chronology extends from the discovery of gold in the Illinois Valley in the early 1850's to more recent prospecting and includes sites representing all the important technological developments associated with hydraulic and hard rock mining.

7. Lands/Realty

The BLM land ownership pattern in the watershed is mostly a scattered mosaic. The primary BLM ownership in the watershed consists of public domain lands that have never left the ownership of the United States. The remainder of BLM lands in the watershed are Oregon and California Revested Railroad grant lands (O&C lands).

Private land ownership was molded by the transfer of public lands from the United States to private individuals through several different land disposal authorities including homesteading, mineral patents, donation land claims, etc. This sometimes leaves the private landowners with access problems and needs that entail rights-of-way across BLM-administered lands.

BLM rights-of-way issued to private landowners include roads, water systems, power lines,

phone lines, and communication sites. The actual locations of these rights-of-way can be found in Master Title Plats kept updated at the Medford District BLM Office.

There are only two FLPMA rights-of-way in the watershed. One is for non-commercial (residential) access to private property, and one for a powerline right-of-way in T40S, R8W, Section 23. There is a right-of-way application in T39S, R7W, Section 34 for the use of a spring diversion and associated pipeline for domestic water use.

There are no leases or permits for residential occupancy or agricultural uses in the watershed.

In the Watershed, there is 11.53 acres of O&C land identified as land tenure zone 3 land (T40S, R8W, Section 1) per the Medford District RMP. Land tenure zone 3 lands may be disposed of through a sale as authorized by FLPMA. Disposal is at the discretion of the Authorized Officer. The parcel is approximately ¼ mile long by 400 feet in width. It was created following Donation Claim patents that deeded irregular shaped parcels into private ownership. This left odd shaped remnants of public lands.

There are no proposed or pending land sales or exchanges.

8. Illegal Dumping

Illegal dumping occurs throughout the watershed. Several contracts have been awarded to clean up these areas over the past several years.

9. Visual Resource Management

The watershed consists of Visual Resource Management (VRM) Class III and IV lands. The objective for management of VRM III lands is "To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate." The objective for VRM IV lands is "To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high." (USDI, VRM Manual 8431, 1986)

IV. REFERENCE CONDITION

A. PURPOSE

The purpose of this section is to assess how ecological conditions have changed over time as the result of human influence and natural disturbance, and to develop a reference for comparison with current conditions and with key management plan objectives (Federal Guide for Watershed Analysis, version 2.2, 1995).

B. CLIMATE

The climate of southwestern Oregon has not been static. During the Holocene (the past 10,000 years), shifts in temperature and precipitation have affected the type and extent of vegetation, the viability of stream and river flows, fish and animal populations, and human access to higher elevations. At the beginning of the Holocene, temperatures were rising and the climate was warmer and drier than today. This trend continued until sometime after 6,000 years ago when wetter and cooler conditions began to prevail. During the past few thousand years, modern climate and vegetative patterns have prevailed. However, during this latter period the environmental forces have not been constant. Fluctuating cycles of drier and wetter conditions, varying in duration, characterize the modern climatic pattern (Atwood and Grey 1996).

C. EROSION PROCESSES

The historic erosion processes were generally the same as those described under the Current Conditions section. Prior to Euro-American settlement there were more mature forests with openings caused by Native American burning practices and natural lightning caused fires. Native people probably did not accelerate the rate of erosion by their burning practices because burning was frequent enough to limit accumulation of fuels and therefore fires were probably more like mosaic broadcast burns. Vegetation, coarse woody material, and organic matter remained on the forest floor protected the soil from erosion. Native burning practices generally involved burning nearly level to gently sloping areas in valley bottoms, foot slopes, some steeper mid-slopes, and some upland meadows. Their fires were spotty and designed to enhance habitats and thus increase numbers of desirable plant and animal species (USDI 1997). The referenced document refers to conditions in southwestern Oregon with specific application to the Grave Creek Watershed; practices were likely similar in the analysis area. Frequent burning by the native people created park-like forests of scattered trees unlike the dense forests we see today (Pullen 1996). The practice of fire suppression began in 1903 (McKinley and Frank 1996).

Concentrated flow (gully and rill) erosion occurred mainly in draws where channels were created. The density of these channels varied with climatic cycles. During wet cycles, intermittent stream channels were more common. During dry cycles, cobbles, gravel, and plant debris accumulated in the draws, burying the channel (USDI, 1998a). According to Pullen (1996), Native Americans recognized the value of riparian areas for humans and animals and therefore did not burn in them. Furthermore, the riparian areas of perennial and intermittent streams were likely very moist due to the stream influence and less vegetation density from

Native American burning.
Mass movement or slides may have occurred in upper parts of the watershed. Accelerated mass movement can be caused by a reduction of root strength or an increase in moisture content, a result of decreased transpiration. It is doubtful that native people's land management practices affected the rates of mass movement. The native people's burning practices had their greatest effects on shallow-rooted plants that rapidly regenerated. Plants with the greatest root strength at depth were negligibly affected by burning.

Native people created foot trails instead of roads. These narrow foot trails had very little effect on erosion, water quality or water quantity. In the 1850s, with the settlement of the area for mining and later farming, trails and wagon roads began to be constructed. With increased roads came increased erosion from ditch line erosion and cutbank and fill failures. In the early 1900s a seventeen ton machine known as The Beast was used in Josephine County to haul lumber over roads; it damaged bridges and culverts (Booth 1984) and compacted soils considerably.

In the latter half of the 19th century miners engaged in placer mining, some hydraulic mining, and hard rock mining on the main stem and some tributaries to Sucker Creek (USFS1995). Evidence of past mining has been observed mainly near the upper part of the main stem in the upper part of the subject area, upstream of Little Grayback Creek. Most mining on what is now BLM land likely took place in the south leg (sections 1, 12, and 13).

With the coming of the 20th century came mechanized transportation and equipment. More roads were built to provide better access for development opportunities, in agriculture and logging as well some mining. Early roads were generally very rough with wheel ruts after winter rains where the grade was simply cut in local soil. As reblading occurred, the road grade would drop creating a ditch effect, thus catching natural surface water and shallow ground water flow, and increasing erosion.

D. HYDROLOGY

1. Floods

Periodic flooding in the Rogue River Basin has had devastating consequences for the cultural environment. River flows were high enough during major flood years to destroy bridges, roads, buildings, and mining structures, and to inundate agricultural lands and stream courses. The December 1861 flood destroyed improvements and crops along the Applegate River (Atwood and Grey 1996). The flood of 1890 wiped out almost all of the barns and houses along the Rogue River including the Applegate River (Atwood and Grey 1996). Similar events most likely occurred in upper Illinois streams. No written record exists of flood impact on human improvements, soil vegetation, or aquatic life before Euro-American settlement and development, although certainly catastrophic one-hundred year floods occurred then, as in the recent past (Atwood and Grey 1996).

Warm rain on snow events have occurred throughout the Euro-American history of the Rogue River and its tributaries. These events have resulted in increased flooding (Hill 1976). An article in the Rogue River Courier, dated January 29, 1903, stated that since Euro-American settlement in this area in the 1850s, there had been floods in 1853, 1861, 1862, 1866, 1881 and

1890. All of these, except for the flood of 1890 which was a rain event, were caused by rain on snow events.

Major floods of record in the 1900s occurred in 1927, 1955, 1964, and 1974 (Atwood and Grey 1996). In the major flood that occurred in 1927 the Rogue River was swept clear of every bridge between Grants Pass and the Pacific Ocean (Rogue River Courier, March 4, 1927).

2. Droughts

In southern Oregon drought conditions were noted in 1841, 1864, 1869-74, 1882-85, 1889, 1892, 1902, 1905, 1910, 1914-17, 1928-35, 1946-47, 1949, 1959, 1967-68, 1985-88, 1990-92, and 1994 (LaLande 1995). During the drought years, many of the smaller streams in the area went dry and the larger streams had low flow. The effect of droughts was intensified by high water usage for agriculture and mining (McKinley and Frank 1996).

3. Beaver Dams

Beaver dams were prevalent on the Illinois River system before Euro-American influence. Beaver dams added woody material to streams, trapped and stored fine sediments, and reduced water velocities. As a result, riparian zones were wider than they are today. Between 1827 and 1850, fur traders removed most beaver from the region. Consequently, the dams were no longer maintained and were destroyed over time. The loss of beaver dams likely resulted in scouring of channel beds and banks, increased width / depth ratios, narrower riparian zones and fine sediment deposition in pools.

4. Mining Effects

In the East Fork Illinois River Watershed, placer mining for gold was initiated in Sailor, Allen, and Scotch Gulches (as well as in Sucker Creek). These areas were intensively mined. However, mining lasted only a few years (Ramp and Peterson 1979:30). Placer mine tailings were usually dumped in piles in the flood plain. Given the time frame in which placer mining occurred, natural restoration of stream and flood plain has occurred to some degree. Still, today mine tailings and piles of reworked tailings are evident in flood plains, particularly in the upper part of Sucker Creek in the subject area (the south leg).

Beginning around 1860, a system of ditches was developed for mines in the East Fork Illinois River system to bring water to the hydraulic mine operations. See discussion of hydraulic mining under Erosion Processes above.

E. STREAM CHANNELS

Prior to Euro-American settlement, the steeper, headwater streams in the Sucker Creek watershed had varying amounts of large woody material (LWM). Generally, the forested streams had sufficient amounts to create pools and meanders. Forests in these areas provided shade and an abundant source of LWM resulting from tree mortality. The large wood provided both structure and nutrients for the stream. The streams were longer, more complex and provided more aquatic habitat. Beaver eradication, mining, agricultural development, and large

wood removal all resulted in straighter stream channels and decreased sinuosity. When clearing for pastures and fields, numerous sloughs, bayous, overflows, and springs in the watershed were channelized to increase the size of fields and pastures (McKinley and Frank 1996). This is likely also true for the Sucker Creek watershed. Marsh communities were so effectively altered that now their locations are unidentifiable (McKinley and Frank 1996). Decreased sinuosity from mining and agriculture has resulted in decreased surface area of the streams, channel downcutting, and decreased groundwater recharge.

F. WATER QUALITY

Overall, prior to Euro-American settlement, historical summer water temperatures were likely lower than today due to lower width-depth ratios and more riparian vegetation. However, given the fire occurrence prior to 1920, some stream reaches could have been sparsely vegetated for periods of time, resulting in higher water temperatures during that time (USDI 1998a).

Agriculture and mining in the late 1800s and early 1900s resulted in reduced riparian vegetation which allowed more solar radiation to reach streams, and increased water temperatures. Irrigation withdrawals lowered stream flows and increased the surface: volume ratio of water receiving solar radiation, which also increased stream temperatures. This remains a problem today.

Sediment loads and turbidity were historically lower due to fewer sediment sources prior to Euro-American influences. Sedimentation and turbidity rose dramatically with hydraulic mining, land clearing, intense logging, road building, and settlement along the Illinois River and its tributaries.

G. VEGETATION

Historical vegetation patterns or reference condition alludes to the forests or vegetation that existed on a site prior to significant Euro-American modification. Examples of significant Euro-American modification include clearing for settlement and agriculture, human development (homes, buildings, roads, etc.), timber harvesting, mining, grazing, and fire exclusion.

The information presented here was gathered from the O & C revestment notes (Appendix F). The inventories were done to determine the economic worth of the land at that time, how much timber volume was present, and how the land should be used. Every 40-acre parcel of O & C land was surveyed. Although some of the notes are hard to interpret, some conclusions can be drawn on what the general landscape looked like circa 1918.

Enough information is present in the revestment notes and additional inventories to develop approximate major plant series and also to estimate the extent of fire occurrence. The information in the survey notes described non-forest land types, noncommercial forest types, and timberland types.

1. Forest Stand Types

An interpretation of the O & C resvestment notes (Appendix F) summarizes forest stand types for BLM lands in the Sucker Creek watershed.

2. Landscape Patterns

Late-successional Forests. – Only 400 acres located in ten 40 acre segments could be considered as late-successional forest. This is based on volume of 10mbf/acre of trees greater than 16" dbh. High volume areas with late- successional forest characteristics were in the riparian areas and in section 9.

Pine species – Ponderosa, and sugar pine were common species or species groups located in 90% of the forty acre segments.

Wildfires - There are twenty-five forty acre segments with mention of burned areas in the revestment inventories.

Tanoak Series – Revestment notes indicate tanoak occurred less frequently on BLM-administered land than is found in the watershed today. This may indicate an inventory omission of this easily detected species, labeling this species only as brush, or it may correlate to a boost in species abundance resulting from decades of successful fire suppression.

H. SPECIES AND HABITATS

1. Terrestrial

a. Special Status Plants

Hickman (1997) used soils maps, geomorphic features and the 1855 cadastral survey to create a map of potential climax vegetation for the Illinois Valley. He stated that non-serpentine terraces near or on the valley floor could have been Douglas-fir with sugar pine as the potential climax vegetation. He stated that Douglas-fir with a mixed hardwood component would dominate most of the uplands with little tanoak influence on northerly aspects. Numerous saw mills cut timber in the watershed and used the lumber for houses, barns and fence construction. Valley bottom flat-lands were cleared and developed for farming and ranching. It could be inferred from Hickman's work that historic habitat for rare plant species associated with late-successional Douglas-fir forests in the Sucker Creek watershed was more extensive and contiguous, at least on north-facing slopes based on past disturbance, and therefore more populations of rare plant species probably existed on these north slopes.

The south-facing aspects in the watershed were probably always moisture limited and associated more with ponderosa pine or Jeffery pine forest types in the overstory and a mixed shrub, forb and grass community understory. The optimum habitat for rare plant species associated with pine communities was most likely more abundant and contiguous before development, mining activities and associated timber harvesting industry became more extensive. Numerous fires

probably helped maintain a competitive niche for rare plant or native plant species in the understory. The rare species found in Sucker Creek were probably never dominant species in the herbaceous layer, but most likely the number of rare plant populations was higher as a result of more extensive and higher quality habitat. The frequency rate of rare plant populations was probably higher in the watershed in the past and the numbers of individuals higher per population. The abundance of native plant species was also probably much higher before human disturbances.

Since serpentine habitats occur as a result of underlying parent rock, the extent of ultra-mafic influenced land is static and should contain similar diversity of plant species as in the past. However, serpentine areas were heavily mined and streams and riparian habitat severely altered repeatedly over the past 150 years. Significant amounts of high quality habitat for serpentine endemic plants have been reduced in uplands, ephemeral areas and riparian areas.

Prior to the combustion engine, the main mode of travel was by foot, horse and wagon. These modes of transportation created less impacts to native habitats, especially grasslands. Wet meadow habitats could have been more extensive which, in turn, means that the federally listed endangered plant, *Lomatium cookii* could have been more prevalent.

Historically, noxious weeds and non-native species were not a concern. There is no relevant information available from the Illinois Valley on this topic. The assumption can be made though that in general any grassland or open habitat most likely had more native grasses and forbs than the current species composition dominated by annual, non-native grasses.

b. Wildlife

Wildlife habitats and populations in the Sucker Creek watershed have historically been influenced by natural events and human activities. Prior to Euro-American settlement, Native Americans managed the landscape for habitats and products they found useful for their survival. Fires were used to burn off undesirable vegetation and to promote production of desired products. Various wildlife species were hunted during this time to meet their everyday needs. Human exploitation of these wildlife resources was likely at a sustainable level.

Many habitat types were created and maintained by disturbance events, specifically fire. More information regarding the fire regimes is found in the Fire Section below. Prior to Euro-American settlement, the landscape was open, lacked roads, and animal movement was largely unrestricted. Many animals would seasonally migrate to take advantage of food, shelter and water. For example, deer and elk primarily wintered in the oak woodlands, and spent warmer seasons in the uplands.

The amount and type of old-growth forest in the watershed varied over time in response to disturbance events, such as fire, windthrow, and insect infestations. These disturbances also played an important role in snag production (a key component of old-growth forests) and the populations of cavity dependent species. Historically, snag and coarse wood development were more likely to occur in pulses than they do today. These pulse events strongly influenced the spatial and temporal recruitment of snags and coarse wood.

Old-growth/mature forest was the dominant forest type in Southwestern Oregon prior to Euro-American settlement, occupying as much as 71% of the area (Ripple 1994). However, in the Sucker Creek watershed, old-growth /mature forest was more scattered and patchy. According to 1918 records of the BLM acres surveyed in Sucker Creek, only 10 % would have been considered old-growth/ mature Douglas-fir stands. The majority of the old-growth/ mature Douglas-fir stands were found in T39S-R7W-Section 9. Historically, ponderosa and sugar pine were more dominant than Douglas-fir in this watershed. According to the 1918 records, 27% of the acres surveyed also had evidence of large scale burning, especially in sections 25 and 35. Due to the patchiness of the old-growth/mature forest on the BLM lands in this watershed, these lands most likely provided more dispersal habitat than nesting habitat for many late-successional habitat associated species. The best late-successional forest connections were found in the riparian areas.

There is very little historic information available identifying the frequency of occurrence of species currently identified as late-successional obligates. However, it is likely that species that benefited from these forests, such as the pileated woodpeckers *(Dryocopus pileatus)*, northern spotted owl (*Strix occidentalis*), northern flying squirrels *(Glaucomys sabrinus),* and red tree voles *(Arborimus longicaudus)* were found in greater numbers in the region than they are now due to the larger contiguous blocks of late-successional habitat. It is also likely that dispersal of animals, recolonization of former habitats, and pioneering into unoccupied territories was accomplished more effectively than it is today due to the connectivity of the older forest. Ripple (1994) estimated that 89% of the forest in the larger-size classes was in one large, connected patch extending throughout most of western Oregon. Due to the higher connectivity levels of mature habitat, species that benefited from edge environments, such as striped skunks *(Mephitis mephitis)* and great horned owls (*Bubo virginianus),* were probably less common than they are today.

Large predator species such as grizzly bears and wolves *(Canis lupus)* were present in the watershed (Bailey 1936) and, along with cougar *(Felis concolor)* and black bear *(Ursus americanus),* maintained the balance between species such as Roosevelt elk *(Cervus elaphus)* and blacktailed deer *(Odocoileus hemionus)* with the available forage. Wolverines *(Gulo gulo luteus)* remained at high elevations throughout the year. This species is an opportunistic predator, feeding on animals such as porcupines *(Erithizon dorsatum)* and occasional winter kills. Grey foxes *(Urocyon cinereoargenteus)* used the valley and nearby brushy slopes as their primary habitat.

Larger scale habitat changes and effects to wildlife populations occurred after Euro-American settlement. Since the 1850's, human activities such as agriculture, mining, large scale timber harvesting, road construction, and fire suppression have changed historic vegetation patterns and habitat distribution levels. These influences had indirect and direct effects to the wildlife populations. Fire adapted habitats and associated wildlife species have been adversely affected by fire suppression. This is particularly true for meadows and oak/savannahs which have declined in the watershed. Historically, there were more acres of meadows and oak woodland habitats present in the Sucker Creek watershed. According to the 1918 records, these habitat types were present in the following locations on BLM lands in the Sucker Creek watershed: T39S-R7W-Section 11 and T39S-R7W-Section 21.

Historically, exotic species such as bullfrogs, starlings, house sparrows, opossum and largemouth bass were not found in the watershed. Their current presence, the result of both intentional and accidental introductions, has impacted native populations through displacement, competition, predation and disease.

c. Riparian

Over time, water quality has varied greatly. Water quality was high prior to the introduction of mining, large scale timber harvesting, and road building. Unaltered seeps, springs, and riparian vegetation, as well as high elevation snow levels, contributed to keeping the water cool. During the winter and spring, occasional floods would flush the system clear of sediment deposited from natural slides and erosion.

Mining, more than any other human activity, has altered many aquatic systems in the watershed. Historically, the majority of the mining occurred on the lands south of Sucker Creek. Some activities associated with mining included diverting water flows, altering stream channels, timber harvesting, road building and the movement of large quantities of soil and rock.

2. Aquatic

a. Fisheries

Pre-Euro-American Settlement: A pre-Euro-American view of the Sucker Creek watershed would have included sustained populations of beaver and salmon, particularly in the lower gradient reaches of streams in the Sucker Creek watershed. In addition, there would have been a mixture of mature conifers and hardwoods, and riparian zones would have had dense canopies. In the upper reaches of Sucker Creek, stream temperatures may have been cooler than today due to narrower channels and more shade, but the understory of some streams was probably less brushy than it is now. Summer water temperatures in these valley bottom reaches were probably cool and not a limiting factor in salmonid production. Based on current perennial flows in the upper watershed, stream flow was most likely not a limiting factor due to the absence of water withdrawals in the watershed. In the valley bottoms there would have been large woody material dispersed throughout the streams providing complex habitats for resident trout, juvenile steelhead and salmon. There probably would have been an abundance of fish in many valley bottom reaches of most streams.

Prior to Euro-American settlement, streams in the valley alluvium meandered with unconstrained channels. Multiple stream channels, along with side channels, dissipated flows and created fish habitat. Riparian vegetation and adequate connections to the floodplain limited the effects of annual peak flows. Winter scour had less impact on macroinvertebrate and fish populations, especially in low gradient reaches. In addition, large riparian down wood held back spawning gravels during high flow events in some of the watershed's steeper gradient streams. Sediment in the spawning gravels was not limiting to fish or macroinvertebrate populations. Occasionally, landslides delivered sediment to streams. However, large wood almost always accompanied the sediment delivery. The wood controlled sediment movement throughout the system and the sediment did not embed itself into the spawning gravel. Erosion and sedimentation were in balance with stream transport capacity resulting in pools with good depth and cover.

Post-Euro-American Settlement: Euro-Americans trapped beaver extensively and as a result, complex, deep pools started disappearing throughout the watershed. Coho salmon populations began declining. In addition, mining roads and other travel ways began to be more numerous. This led to an increase in peak winter flows, especially when roads were located near streams. Sedimentation of streams increased as well.

Mining occurred throughout the Rogue basin. Extensive mining in the early 1900s caused the Rogue River to run brick red with silt (ODFW 1994). Stream sedimentation contributed to a decline in salmonid populations throughout the watershed, and water temperatures increased as riparian vegetation was removed. The 1964 flood eroded banks and widened channels that had begun to recover following the impact of mining.

Mining in the Sucker Creek drainage began the 1850's, peaking in the 1860's. This mining consisted of panning, sluicing, and hydraulic mining. The hydraulic mines would wash the material from banks. This process also involved removing vegetation from the area. Mining occurred extensively through the BLM portions of T40S-R7W Section 1. This area had been placer mined for gold for at least the past 120 years. The channel and floodplain were highly disturbed and the substrate was a mix of eroded and churned alluvial materials. Much of the fines had been lost from the soil and the flood plain was largely denuded of vegetation. The stream channel was moved multiple times in order to mine under the original channel. (USDI, 2000)

During this period, there was increasing agricultural activity in the Sucker Creek watershed. Fields were plowed close to the streambanks and streams were channelized. Trees and other riparian vegetation were removed, thereby reducing stream shade. In addition, agricultural runoff added excess sediment to streams and increased stream temperatures. Irrigation diversions limited salmonid survival wherever they occurred. Water rights allowed complete diversion of stream flows for irrigation. Fish screens on irrigation diversions are a relatively new phenomenon and consequently, large numbers of salmon and trout ended up in farmer's fields.

Past timber harvest has had a big impact on juvenile coho salmon, steelhead, and cutthroat trout habitat. Streamside trees were harvested due to their size, value and ease of logging. When the majority of the large wood was removed, there was little available for recruitment for fish habitat. Habitat complexity rapidly declined, as did the chinook, coho salmon, steelhead, and cutthroat trout populations which were dependent upon the large wood. Coho salmon were most affected by the loss of large wood, since juvenile coho require complex pools for rearing habitat. In addition, coho and chinook are found in lower gradient stream reaches than resident trout and steelhead, and are not distributed as far upstream. The lowland areas are more often private lands, which were commonly converted to agricultural use. As a result, when the lowland habitat and stream flow was altered, there was more of an effect on coho and chinook.

Road construction increased with timber harvest, compounding the problem of limited juvenile habitat. Sedimentation increased and limited salmonid production. Peak winter flows increased as a result of increased road density. High winter scour limited macroinvertebrate populations and transported wood away from streams. Fish habitat declined. In addition, stream-side roads limited stream meander and the development of multiple channels. Peak flows did further

damage, as the streams could not naturally diffuse the high energy from flood events.

In 1973, a USFS report noted that in the Illinois River, chinook, coho, winter-run steelhead, and sea-run cutthroat trout were of great economic and recreational value. Coho and chinook contributed less to the sport or commercial fishery than steelhead.

I. FIRE

Over 40% of lands in the Sucker Creek watershed subject area have an historical mixed severity fire regime. The mixed severity fire regime is characterized by both lower severity more frequent fires and infrequent large, stand-replacing fires every 35-100+ years (Agee 1990). Landscapes in a mixed severity regime often consist of a mix of stand ages and size classes. Fifty-six percent of the watershed subject area is considered a low severity fire regime with frequent (0-35 years) fires.

Moderate or mixed severity fire regimes are the most difficult to characterize. Fire frequencies usually range from 25 to 100 years and individual fires often show a wide range of effects, from high to low severity. The overall effect is patchiness over the landscape as a whole. Tanoak-Douglas-fir forests which comprise 45% of the analysis area have a complex fire disturbance history. Atzet and Wheeler (1982) estimated a 20 year fire return for interior southwestern Oregon tanoak-Douglas-fir stands. A high percentage of natural stands have a history of frequent surface fires, resulting in 2 or 3 storied stands with each story being even aged. The layered under-story vegetation often contributes to the intensity of the fire: waxy-leaved shrubs and trees can carry flames into the over-story, creating a high intensity fire.

Agee (1990) provided a synopsis of how Douglas-fir / tanoak stands develop after fire:

> Following intense fires, which occur in patches on the landscape, tanoak sprouts from root collars, while Douglas-fir must reestablish from seed. Either species can dominate the stand, or the stands may contain a mixture of both. If tanoak dominates, it will form a solid canopy and exclude Douglas-fir until that canopy begins to break up between age 60 and 100 years. The eventual stand will be a mix of the two species. If the stand is mixed from the beginning, Douglas-fir will begin to dominate after 15 - 30 years because of a faster growth rate at that age. When the Douglas-fir begins to break up, tanoak established in the under-story is released, forming a mix of the two species (Thornburgh 1982). However, examples of such stable, two-storied stands are rare because of fire history. Successive intense fires may result in hardwood dominated stands while less intense fires may result in stands with several age classes dominated by the species best able to take advantage of the environment following a fire.

Fires in the low severity regimes are associated with ecosystem stability, as the system is more stable in the presence of fire than in its absence (Agee 1990). Frequent, low severity fires maintain fuels so they are less likely to burn intensely, even when there is severe fire weather. Under the identified natural fire regimes, limited over-story mortality occurs. The majority of the dominant over-story trees are adapted to resist low intensity fires because of thick bark developed at an early age. Structural effects of these fires are on the smaller under-story trees and shrubs which, along with down woody fuels, are periodically removed or thinned by low

intensity fires. The resulting understory is low, open, and park-like in appearance over a vast majority of the landscape.

With the advent of fire exclusion, the pattern of frequent, low intensity fire ended. Dead and down fuel and under-story vegetation are no longer periodically removed. Species composition changes and thinner barked, less fire-resistant species increase in number and percentage of site occupancy. This creates a trend of ever increasing buildup in the amount of live and dead fuel. The under-story becomes dense and choked with conifer and hardwood reproduction. The longer interval between fire occurrences allows both live and dead fuel to build up. This creates higher intensity, stand-destroying replacement fires rather than the historical low intensity ground fires that maintained park-like stands.

The reference condition for fuel conditions in the pre-European settlement period would have been one of low build-up over the majority of areas. Lack of fire suppression and Native American use of fire maintained a comparatively open forest under-story with little fuel accumulation or under-story vegetative growth. This would have occurred across the watershed subject area with only isolated areas of dense undergrowth and fuel accumulation. These areas would have changed over time. Location would have largely been dependent on lightning occurrence patterns and Native American use of fire.. The build up of fuel and vegetation that has resulted from modern human settlement and subsequent fire exclusion has created a hazardous situation that is outside the reference condition and natural range of variability.

J. AIR RESOURCES

Lower air quality due to natural and human ignition sources has historically occurred in the spring, summer, and fall in southern Oregon. Numerous references are made by early Euro-American explorers and settlers of Native American burning and wildfire occurrence in southern Oregon. Smoke-filled skies and valleys were once typical during the warm seasons. Air quality impacts from natural and prescribed fires declined with active fire suppression and a reduction in burning associated with settlement and mining. Factors influencing air quality shifted away from wildfire and human burning to fossil fuel combustion as population and industry grew. This created a shift in the season of air quality concern to the winter months when stable air and poor ventilation occur. By the 1970s, fossil fuel emissions became a major factor along with wood stove and backyard burning. Prescribed burning related to the forest industry increased throughout this period and was an additional factor, particularly in the fall. Regulation of prescribed burning smoke emissions and environmental regulation of fossil fuel combustion sources has lead to a steady improvement in air quality since the 1970s.

The historical fire regime created a pine-dominated forest characterized by little dead and down ground fuels and few standing snags (USDA, USDI 1994a). Upland vegetation had a considerably less dense under-story. Coarse down woody accumulations were relatively light because frequent low intensity fires consumed the majority of the down wood. Less smoke and particulates were produced in the past, as there was less material to burn.

Air quality as a reference condition is determined by legal statute (the Clean Air Act and the Oregon State Air Quality Implementation Plan). Management actions must conform such that efforts are made to meet National Ambient Air Quality Standards, prevent significant

deterioration, and meet the Oregon visibility protection plan and smoke management plan goals.

K. HUMAN USES

1. Prehistory and Ethnography

Archaeological evidence dates occupation of southwest Oregon back at least 10,000 years. The early prehistory of the people that inhabited the interior valleys is not as clearly understood as other areas in Oregon. This is in part due to research being oriented more towards coastal areas than interior valleys and the lack of archaeological sites dating to pre-Holocene times (Tveskov et al. 2002). The majority of prehistoric sites recorded in southwest Oregon date to the late Holocene period which provides a comprehensive view of the cultural practices of the people inhabiting the area 1,500-2,000 years ago. Ethnographic research gathered in the late 19th and early 20th century from informants living at the Siletz and Grand Ronde Reservations provide invaluable information, but the small number of informants, the number of years away from their traditional lands, and the influence of white culture most likely had a direct affect on the accuracy of the information gained (Tveskov et al. 2002; Pullen 1996; LaLande 1995; Gray 1987; Beckham 1978).

The various groups who lived in close proximity to the watershed were the Takelmas (Penutian speakers), and Dakubetede (Athapascan). At the time of white contact, the Native Americans living in the Rogue and Illinois valleys spoke different languages but were culturally very alike and practiced similar lifeways (Tveskov et al. 2002; Jones 2001; Pullen 1996). The watershed was likely utilized by different Native American groups, with territorial boundaries over-lapping. Each group occupied a nuclear territory along their respective river drainages, but utilized the surrounding uplands to gather a wide variety of plant foods, hunt deer and elk, and to gather material for making baskets and tools (Jones 2001; Pullen 1996:IV-1; Gray 1987).

The people were hunter-fisher-gatherers following a subsistence pattern of procuring food as it became available throughout the different seasons. Primary food resources included the acorn, camas, fish, seeds, nuts, deer, and berries. People wintered in small permanent villages and dispersed during the spring, summer, and fall to utilize upland resources, returning to their permanent villages in mid-autumn. The winter villages were normally located at low elevations close to the confluence of two streams, or in areas where food resources were abundant. Permanent structures were made of sugar pine boards set vertically over a semi-subterranean, rectangular structure with a gabled roof. Other village structures would have included sweat lodges and drying racks. Men and women had separate sweat lodges, with the men's being more substantial. When gathering resources at the higher elevations, brush structures may have been constructed for shade, but no permanent structures would have been built (Gray 1987).
With the large influx of miners and settlers into the area in the 1850s, conflict with the Native American groups increased. Food was becoming scarce for the Native Americans living in southern Oregon. Areas formally inhabited by the Indians were being settled by the whites. Former hunting grounds were decimated by cows, pigs and crops raised by the settlers, and rivers and streams became choked with sediment from placer mining activities depleting the salmon runs. Extermination of the Indians became the policy of self-regulated military volunteers. This conflict escalated into the Rogue River Indian Wars of 1852-1856. By 1856, most Native Americans living in the Rogue and Illinois valley were forcibly relocated to the

Coast Reservation in northern Oregon.

Today the descendents of these people are included in the Confederated Tribes of Grand Ronde and the Confederated Tribes of the Siletz. These tribes take an active role in the management of their native lands and the continued education of the general public.

Little is known of the archaeology of the upper Illinois River Watershed, especially in the Sucker Creek watershed. The oldest recorded site in our immediate area is located at Marial on the Rogue River, 21.9 miles below Grave Creek. This site has been dated to around 8,000 years before present (Schriendorfer 1985). Recorded archaeological sites downstream of the watershed include the McCaleb's Ranch site (35JO32) possibly correlated with the ethnographic site "Talsalsan", and the Gallaher site (35JO28), a late archaic site that was possibly occupied to the mid-1800s. In addition, pit house village sites have been recorded on the wild section of the Illinois River (Steep 1994).

2. Regional Culture-History

Although early prehistory of southwest Oregon remains poorly understood, there is a general consensus of the chronology of the gradual transformation of local groups from nomadic big game hunters to semi-sedentary "foragers", and then sedentary "collectors" (Goebel and LaLande 1997). The following is a four-part culture-history sequence proposed by Goebel and LaLande (1997):

Paleoindian Period (about 12,000 years ago until approximately 9,000 years ago: documented by the presence of a few "Clovis", fluted projectile points found in southwestern Oregon; probable focus on hunting of large, now-extinct mammals.

Early Archaic Period (about 9,000 to 6,000 years age): documented by a few sites in the lower Rogue River and Applegate River drainages; probable transition to broader-based hunting and gathering; characterized by wide-stem and large leaf-shaped projectile points; period-experienced onset of hotter-drier conditions (the "Altithermal").

Middle Archaic Period (about 6,000 to 2,000 years ago): documented by larger number of sites (including a few in the Upper Rogue area); period of increased reliance on certain resources and beginnings of more settled, village pattern; proliferation of variety of projectile points; probable reliance on fire to manage vegetation after close of "Altithermal".

Late Archaic Period (about 2,000 to 200 years ago): documented by largest number of regional archaeological sites studied to date; period of increased sedentism and storage of food surpluses (salmon, acorn meal); growing populations, aggregated during winter at major village sites on river terraces.

3. Burning by Native Americans

Fire is an important aspect of ecosystem function in southwest Oregon. Major plant communities are dependent on fire and other types of disturbance to successfully maintain ecosystem health (Atzet and Martin 1991). In this respect, Native Americans played an active

role in maintaining fire dependent communities over time, and in establishing themselves as the dominant "edge dependent species" (Bean and Lawton 1993; Lewis 1989, 1993).

Native American burning practices provided small and big game habitat, natural fuel breaks, various edible plant foods, materials for basketry, and other technological uses. Other uses for fire included hunting, crop management, insect collection, pest management, warfare, food preparation, and clearing areas for travel (Williams 1993).

Specific ethnographic information for the use of fire in southwest Oregon has been limited (Lewis 1989). However, research specific to the Applegate and Illinois Valleys has been published (McKinley and Frank 1996; Pullen 1996). Native peoples' burning practices in southwest Oregon likely functioned similarly to those described for such tribes as the Miwok, Hupa, Tolowa, and Wintun in California (Lewis 1989, 1993; Blackburn and Anderson 1993). However, some have noted that Native American burning as a source of fire in southwest Oregon is indistinguishable from lightning caused fires (Personal communication Tom Sensenig, 2006).

The following review of Native American burning is based on Lewis (1989) and Pullen (1996). In addition, Pullen (1996) provides an extensive review of historical journals and other writings illustrating Applegate and Illinois Valley plant communities at the time of historic contact.

Riparian Zones - Conifers were an important part of riparian zones along the Illinois River and their tributaries: ponderosa pine along the upper Illinois River (Illinois Valley) and Douglas-fir on its lower reaches.

Valley Floor-Oak-Grasslands - These plant communities were burned beginning as early as late July and continuing through September. Burning often occurred after spring rains. Burning initiated early grass growth and provided habitat for game. It also controlled acorn-destroying insects (McCarthy 1993). Native American seasonal habitation sites are usually found along the boundaries of this zone. Recent research indicates that more oak-pine habitat existed in the past and that these communities were specifically maintained by native burning (Pullen 1996). Open ponderosa pine stands were maintained, interspersed with open groves of Oregon white oak.

Valley Slopes – North facing slopes in the Illinois Valley were covered with open stands of ponderosa and sugar pine and occasionally Douglas-fir. South facing slopes were covered with grass, except along ravines where oaks, chaparral, and scattered ponderosa pine occurred.
Chaparral - Fires were usually initiated in the fall. The primary goal was to maintain a mosaic of early to mid-seral plant communities that functioned as small and big game habitat. Edible plant species were also produced. This mosaic created natural fuel breaks. Spring burning helped to maintain more permanent openings.

Mid-Elevation Forests - Fire was possibly used to maintain open understories in stands dominated by Douglas-fir and ponderosa pine. Fires eliminated the build up of ladder fuels that could contribute to stand replacement fires. Meadows were maintained but overall native use of fire in this zone was limited.

Upper Elevation Forests - Upper elevation forests in the Illinois River drainage were composed

of mature fir, pine and cedar. Meadows were likely maintained by native burning but overall use of anthropogenic fire in this zone was limited.

One of the management objectives of native burning was the maintenance of wildlife habitat; therefore a brief discussion of wildlife populations at the time of contact is in order. Based on a review of historic sources, Pullen (1996) provides the following general observations:

Deer, elk, bear and wolf - Deer, elk, bear and wolf populations were much higher before or during Euro-American contact. This can be attributed to the positive effects of native burning.

Beaver - Large numbers of beaver existed along the Applegate River and there may have been large populations in the Illinois River drainage as well.

Rabbits and squirrels - Rabbits and squirrel populations may have been considerable in the Illinois Valley. Jack rabbit populations may have been high due to the maintenance of quality habitat in the valley. Silver gray squirrel populations would have benefited from fire maintained oak-pine woodland habitats.

4. Native American Utilization of the Anadromous Fish Resource

The importance of anadromous fish resources to Native Americans is well documented in the ethnographic literature for northwestern California and southwestern Oregon (Hewes 1942, 1947; Kroeber 1925; Kroeber and Barrett 1960; Suttles 1990). Native peoples were familiar with all major fish species: trout, salmon, steelhead, silverside, and Chinook (Gray 1987). In addition, fresh water fish, mussels, and crawfish were taken. Riparian products include willows and other wetlands materials used in basketry. Chinook salmon (*Oncorhynchus tschawytscha*) and silver or coho salmon (*O. kisutch)* dominated aboriginal fish harvest. The abundant seasonal runs and ease of procurement of anadromous fish strongly influenced the distribution of Native American settlements and the spiritual life of native peoples. The distribution of villages and camps along the Rogue and Illinois Rivers and their tributaries attest to the importance of obtaining and processing fish. Major villages were often located near falls or rapids to facilitate harvesting. Examples are the village sites at Gold Hill and Marial on the Rogue River, the village site of *Tlegetlinten* located at the confluence of the Rogue and Illinois Rivers, and McCabe's Ranch located in walking distance to the falls on the Illinois River.

Harvesting of anadromous fish was incorporated in a larger web of ceremonial interactions. Ritual procedures were used to organize harvest of a variety of food resources and to insure a sustainable resource. Part of the yearly ritual cycle was devoted to salmon (Sewezy and Heizer 1977). Tribes in northwest California and southwest Oregon had "first salmon" rites which were often held with the onset of the spring king salmon run, a fish migration of major importance. These rites were used to recount orally the myth of the origins and travels of the first Salmon, who became a culture-hero and was invited to ascend the rivers and streams again. Tribal members were strictly forbidden to eat salmon until rituals were completed, and often up to ten days afterwards. These restrictions had the ecological effect of avoiding premature harvest of salmon and also insured that a portion of the run could travel upriver. Inter-tribal conflicts concerning downstream over-harvest were thus avoided. A first salmon ceremony was performed at Ti'lo-mi-kh falls in Takelma territory (upriver of Goldhill, Oregon). This was a

central place that drew people from the entire watershed (Gray 1987). The first five or ten chinook salmon, among Athapaskans, was eaten ritually by the entire group (Miller and Seaburg 1990). Failure to incorporate salmon into the ritual cycle was believed to result in poor fish runs or failures of entire watersheds to produce fish.

Ritual specialists also organized the building of fish dams and weirs at critical locations. Weirs were left open at night both to ensure that facilities weren't damaged as well as to allow the continued passage of fish upriver. Dams were removed after a set fishing period (Waterman and Kroeber 1938).

5. Early History

Historic exploration into the North Pacific began in the early part of the 16th century, a product of the Renaissance and Enlightenment in western Europe. Spanish explorers spurred on by the acquisition of dazzling amounts of wealth, began to seek more wealth and such fabled geographic locations as the Northwest Passage. Maritime exploration along the southwest Oregon coast began in the late 18th century, but the interior remained unknown to white explorer's until the early part of the 19th century (Beckham 1978). The first Euroamericans arrived in southwestern Oregon in 1827. They were fur trappers who worked for the Hudson's Bay Company led by Peter Skene Ogden. In a quest for furs his Snake Country Brigade headed from the Klamath River over the Siskiyou Mountains and entered the Rogue River Valley. Fur trappers continued to travel through Southwestern Oregon gaining knowledge of the land. Little was done to publicize this knowledge since the Hudson's Bay Company wanted to keep out competitors (Beckham 1978). When gold was located in Josephine County in the early part of the 1850s, a large influx of Euroamericans came through southern Oregon, and settlements and towns began to develop and grow.

6. Gold Mining

The discovery of gold at the mouth of Josephine Creek in the summer of 1851 brought about tremendous change in the Illinois Valley. The first known trails into the Illinois Valley from the west were opened in early 1851, bringing people from Trinidad, California, and over the Siskiyous from above present day Happy Camp. Prospectors from northern California spied the potentials of the streams in the Siskiyous and the upper reaches of the Illinois River. Mining activities at first centered on Josephine and Canyon Creeks, but after 1852, exploration for gold revealed extensive deposits on the alluvial flats of the upper Illinois River and along the streams and gulches that feed the East Fork of the Illinois River. By 1852-53 the needs of the miners in the Illinois valley created a tremendous market for merchants eager to sell tools, clothing, food, liquor, and other commodities. By 1853 the Cold Mountain Spring Trail was opened up leading from the Applegate River to Kerbyville and then onto Crescent City, California. In five years the route from Crescent City to Kerby and onto Jacksonville had become a wagon road.

Both Sucker and Althouse Creeks were among some of the most productive mining regions in Oregon. Sucker Creek, named on account of some Illinoisan miners, (Illinois was once known as the "Sucker State") rises in the Siskiyou Mountains and flows west-southwest and falls into the East Fork Illinois at a point nine miles north of the state line, and five miles south of Kerby, Oregon. Mining in the Sucker Creek drainage began in the 1850's with the original gold rush to

the Northwest. This original mining peaked in the 1860's, and gradually declined until the present. The regions mining population was dominated by "Yankees" and other northern European stock, but also had an assortment of different nationalities and races. Reviews of regional environmental and mining history are found in Kramer (1999), McKinley and Frank (1996), Ramp and Peterson (1979), and Francis (1988).

The first settler on Sucker Creek was Rhoda, who established a dairy in 1852, but did not remain long. Early in 1852 the first house was erected in that region by A.G. Walling, E.J. Northcut and Bell, near the mouth of Democrat Gulch, where supplies were sold to miners on Sucker and Althouse Creeks. At this place known as "Walling's Ranch" miners left their horses while they mined for gold (Hill 1976:9, 10).

The town of Sucker Creek was established around the middle of 1853 near the mouth of Yeager Creek. The Indians burned this town on October 28, 1855. When the Indian War of 1855-56 began, the people of Sucker Creek, then rather numerous, experienced some of the ills associated with it, and there were several narrow escapes. The town was rebuilt in the summer of 1856 after the Indian War, further up the creek at the mouth of what is now called Bolan Creek. Due to the nature of the miners and the conflicts occurring with the Native American population, Fort Briggs was built. This "fort" was merely a fortified log house in which the surrounding settlers and miners (approximately 80 or so) took refuge during these conflicts and later was used as a garrison during the Rogue River Indian wars. The fort was built on the Donation Land Claim of George E. Briggs off of Holland Loop Road (Hill 1976:21, 22).

Early mining consisted of panning, sluicing, and hydraulic mining. The miners prospected by panning and sluicing banks and benches throughout the drainage. When a prospect looked good, a crew was brought in to mine using hydraulic giants. Hydraulic mining enabled miners to work large amounts of gravel in a short period of time. In addition to its productivity hydraulic technology was relatively inexpensive (USDI 2000). The hydraulic miners used water pressure to wash the banks and benches, actually moving all overburden down to bedrock through a sluice box located at the lowest end of the project. All vegetation in the mine area was stripped off prior to the washing process. The hydraulic mining required miles of ditch line in order to maintain water pressure and volume necessary to move the overburden.

Many of the ditches and flumes were constructed by Chinese laborers. The Chinese usually worked in gangs or "companies" overseen by a "boss-man" manager. Many Chinese laborers left the construction jobs to work over the depleted placers deserted by the original miners. The Chinese would work the tailings and bedrock with patience and diligence and in some cases were rewarded with wealthy finds overlooked by the earlier miners. The influx of Chinese into the area was greatest from 1860-1870. Because of the success of the Chinese miner, many white miners became jealous and hostile toward the Chinese. This hostility was represented through the Immigration Act of 1880 which cut off the flow of Chinese into the United States. One miner recalled this story about the tension between Chinese and white miners along Sucker Creek:

> One or two years before [about 1855], we a lot of miners, had run all the Chinamen off of Sucker Creek, and would not let them mine. But the county

> officers were making a good thing out of them collecting their licenses and $4 per month each head and the sheriff brought back the Chinamen and told us the authorities would protect them as each Chinamen had paid $50 apiece to the United States government at San Francisco when they landed, and the government would have to protect them. So we had to let them alone, and they bought a great many mining claims on Sucker Creek and paid some big prices, too (Reinhart 1962:104).

Numerous lode (hardrock) claims exist in the drainage. These claims are generally found on ridges or side slopes and are not associated with riparian areas. Most mining on lode claims is from tunneling underground and milling hardrock deposits on site. Load claims were commonly worked from 1850 to around 1950. According to the Oregon Metal Mines Handbook (1952), historically, there have been many hardrock mines in the Sucker Creek watershed, including the Ajax Placer, Akers Mining Company, Johnson Gulch, Four Star Placer, Rainbow, and the Tip Top Mine. The oldest quartz mine in southwestern Oregon is the Cohen Ledge located along the divide between Althouse Creek and Sucker Creek.

Sucker Creek was placer mined in the 1970s and early 1980s by several individuals. One noticeable mining location was an area several acres in size on both sides of Sucker Creek, but most work involving heavy mechanized equipment was on the west side of the creek. The activity was short in duration.

7. Timber

The development of timber resources for commercial purposes in the Illinois Valley began in the 1850s. Initial use of timber resources was primarily for settlement and in support of mining operations. Primary uses of wood in those days was for shelter and homes, fuelwood, sluices, diversion dams, flumes, saloons, bowling alleys, railroad ties, and coffins (USDI 1995:17). As with the miners, trees were a hindrance to the farmers. "When the Illinois Valley was being settled, the pioneers cleared the land for farms and had little use for the trees, which were often piled and burned. Some of the forests began to disappear, but the stage coaches still went most of the way through the valley with miles of trees on either side of the road. Then as the population grew and there was more demand for lumber, there were a few sawmills." (Walling 1884). An operation specific to Sucker Creek is recorded: "A single mill was built in 1868 by Beach, Platter & Brown, remained in operation on Sucker Creek. The mill's production was a very meager 1,000 board feet per day." (Beckham 1978:131) World War II marked the beginning of large scale timber harvest.

8. Roads

Before European settlement of the west, ground disturbances were caused by animals, native people and natural events. As the west developed, animal trails and foot paths became narrow roads used to transport people and supplies mainly along streams, ridges and through saddles. These roads were generally naturally surfaced; the amount of associated sediment flow depended upon use, location, weather conditions, and soil type. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways began as trails and are now widened, realigned, and surfaced to meet the increase and change in vehicle traffic.

Even with the increase in traffic flow, crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainage have actually decreased sedimentation and erosion along the original natural-surfaced roads.

9. Recreation

During the earliest years of the twentieth century, recreational activity was intertwined with work and food acquisition (Atwood and Grey 1996). The 1930s brought about the Civilian Conservation Corps (CCC) which, among other duties, was responsible for building roads. These new roads provided recreational opportunities that were not previously available to many people. People began using roads to access sites for hiking, camping and driving for pleasure. Other recreational activities included hunting and horseback riding.

V. SYNTHESIS AND INTERPRETATION

A. PURPOSE

The purposes of the synthesis and interpretation section of the watershed analysis is to compare existing and reference conditions of specific ecosystem elements, to explain significant differences, similarities or trends and their causes, and to assess the capability of the system to meet key management plan objectives.

B. EROSIONAL PROCESSES

The major changes between historic reference conditions and current conditions are due to increases in the intensity and the types of human interaction with the environment. Native people's burning practices were limited to valley bottoms, gently sloping foot slopes, mid-slopes, and isolated upland meadows. The fires were spotty. This contrasts strongly with the use of fire to clear the land for mining, hydraulic mining, agriculture and forest management that has occurred since the end of the middle of the nineteenth century.

Forest management on both private and public land has included fire suppression, road construction, logging with yarders on steep slopes and with tractors on gentle to moderate slopes. Fire suppression has resulted in accumulation of fuels. A consequence of this is that when wildfires occur, they can burn extensively and with high intensity. A high-intensity fire consumes the duff, litter and most of the coarse woody material. This leaves bare soil conditions that are highly susceptible to erosion.

There is a correlation between ultramafic parent materials and fire hazard in the watershed. Fire suppression management policies have caused stands on non-ultramafic soils to become overstocked. This pattern is not apparent on ultramafic soils because these soils produce scattered vegetation due to soil chemistry, which limits plant species and rate of growth. Areas of high fire hazard are of concern because, if left in this condition there continues to be the potential for extensive erosion after catastrophic fire.

Any surface disturbing (including burning) treatment on slopes of ultramafic soil is of concern because of these soils' tendency to erode. Plant communities usually contain only a few species tolerant of the unusual soil chemistry that grow slowly and are arranged in a scattered distribution. This results in thin duff and litter layers. These soils often have high erosion hazard due to the steepness of the slope. The steep slopes give flowing water high erosive energy as it increases velocity running down slope. Reestablishing vegetative cover may be difficult.

C. HYDROLOGY

The stream flow regime in the Sucker Creek watershed reflects human influences that have occurred since European settlers arrived. Changes in the stream flow regime due to human disturbance have not been quantified. Changes may include channel widening, bank erosion, channel scouring and increased sediment loads.

Road construction, timber harvest, water withdrawals and fire suppression are the major factors having the potential to adversely affect the timing and magnitude of stream flows in portions of this watershed. Extensive road building and timber harvest have raised the potential for increasing the magnitude and frequency of peak flows in many tributaries. As the vegetation in harvested areas recovers, the magnitude and frequency of peak flows diminish. Permanent road systems will prevent stream flows from returning to pre-disturbance levels (USDI 1998a) However, road construction and reconstruction techniques can minimize the long-term effects by spreading runoff so that most is subject to soil infiltration.

Effects of roads vary with their location on the landscape. Roads, particularly those adjacent to streams, have a direct effect on stream flow patterns and water quality. Roads were historically built where the natural gradients made road location and construction easiest, generally in valley bottoms where stream were located. Added investments for improvements and tributary roads over time would make many of these roads nearly permanent in spite of their poor location from a hydrologic and erosion perspective.

Hydrologic cumulative effects analyses have not been completed for subwatersheds in the watershed. However, estimates based on GIS mapping, indicate that overall road density is 3.4 miles / mi^2, road density on BLM land is 4.5 miles / mi^2, road density on non-BLM land, including Forest Service land is 3.3 miles / mi^2, and road density on non-BLM/non-Forest Service lands, is 7.1 miles / mi^2 . Road density is considered to be high when it is greater than four miles of road per square mile.

High road densities combined with patch clearcuts result in substantial increases in low-range peak flows in small streams (Beschta et al. 2000). Other effects that may be attributable to high road densities combined with clearcuts are destabilization of stream channels and a reduction in intermediate and low flows.

D. WATER QUALITY

Changes in water quality, including temperature, from reference conditions to current conditions, that can stress aquatic life, are predominantly caused by riparian vegetation removal, water withdrawals, and roads. Water quality elements known to be affected the most by human disturbances are temperature, sediment and turbidity.

The recovery of riparian vegetation will provide shade and should bring about the reduction of stream temperatures. Road maintenance (*i.e.,* drainage improvements including surface regrading to outslope wherever possible) and decommissioning would decrease sedimentation in the analysis area (USDI 1998a).

Water withdrawals are active during the irrigation season on private land. Increased irrigation efficiency would leave more cool water in the stream system and decrease the amount of warm water that gets back into the system. This is an issue on private land.

E. STREAM CHANNELS

Channel conditions and sediment transport processes in the Sucker Creek watershed have changed since Euro-American settlers arrived in the 1830s. This was primarily a result of mining, road building, and agricultural development. Hydraulic mining resulted in entrenched channels with greater width-depth ratios. The larger width-depth ratios lead to increased instream gradients and sediment.(USDI 1998a)

Sediment is mainly transported from road surfaces, fill slopes, streambanks and ditch lines. Increases in sediment loads due to roads are generally highest during the five-year period after construction. However, roads can continue to supply sediment to streams as long as the roads exist. Road maintenance, renovation and decommissioning may reduce the amount of sediment moving from the roads to the streams. Roads constructed adjacent to stream channels tend to confine the stream and restrict the natural tendency of stream channels to move laterally. This can lead to downcutting of the stream bed and bank erosion. In such cases, obliteration of streamside roads would improve the situation (USDI 1998a).

Past removal of riparian vegetation and large wood from streams has had a major detrimental effect on the presence of large wood in the stream channels. There is a minimal amount of large wood in the analysis area with many areas lacking a source or reservoir for short-term recruitment. Large wood functions to reduce stream velocities during peak flows, and trap and slow the movement of sediment and organic matter through the stream system. It also helps diversify aquatic habitat. Riparian reserves along intermittent, perennial nonfish-bearing, and fish-bearing streams will provide a long-term source of large woody material recruitment for streams on federal land once the vegetation has been restored (USDI 1998a).

F. VEGETATION

The vegetative and structural conditions of the forests in the watershed have seldom been constant and have changed frequently with historical disturbance patterns. Disturbance has played a vital role in providing for a diversity of plant series, seral stages, and distribution of series and stages, both spatially and temporally. The presence of fire, insects, disease, periods of drought, and the resultant tree mortality have always been part of the ecosystem processes.

The fire exclusion in relatively recent times has driven forest structure towards more complex canopy layers caused by a substantial increase in small diameter trees and high density of brush species. This has occurred on the full range of sites including sites where it is not sustainable, such as those areas that historically supported pine species. Due to both timber harvesting and fire exclusion, there has been a substantial reduction in the presence of pine species over the past 50-75 years.

The watershed's vegetation, reference and current condition, and successional patterns indicate distinct areas for watershed management consideration.

1. Plant Composition

In the past, the Douglas-fir series was the dominant plant community in the watershed and remains so today. In 1920, 63% of the acres inventoried were in the Douglas-fir series. Today, the Douglas-fir series has been inventoried on 25% of the acres, a decrease of approximately 35%. In 1920, there was no mention of the tanoak series or tree form tanoak in the watershed. Today, the Douglas-fir/ Tanoak plant community covers 57% of the watershed acres inventoried.

This change in series composition shows the following trend: species that are more shade tolerant and fire intolerant are increasing. For example, tanoak is moving into what would have been Douglas-fir sites had fire disturbance taken place over the past 70+ years. Pine species are being encroached upon by Douglas-fir and white fir, and their vigor and extent is declining. These correlations are rough but demonstrate changes in plant communities over time.

2. Late-Successional Forest

In 1920, 10% of the inventoried acres were classified as Douglas-fir mature/old growth. Today, about 2,606 acres or 45% of BLM administered land has trees with an average dbh greater than 21” (late-successional forest). Most of the reference condition old growth was present on what is now private land.

3. Fire Events

Historically, fire has had a great influence on vegetation conditions and distribution. Fire suppression policies have reduced the effect of fire on vegetation conditions over the past few decades. A review of fire records indicates that since the 1960’s, fires have been small due to suppression success.

4. Size Class Distribution

A high percentage of the watershed exists in the 5-21" dbh range. Fire exclusion this century has permitted dense pole stands to develop throughout the watershed, crowding out important mid-seral species less tolerant of shade such as ponderosa pine, Pacific madrone, California black oak and Oregon white oak. When forests remain at unsustainable densities for too long, a number of trends begin to occur that effect stand health. Species composition, relative density, percent live crown ratio, and radial growth are all indicators of how forests can be expected to respond to environmental stresses. Potential for a stand destroying fire in these dense stands, particularly in the rural interface, is high.

5. Port-Orford-Cedar / *Phytophthora lateralis*

The fatal root disease caused by *Phytophthora lateralis* threatens the development of large (greater than 21"dbh) Port-Orford-cedar in the watershed. Infestations of the root disease are found in the Sucker Creek watershed.

G. SPECIES AND HABITATS

1. Rare Plant Species and Habitats

a. Special Status Species

Habitat for special status plant species in the Sucker Creek watershed may have been reduced from historic conditions. The changes occurred primarily as a result of land development, timber harvesting, rural residential or agricultural development and especially mining. As a result of the loss of habitat, it could be assumed that there have been considerable changes in rare plant site density. Without documented information of rare plant species occurrences, distribution or abundance prior to the 1850s, it is difficult to determine at what historic levels rare plant species occurred in the watershed and therefore the difference between current and reference conditions.

Due to the intensive and extensive manner private lands are managed, it is expected that a majority of all rare plant species populations will persist only on public lands. Public land managers pro-actively survey for rare plant populations and design protection measures when necessary to ensure viability of the populations and habitat. There are no similar efforts on private lands, except in rare occasions by concerned individual land owners.

Changes in habitat are especially evident where intensive mining and agricultural development took place. Many of these areas occur on private lands, although a large amount of mining operations occurred on public lands. Some areas have recovered considerably since mining operations have ceased, but other areas were so extensively altered by mine tailings, water holdings and sluicing operations that they may never have the capacity to recover. Agricultural lands have eliminated and modified the low elevation lands where habitat for many rare upland species that enjoy more open conditions would have existed.

Rare plant occurrences are more susceptible to extirpation by chance events, both natural and human, such as a hot-burning wildfire, landslides, OHV activities etc. As the human population increases in the watershed and the amount of activity rises, it is reasonable to expect an overall increased risk to rare plants in the long term. For example, the chance of wildfires increases with increased human activity. In addition, fuel loadings have increased over the past decades due to fire suppression, resulting in an increased potential for high intensity fire events, and further increasing the risk of rare plant population loss. OHV activity is also rising dramatically in the area as affluence and leisure time increase. Impacts from OHVs have been documented in nearby watersheds.

The reduction and/or alteration of late-successional mixed evergreen habitat lend uncertainty to the long-term stability of populations of high canopy dependent rare plant species. The rare plant species (*Cypripedium* species), generally thought to be associated with late-successional conditions, are being found in a wider variety of habitats. Therefore the risk that these species may become more isolated due to reduced opportunities for new population establishment and survival is not as high as once thought.

The biggest impact affecting species diversity is the reduction in number and size of natural openings as well as increased density of vegetation in edge habitat between the hardwood/conifer forest and openings. Many of these openings and meadows (serpentine or non-serpentine) are filling in with shrubs and trees due to lack of fire shrinking meadow habitat.

This reduces the optimum habitat of populations for species such as Howell's fawn lily and the firecracker flower which also prefers openings. This species is truly rare in such habitats in Oregon and management to maintain viable populations may be difficult. Actively managing these habitats for shade intolerant rare plant species is important towards maintaining these species.

Managing these openings and edge to minimize disturbances and competing non-native annual grasses through mechanical or prescribed fire treatments will optimize habitat conditions. Improved habitat would occur with prescribed burning resulting in reduced thatch and reduction in shrub encroachment; periodic nutrient pulses as a result of fire will improve species diversity. Re-seeding with native species will reduce the competitive edge on non-native grasses.

While maintaining such habitats, special status vascular and nonvascular plant species will remain in the ecosystem. Continuing surveys and the identification of key habitat areas will provide the basis for proactive management that maintains or improves special status plant populations.

An analysis could be conducted on a species by species basis or by groups of species associated by habitat types to compare the current amount of suitable habitat and number of known rare plant occurrences to the estimated amount of habitat lost by human activity. These results should provide a comparison of current species and occurrences to an estimated historic level of occurrences. However, that type of analysis has not been completed for Sucker Creek Watershed Analysis.

Very limited surveys and habitat assessments have been completed for nonvascular plants in the watershed. It is unknown how rich in rare non-vascular plants the watershed may be. Also, no surveys or inventories exist for fungi in the watershed. The Bureau Sensitive fungi, *Phaecollybia californica* was thought to have been found in the nearby East and West Fork Illinois watersheds; however, the species was misidentified and the nearest known population is in northern California. It is reasonable to assume that fungi habitat exists and the potential of unusual and rare fungi occurring in the watershed is possible.

2. Wildlife

Past management activities such as timber harvesting and mining have reduced the quantity and distribution of late succession forest. The pattern of private land ownership combined with conversion of much of these lands for agriculture or home developments has also contributed to the decline of late-successional forests.

Without detailed historic information of species presence and population size, it is difficult to determine at what natural levels these species may have existed. Additionally, few formal wildlife surveys and habitat assessments have been conducted on BLM lands in the Sucker Creek watershed. Consequently, it is difficult to determine population trends in the watershed. Many of the assumptions aren't specific to this watershed, but common throughout the region.

An increase in the number of roads in the watershed has contributed to fragmentation of old-growth forest patches and created additional "edge" habitat. This has influenced interior forest

conditions and allowed for habitat generalist species to compete with old-growth dependent species. Species such as the great horned owl (*Bufo virginianus*) utilize fragmented landscapes and prey on spotted owls. For big game, roads have allowed for increased disturbance and poaching, and in effect decreased habitat.

The reduced small and isolated late-successional forest patches in the watershed are not large or widespread enough to provide habitat for significant source populations. More likely, some of these sites may act as sink population habitats for individuals emigrating from adjacent Forest Service lands where late-successional forest patches are larger and better distributed.

Past management activities such as timber harvesting, mining, agriculture and home developments have reduced the current quantity and distribution of late-successional habitat. This has reduced dispersal opportunities at both a local and landscape level. The purpose of providing connectivity is to facilitate dispersal and migration, and genetic exchange between individuals. Connectivity is particularly important for certain fur bearers, such as fisher and marten (USDA, USDI 1994a), and species such as the northern spotted owl, which depends on higher levels of canopy closure to successfully move between habitats without increased risk of predation by great-horned owls or red-tailed hawks (Foresman 1984).

The biggest influence on habitat in the Sucker Creek watershed has been fire suppression and exclusion. In the Klamath Province and on the adjacent Siskiyou National Forest, fire is the most important agent of disturbance (Atzet and Martin 1991; USDA, USDI 1995). However, fire has largely been excluded from the watershed for more than 65 years. Historically, these areas burned more frequently, reducing ladder fuels and the potential for large, stand-replacing fires. Due to fire exclusion, the accumulation of ladder fuels currently poses a greater threat than was historically present. This has created significantly greater risks of stand-replacement fires and the habitats these stands provide.

Fire suppression has also contributed to overstocked stands with many younger trees. This overstocking level and recent drought conditions have increased the water stress on older overstory trees. As a result, there is an increased risk of disease and insect infestation.

Tree species composition has been influenced by fire suppression. Pine, madrone and black oak have been (and are being) replaced by more shade tolerant species such as tanoak and Douglas-fir. According to the 1918 records of the BLM acres surveyed in the Sucker Creek watershed, 84% contained the Douglas-fir/ Pine series. This is contrasts with the current condition, in which the majority of the plant series is Douglas-fir or Douglas-fir/ tanoak. Changes to tree species and plant series may have affected the wildlife species diversity in the watershed.

Fire adapted habitats and associated wildlife species have been adversely affected by fire suppression. Fire exclusion has resulted in encroachment of meadows by species such as incense cedar and Douglas-fir. Meadows and oak woodlands have declined in the Sucker Creek watershed as a result of fire exclusion. Additionally, fire exclusion has contributed to decadent brush fields and the loss of forbs and grasses typically associated with lower brush canopy closure. It is likely that increased brush canopy closure and encroachment by fire intolerant species will result in smaller and less productive meadows. Species that utilize meadows for foraging and nesting will lose additional habitat if current trends continue.

a. Riparian

Human activities have impacted water quality and the overall condition of riparian areas. Timber harvest and road building have led to increased sedimentation, increased stream temperatures, and decreased stream stability and structural diversity, all of which negatively affect aquatic and semi-aquatic wildlife. Although widespread mining is no longer practiced in the watershed and water quality has improved, its historical impacts persist.

It is likely that many native aquatic and amphibious species are less prevalent now than they were during pre-settlement time. In general, the riparian habitat in the watershed has been degraded from historic conditions and supports lower levels of species diversity than in the past.

3. Aquatic Species and Habitats

a. Stream and Riparian Trends

Current aquatic habitat conditions on federal and non-federal land in the Sucker Creek watershed differ appreciably from the reference condition. This has resulted from changes in the following major watershed attributes: (1) seral stage of vegetation in riparian zones; (2) the amount of stream flow between early summer and fall, and (3) the rate and magnitude of sediment delivery. On both federal and non-federal lands, the changes in watershed processes have been brought about through mining, logging, associated road network development, wildfire exclusion, and water withdrawal. On non-federal lands, agriculture and development in the floodplain have been additional major factors changing aquatic habitat conditions.

b. Riparian Reserves and Coarse Woody Material

The majority of BLM lands are in the Douglas-fir series. The change in seral stage, coupled with fire exclusion, has resulted in changes to the character of coarse wood on the ground in the Riparian Reserves. All decay classes of woody material are now more likely to be found because the material is not being consumed by frequent past fires. However, larger diameter coarse wood is most likely less than at reference conditions due to past logging practices.

The change from reference condition has been toward a mid-seral stage, with less structural and species diversity, less shade, and fewer mature trees as a source of future coarse wood. Logging in these stands has reduced the amount of coarse wood available to riparian-dependent species.

In many areas riparian vegetation has changed from forest stands dominated by mature trees to stands of poles and small trees. On private land, logging and the development of valley bottoms have degraded riparian habitats which were capable of supporting late-successional habitat. The long term trend on BLM land is an increase in late-successional forest characteristics in Riparian Reserves.

c. Instream Large Woody Material

The difference between the reference and current conditions regarding instream large woody material is a decline in quantity, quality, and function across the watershed. Logging, mining, and clearing of riparian vegetation for agriculture and residential development have reduced the amount of large wood in streams by removing the source from the adjacent slopes. In addition, large wood was most likely cleared out of stream channels when it appeared to pose a risk to structures or block fish passage.

The quality of instream large wood has declined as mature trees have been removed and streamside forests have become dominated by smaller trees. Smaller material in streams decays sooner and gets flushed out of the stream system easier. Where conifers have been removed and hardwoods have become more prevalent, large wood quality also has been degraded because hardwoods decay rapidly instream.

The function of large woody material in the watershed has been degraded as the amount and quantity of instream wood have decreased. Streams have become ecologically simplified and less effective in dissipating stream flow energy, scouring pools, providing complex habitat for fish, amphibians and invertebrates, and providing organic detritus. Deforested slopes may fail as a result of road failure or natural causes, but in either case, the debris flow no longer carries large wood to the stream along with the sediment load. This represents a break in an important watershed mechanism for supplying the system with large wood. Channelized river sections which have been straightened and disconnected from the floodplain cannot hold large wood in place as well as natural channels so it is flushed out of the system sooner. When the wood cannot function to shape the channel, fewer meanders and side channels develop to provide needed rearing habitat.

Another change from the reference condition is the presence of Port-Orford-cedar root disease. Infected areas have been identified in the Sucker Creek watershed. As the Port-Orford-cedar dies, the result may be an addition of large wood into the stream. However, the loss of Port-Orford-cedar from the riparian corridor will remove a source of long term recruitment of large wood.

d. Sedimentation

Stream sedimentation and an increased bed load are issues in the Sucker Creek watershed. Past mining, logging practices and road building account for the changes in the sedimentation of the watershed from the reference condition to the current condition. Road and culvert failures resulting from the 1997 flood put large amounts of material into Sucker Creek and its tributaries. Increases in peak flows, coupled with the removal of riparian vegetation and instream wood, led to increased scour, increased bank erosion, and increased sediment delivery to aquatic systems.

Stream sedimentation from federal lands is expected to decline with the continued implementation of the ACS. New activities designed to these standards will not contribute to existing sedimentation problems. However, there may not be an appreciable decrease in the overall amount of sediment deposited in streams if road construction standards and logging practices do not substantially improve on non-federal lands. Many roads and tractor skid roads on private lands do not receive regular maintenance, nor were most of them designed with adequate drainage or erosion control features. Sediment from these areas could create adverse

cumulative effects downstream.

e. Stream Flow

The decrease in the amount of water available to fish during low-flow periods is due primarily to irrigation withdrawal. Increased width-depth ratio and decreased riparian canopy cover have resulted in shallow warmer water. Changes in these stream attributes from reference conditions are a result of agriculture and development, road density, mining and logging. Irrigation withdrawals exacerbate the adverse effects of land management and continue to cause declines in native fish populations. Past land use practices which increased peak flows have had the effect of destabilizing banks and widening channels.

Summer stream flows on federal lands are expected to increase in the future, as a result of the Northwest Forest Plan Standards and Guidelines. Intensity and frequency of peak flows will diminish as vegetation regrows in previously harvested areas. Potential indirect adverse effects of altered peak flows on salmonid production and survival should diminish.

In the lower reaches of the watershed, where private ownership dominates, low flows are expected to continue to be a limiting factor for salmonid survival due to the effect on rearing habitat.

f. Stream Temperature

Stream temperatures are likely higher than at the time of the reference conditions due to loss of riparian canopy cover and decreased summer flows. Natural causes of riparian canopy loss in the watershed include floods and wildfires, although the effect of fire has been decreased due to wildfire exclusion over most of the analysis area. Logging, mining, and residential/agricultural clearing are the three forms of human disturbance that are most evident in this watershed. Some streams in natural (undisturbed) condition may naturally have temperatures that exceed ODEQ standards due to lack of vegetation for shade, particularly in rocky, serpentine areas, and warm summer temperatures in this watershed (see Current Condition, Stream Temperature).

Until adequate canopy closure is attained in the Riparian Reserves and summer flows remain low, summer temperatures will continue to exceed optimal levels for salmonids. Summer stream temperatures in areas with predominately federal land holdings should decrease with continued implementation of the ACS. In the low-gradient reaches of the valley floor, summer stream temperatures are not likely to improve as riparian vegetation is not expected to recover, and the demand on water allocation remains.

g. Aquatic Species

Factors outside the Sucker Creek watershed which have resulted in a change from the reference condition will continue to influence anadromous fish returns to the watershed. These include ocean productivity, recreational and commercial fish harvest, predation in the Illinois and Rogue Rivers, and migration and rearing conditions in the Rogue and Illinois Rivers. Coho salmon are federally listed as threatened. Implementation of the Aquatic Conservation Strategy on federal land will improve watershed health. The likelihood of recovery of anadromous fish habitat in

Sucker Creek is moderately low, however, because the majority of the lower watershed is privately owned. Changes in summer temperatures and the loss of stream complexity in Sucker Creek have affected coho and steelhead freshwater rearing habitat. The lower reaches have been affected most by the development of private land. As a result, the potential is great for private land owners to affect stream health downstream of federal ownership. However, the upper sections of Sucker Creek, which is a key watershed, on BLM and FS land will most likely continue to provide the best coho and steelhead habitat. Key watersheds in the Illinois Basin will allow remnant stocks of coho to survive while areas disturbed by past practices recover.

More sediment and temperature intolerant aquatic insect taxa will be present in the Illinois River tributaries as watershed conditions improve. Collector-dominated communities in these small streams would gradually shift to scrapers and shredders as canopy closure and the conifer component increases. In Sucker Creek, increased woody material will retain detritus and encourage communities of macroinvertebrates intolerant of scouring and degraded conditions.

In the past, mining had a great impact on fish habitat conditions. With the reduced mining activity, this has much less of an impact on fish habitat. The fact that the mining site in Section 1 is now withdrawn from mineral activity and has been restored has and will continue to improve fish habitat.

The large amount of private ownership in the lower section of the Sucker Watershed will continue to have an effect on the fisheries populations in the watershed. Expected population growth and development, current resource management practices, and water diversions on private lands, which are beyond the scope of the Aquatic Conservation Strategy, will continue to limit the potential for recovery of salmon and steelhead habitat and populations. Removal of fish passage barriers and the improvement of water withdrawal methods (*e.g.*, gravel push-up dam removal and creating more efficient irrigation systems) would contribute to improving aquatic conditions. Joint projects by the BLM and the Illinois Valley Soil and Water District on private land have been effective and provide a watershed model for future irrigation and fish passage improvement.

Private forest lands will continue to be managed primarily for wood production. The cumulative effects of management activities on private land have altered the timing and quantity of erosion and have changed stream channels, both of which have affected fish production. Streams and riparian areas with federal ownership are generally in better condition than streams on private lands. This trend will likely continue.

H. FIRE MANAGEMENT

There is a high potential for a large scale, high severity wildfire in the watershed. Mixed land ownership, wildland urban interface area, and recreational use increase the complexity of fire prevention, protection, fuels management, and hazard reduction programs. All have increased the risk.

Fire exclusion has created vegetative and fuel conditions with high potential for large, destructive, and difficult-to-suppress wildfire occurrence. The watershed analysis area has a large number of sites which are at a high risk of loss from wildland fire. High severity, stand

replacement wildfire presents a threat to human life, property, and nearly all resource values in the watershed. Management activities can reduce the potential for stand destroying fires through hazard reduction treatments. Public acceptance of hazard reduction management activities will be critical for the long-term health and stability of the forest ecosystem in the watershed. Collaborative planning efforts with other federal, state and county agencies such as the Josephine County Integrated Fire Plan will contribute to a landscape scale approach to watershed fuels reduction and ecosystem restoration projects.

A major difference between the existing and the reference condition is the change in the fire regime. This has been highlighted with the discussion of fire condition class and the extent of the watershed that is considered in fire condition classes II and III. The general area has gone from a low severity to a high severity fire regime. Previously, fire occurred frequently and burned with low intensity, and functioned largely in maintaining the existing vegetation. Currently, fire is infrequent, high intensity, causes high levels of mortality, and terminates vegetation conditions rather than maintaining them, as was shown by the 2002 Biscuit Fire. This effect has resulted from nearly a century of fire suppression and exclusion. The change in vegetative conditions, fuel profile, and amount of fuel now present could support a large wildfire that would have severe effects on vegetation, erosion, habitat, and water quality. The current trend is for increasing fuel hazard buildup and increasing risk for fire ignition due to population growth and human use in the watershed and adjacent region.

The change is great in magnitude and is widespread throughout the watershed. Only 4.5% of the analysis area is currently in a low hazard condition. High hazard conditions occur throughout the watershed, covering over one half of the analysis area. Vegetation in the watershed is at a high degree of risk for mortality and stand replacement from wildfire. The existing and future trend in fuel and vegetative conditions is a dominant factor that may define or limit achieving many management objectives for the watershed.

Risk of ignition has increased in the watershed. This is a result of the higher population residing in and adjacent to the watershed. Development has been substantial in the past decade and it appears that it will continue at the same rate.

I. HUMAN USE

Significant changes have occurred in the watershed due to mining, timber harvesting, road building and development. The Illinois Valley is increasing in population due to the influx of out-of-state individuals purchasing property. With this increase in population and access has come an increased use of public lands. The type of recreational use is also changing from non-motorized to motorized (before roads, there were mainly trails which accessed the area). In the past 10 years, there has been less federal timber cutting. Due to the increase in population and access, as well as an increase in landfill fees, there has been an increase in the illegal use of the watershed such as refuse dumping, living on BLM land and firewood cutting and collection.

Settlement patterns in the watershed have shifted from the town site of Browntown in the middle part of the watershed (over 100 years ago) to the north and west. Most of the settlement has occurred in the flat, valley of the northwest portion of the watershed. The area is slowly growing, with economic development centered on tourism, due to the fact that highway 199, a major route to the coast from southern Oregon, is located just west of the watershed. Cave Junction, just three miles northwest of the northern portion of the watershed, is the second largest community in Josephine County. Highway 46 to the Oregon Caves National Monument is also a major tourist attraction in the area. The development of wineries is bringing more tourists into the watershed. As of 1997, approximately 15,000 people lived in the Illinois Valley, scattered in the backwoods and small communities such as Takilma, Selma, O'Brien, and Holland (Cosby 1997).

Human use has led to increased erosion over reference conditions. Erosion and sedimentation is due to additions of increased runoff from roads, parking lots, roofs and other surfaces where there is no or little soil infiltration. Agricultural and forest management practices have also caused erosion and sedimentation. Stream channelization has created destabilized stream channels with increased bank erosion and, therefore, added sediments to streams. Clearing of riparian vegetation in developed areas has created increased water surface exposure to sunlight which results in increased summer stream temperatures.

These social or demographic changes/trends have implications for potential management activities and demands. Anticipated due to an increase in population is an increase in demand for use (or abuse) of public lands and a continuation of the illegal activities in the watershed (e.g., dumping, poaching).

As previously discussed, a major change regarding fire in the landscape has been occurring since the interruption of Native American periodic burning of specific plant communities, particularly those found at the interface of oak-pine valley woodlands and forested slopes. An informal fire study done in mixed conifer stands, somewhat adjacent to the valley floor, noted that the last time fire had moved through the area was in the 1860s. This would roughly correspond to the period of time after the Rogue Indian Wars and the removal of Native Americans.

Miners tended to burn indiscriminately to improve access to mining areas. Burning by miners and other Euro-Americans amounted to an *"ecological transition"* which changed the distribution of habitats and seral communities across the landscape which may have contrasted sharply with communities that resulted from Indian burning. The legacy of mining and the

subsequent mix of plant communities across the landscape may bias our vision of what we consider to be pre-settlement conditions.

Fire suppression policy also influenced the composition and structure of plant communities. Following WWII, new techniques such as smoke jumping and easy access to previously unroaded areas allowed for more efficient fire suppression. In addition, large fires primarily caused by lightning, such as the Longwood Fire of 1987, still periodically dominate the landscape.

Early placer and hydraulic mining profoundly altered riparian and other habitats that are still in various degrees of recovery. Sediment loads from large scale hydraulic mining operations in the watershed had an impact on anadromous fish and water withdrawal may have had an impact on water temperature which in turn affected fisheries. Areas in the reaches of the upper East Fork Illinois River were heavily impacted by mining activities. In some areas, the streambeds were virtually turned upon themselves (McKinley and Frank, 1996). An article in the Oregon Mining Journal (1900) printed the following about Sucker Creek:

> A stranger going into this old camp today and seeing the miles of rock piles and boulders might conclude, if he knew nothing about mining, that the creek had been struck by a cyclone. If a mining man, he might conclude that the country was worked out.

The timing of the mining season played a major role in terms of severity. LaLande (1995) has pointed out the seasonal effect of severity: the effect upon anadromous species was more pronounced in the fall, when lower water levels and stream turbidity created an environment detrimental to the fall runs of chinook and coho salmon. Winter resident species were also impacted. The effect from stream channelization extended beyond seasonal impact. As streams were channelized, their ability to hold water was decreased, with an overall loss of moisture in riparian and marsh communities and a resultant loss of moisture dependent plant species.

VI. MANAGEMENT RECOMMENDATIONS AND DATA GAPS

A. PURPOSE

The purpose of this section is to bring the results of the previous steps to conclusion by focusing on recommendations that are responsive to watershed conditions and processes identified in the analysis. Recommendations also document logic flow through the analysis, linking issues and key questions from step 2 with the step 5 interpretation of ecosystem understandings. Recommendations also identify monitoring and research activities that are responsive to the issues and key questions and identify data gaps and limitations of the analysis (*Federal Guide for Watershed Analysis, Version 2.2, 1995.)*

B. RECOMMENDATIONS

Tables VI-1 through VI-4 list potential management actions and data gaps for the Sucker Creek watershed. It is organized by NWFP land allocations. Actions that are required by the RMP, NWFP, or other decisional document may not be included in these recommendations tables.

It is important to keep in mind that these recommendations are **not** management decisions. In fact, recommendations may conflict or contradict one another. No appreciable attempt was made to reconcile them. They are intended as a point of departure for project specific planning and evaluation work. Project planning then includes the preparation of environmental assessments and formal decision records as required by NEPA. It is in this planning context that resource conflicts would be addressed and resolved, and the broad recommendations evaluated at the site specific or project planning level. Project planning and land management actions would also be designed to meet the objectives and directives of our Medford District Resource Management Plan (RMP).

Table VI-1: Recommendations – All Land Allocations

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
All	Ponds	Human Uses (Fire), Species and Habitat (Wildlife)	BLM lands (sec 1)	Where possible, maintain and improve ponds for wildlife, road maintenance and fire suppression.
All	Mines (adits)	Species and Habitat (Wildlife)	BLM lands	Prevent or minimize disturbance to mine habitats (e.g., bats) through the use of closures, buffers and seasonal restrictions.
All	Watershed with Mixed Ownership	All	Non-BLM lands	Work with land owners, watershed councils, partnerships, etc. on projects, planning, and activities to promote a healthy watershed. Potential projects include working with Special Status species and their habitats; restoring riparian and fish habitat; modifying irrigation diversions and fish barriers that jeopardize juvenile fish passage; roads; wildlife; fire; recreation projects and vegetation treatments.

Table VI-1: Recommendations – All Land Allocations

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
All	Meadows, Oregon White Oak, Ponderosa pine Sites	Species and Habitat (Botany, Wildlife), Vegetation	BLM and private lands	Restore and maintain meadows, ponderosa pine and Oregon white oak plant communities. Appropriate methods may include thinning, brushing and burning. Efforts will be made to utilize native plant materials. Utilize fire for restoration in fire adapted habitats.
All	Noxious Weeds	Species and Habitat (Botany), Vegetation	BLM and private lands	Develop and implement an active noxious weed control strategy for the watershed identifying priority species and treatment objectives such as containing larger populations versus eradicating new small infestations. This will entail more comprehensive inventory.
All	High Intensity Fire Occurrence	Fire, Erosion Processes, Species and Habitat (Fisheries, Wildlife)	Watershed Wide	Prioritize and implement fuel hazard reduction treatments at strategic locations. These sites could be located on ridge tops, roads or other natural or human made features which can function as suppression anchor points or barriers to slow wildland fire spread. Fuel planning should incorporate ecological processes and plant series characteristics. Collaborative multi-agency planning efforts such as the Josephine County Integrated Fire Plan should be continued to identify areas of highest fire risk and hazard.
All	Pump Chances	Fire	Watershed Wide	Maintain pump chances.
All	Fire Hazard	Fire, Human Uses	Watershed Wide	Pursue both mechanical and prescribed fire treatments to reduce fire hazard. Focus on high priority and wildland/urban interface areas. Encourage a coordinated and collaborative approach with private landowners, Forest Service, Josephine County and ODF. Brush roads to allow for safe public and emergency traffic access.
All	Dispersed Recreation	Human Uses	Watershed wide	Encourage cooperative agreements and MOUs between BLM, other government agencies and private land owners to promote recreation opportunities.
All	Illegal dumping, firewood cutting	Human Uses	BLM lands	Minimize illegal dumping and illegal firewood cutting by enforcing rules and regulations, limiting access, increasing visible presence in the area and educational efforts about protection of resources. Clean up illegal dump site in section 16 (Bear Creek slide area).
All	OHV inventory	Human Uses, Species and Habitat, Vegetation	BLM	Inventory and map OHV trails on BLM. Designate and sign trails.
All	Botanical restoration	Species and Habitat (Botany)	Watershed Wide	Maintain / improve habitats using prescribed fire, manual thinning and other methods while protecting special status plants known to be intolerant to burning.

Table VI-1: Recommendations – All Land Allocations

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
All	Plant species composition and stand structure	Vegetation, Species and Habitat (Wildlife, Botany)	BLM lands	Encourage forest stand resilience. Conduct density management (thinning) in natural and planted stands. In mature stands, use variable treatments that are incremental in implementation and result in high habitat diversity in stands and across the landscape. Objectives should include reduction of stem numbers, and species selection to provide a species mix that more closely resembles that thought to occur prior to fire exclusion and logging. Increase spatial heterogeneity of trees and canopy structure by variation of prescriptions in mature and planted stands. Utilize prescribed fire to reduce the activity fuels (slash) created by density management. Conduct forest management activities in a manner that mimics natural disturbance, and maintains special status species and structural diversity.
All	Port-Orford-cedar	Vegetation, Water Quality, Species and Habitat (Aquatic)	BLM and FS lands	Prevent export of POC root disease to uninfested sites. In POC areas, follow the POC ROD and take extra steps to restore or maintain healthy POC in its range. Reduce vehicle access to uninfected Port-Orford-cedar locations and enforce road closures in infected POC areas.
All	Roads / Port-Orford-cedar	Vegetation, Water Quality, Species and Habitat (Aquatic)	BLM Roads	Prevent the export of POC root disease to uninfested sites by incorporating appropriate POC management practices with road work projects. Roads currently identified as concerns are 39-7-24; 39-7-24.2; 40-7-1; 40-7-1.4; and 40-7-1.2.
All	Species composition	Vegetation, Fuels, Botany, Fisheries, Wildlife, Hydrology	Watershed wide	Reduce tanoak, White fir and other encroaching vegetation that has developed in the absence of fire disturbance.
All	Quarries	Species and Habitat (Aquatic), Erosion Processes, Water Quality	BLM	Continue to develop and utilize rock sources with in the watershed to produce aggregate for road maintenance and road surfacing, rip rap for slope protection, rock for stream enhancement projects and other miscellaneous uses in accordance with long term management objectives.
All	Access	Fire, Vegetation, Species and Habitat (Fisheries)	BLM lands	Maintain and enhance strategic road access for wildfire suppression forces. Access is critical in the short term to reduce large fire occurrence potential. This is especially important where we have high value forest stands or other high values at risk. Decommissioning of roads should not occur until hazard reduction and maintenance plans are in place. Consideration should be given for erosion and sedimentation. See TMO map.
All/ Key WA	Transportation Management	Fire, Vegetation, Species and Habitat (Fisheries)	BLM lands	Consider land allocation, long term access needs for management, maintenance limitations, and environmental concerns when developing TMOs. In upper Sucker Creek maintain or reduce road mileage in accordance with the RMP. pp. 23 and 34 (USDI 1995). Reduce road maintenance levels on spur roads in accordance with long term land management needs. Pursue non-exclusive easement across Boswell Mine (Section 1). See TMO map.

Table VI-1: Recommendations – All Land Allocations

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
All	Mature Stands / Connectivity	Vegetation / Species and Habitat (Wildlife, Botany)	BLM lands	Design vegetation treatments for continued and potential development of connectivity corridors. Where feasible, prioritize these corridors in and adjacent to Riparian Reserves.
All	Deer Habitat	Species and Habitat	Watershed Wide	Enhance deer foraging habitat by creating small openings, conducting prescribed burns and seeding closed roads with native grasses.
All	Species Composition	Vegetation, Botany	Watershed Wide	Increase the amount and percent cover of fire tolerant species, shade intolerant tree form hardwood species and pine.
All	Occupancy trespass	Human Uses	BLM lands	There are a few residential occupancy trespasses on BLM lands. Resolve these cases in accordance with the BLM Mining Claim Use and Occupancy Regulations (43 CFR 3715). Appropriate actions will be taken as new trespasses are identified.
All	Special Forest Products	Vegetation, Botany,	BLM	Restrict permitting in uninfested POC root disease watersheds. Continue working with local groups on mushroom picking issues. Issue permits where consistent with land uses.
All	Fire holding points	Fuels, Human Uses	BLM roads	Improve ridge top roads and strategically located roads for fire holding points on roads.
All	Stewardship	Vegetation, Human Uses	BLM	Promote stewardship opportunities where possible.
All	Late-successional Connectivity	Vegetation/ species and Habitat (Wildlife)	BLM	- Maintain and promote connectivity west of the East IV/ Williams-Deer LSR. Identify areas that are highly functioning as late-successional forest habitat or at risk of loss from fire or disease.
All	Coarse woody debris	Species and Habitat, Soil Productivity	BLM	- Promote snag and down wood recruitment in old clearcuts, but away from roads, by leaving snags on forested margins adjacent to clearcuts and encouraging them to fall into clearcuts. Directionally fall into clearcuts when non contrary to wildlife objectives.
All	Key Watershed	Water Quality, Water Quantity	Watershed Wide	-Adopt intent and goals of Forest Service, Aquatic Restoration Plan for Sucker Creek watershed (USDA Forest Service. 2005) by promoting and implementing projects such as a) adding large wood to streams, increasing structure, b) stabilize road drainages where needed, c) reduce stand densities where overstocked in riparian reserves.
All	Aesthetics	Human Uses	Watershed Wide	Consider viewsheds and views, especially from Highway 46, when recommending projects on BLM lands that would be visible to visitors and residents traveling through the area. Utilize Highway 46 as a Key Observation Point when analyzing the impact of proposed projects on the viewshed.

Table VI-1: Recommendations – All Land Allocations

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
All	Roads/ Transient Snow Zone	Erosion Processes, Hydrology	Watershed Wide	When developing the TMOs for the roads in the TSZ of the watershed, drainage features should pay heed to heavy runoff resulting from rain-on-snow. Emphasis would be on diversion of potential road surface water prior to entering natural drainage ways. Culvert sizing and cross drain spacing would be based on site-specific hydrologic calculations. Close natural-surface roads in the winter. See TMO map. Road decommissioning: when recommended by the TMO process, roads will be fully decommissioned (remove culverts, etc.) and planted with conifers to reestablish high canopy cover. Surfacing will also reflect the TSZ: surface roads with combination of surface coarse and base coarse rock
All	Canopy Closure/ Transient Snow Zone	Hydrology	BLM	Manage the transient snow zone to attain high canopy closure levels. Optimal tree canopy cover is 70+%.

Table VI-2: Recommendations - Riparian Reserve Land Allocation

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
Riparian Reserve	Riparian Reserve Mgmt., Reserve widths	Species and Habitat	BLM lands	Retain interim riparian reserve widths outlined in the NWFP and RMP. Based on site conditions and analysis, manage vegetation and conditions inside Riparian Reserves to promote or accelerate ACS attainment, especially long term. Use thinning, prescribed fire or mechanical treatments to reduce fuels.
Riparian Reserve	Late-successional forest enhancement	Species and habitats	BLM lands	Utilize the existing natural late-successional forest stands in the riparian reserve (such as portions of section 13) as a template to guide prescriptions in other adjacent stands.
Riparian Reserve	Large Woody Material (instream and riparian)	Species and Habitat (Aquatic), Erosion Processes, Water Quality, Water Quantity	BLM lands	Where appropriate based on local site conditions of the riparian plant community, improve instream complexity by adding key pieces of wood and increase potential large wood recruitment. Emphasize key watershed. Specific sections recommended for large wood placement include 40S-7W-1, 40S-7W-12, & 40S-7W-13 on Sucker Creek and 39S-7W-13 & 39S-7W-24 on Little Grayback Creek.
Riparian Reserve	Fish passage / Culverts / Barriers	Species and Habitat (Aquatic), Human Uses	BLM lands	Improve or replace the 3 culverts on BLM land along the Bear Creek Road (39-7-21). Replace/remove culverts on private land. Stream crossings should be built with natural streambed.

Table VI-2: Recommendations - Riparian Reserve Land Allocation

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
Riparian Reserve	Water Temperature	Water Quality, Species and Habitat (Aquatic)	BLM lands	Wherever early to mid seral stages occur along creeks, reduce stand density to expedite larger tree growth to improve stream shade and temperature for summer rearing for fish and other aquatic organisms. Promote reduction of channel width by additions of structural elements (example: BLM lands, mined flat above Cave Creek per Sucker Creek Water Quality Management Plan, 1998) Seize opportunities to return instream flows to perennial and intermittent streams affected by mining activities.
Riparian Reserve	Sediment management (roads, mining, OHVs)	Human Uses, Erosion Processes, Water Quality	BLM lands	Conduct sediment evaluations and follow TMOs. Corrective measures may include road surface design and reduction of drainage ditch (roads and mining) flow into natural tributaries. Discourage OHV use in riparian areas.
Riparian Reserve	Key Watershed Management	Human Uses, Erosion Processes, Water Quality	BLM lands	Reduce road mileage in the key watershed.
Riparian Reserve	Sedimentation	Aquatic Species and Habitat, Erosion Processes, Water Quality	BLM lands	Reduce spawning or riffle substrate embeddedness to 30% or less and sand content to 20% or less by reduction of fine sediment load and addition of structure.
Riparian Reserve	Instream flows	Species and Habitats	Watershed Wide	Work with watershed council, agencies and private landowners to improve water utilization, create fish-friendly water diversions, maintain instream flows, and minimize aquatic resource impacts.
Riparian Reserve	Water Diversion	Species and Habitats	Watershed Wide	Improve diversion points for screening and fish passage. Improve water withdrawal systems to increase efficiency and reduce over allocation of water. Follow the recommendations in the WQMP.
Riparian Reserve	Late-successional forest	Species and habitats	BLM lands	The existing natural late-successional forest stands in the riparian reserves of section 39-7W-12 may provide a template to guide prescriptions in other adjacent stands as well as riparian reserves throughout the watershed.

Table VI-3: Recommendations – Late-successsional Reserve Land Allocation				
Land Alloc.	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
LSR	Special Status/Survey & Manage Plants	Species and Habitat (Botany)	Watershed Wide	Implement management strategies to maintain/improve these species habitats using such techniques as prescribed fire.
LSR	Spotted Owl Habitat	Species and Habitat	LSR wide	In spotted owl activity centers where less than 40% of the home range is suitable habitat, maintain and develop late-successional forest conditions. In spotted owl activity centers where more than 40% of the home range is suitable habitat, attempt to increase the habitat available with thin stands less then 80 years of age, to accelerate the development of older-forest components.
LSR	Late-Successional Forest Habitat	Species and Habitats	T39S R7W Sections 1,12,13	Forest management activities should emphasize young stand management as a priority (< 50 years) (See young stand management recommendations)
LSR	Vegetation	Vegetation	LSR	Present indications are that the watershed will require extensive density management (thinning) in both natural and planted stands. General objectives for the thinning include reduction of total number of stems, species selection to provide a species mix that more closely resembles that which was thought to occur prior to fire exclusion and logging, and fuels management (prescribed fire) to reduce the activity fuels (slash) created via the density management.
LSR	Young Stand Management	Vegetation	LSR	Concentrate habitat development work in young stands where the greatest potential to grow and maintain late-successional habitat exists. Emphasize creation of snags, down wood and shade-intolerant hardwood components. Leave 10% of the areas untreated to provide diversity pockets. North aspects have the highest priority.
LSR	Young Stand Management	Vegetation	T39S R7W Sections 1,12,13	Forest management activities should emphasize young stand management as a priority (< 50 years). Pursue a young stand management plan (brushing, precommercial thinning, hand piling and burning the resulting slash) in natural stands as well as old clearcuts. Prioritize treatments based on site quality, not simply on whether or not the area has been clearcut. The best sites get the first treatment(s). "Link" treatments over time culminating in desired future condition. Prioritize treatments to address the young stands in the riparian reserves to accelerate their succession to larger trees and later successional conditions. Prioritize by the health of the riparian area. Long-term goal is to increase connectivity with Northern Spotted Owl (NSO) activity centers. Example: stand initiation (new age class) to initial canopy closure of the desired number of trees by species per acre. This would incorporate multiple treatments over a 10 to 20-year project window and enhance planning/budgeting efforts. Encourage canopy layering, non-tanoak hardwood development and retention, tighter spacing in hardwoods with priority for multiple stem (multiple canopy development). Implement multiple thinning prescriptions in individual units and incorporate no-treatment areas.

Table VI-3: Recommendations – Late-successsional Reserve Land Allocation

Land Alloc.	Issue / Concern	Related Core Topic	Location	Recommendation
LSR	Coarse Woody Debris	Species and Habitat, Soil Productivity	LSR wide	Promote recruitment of snags and down wood as a routine management practice. Use CWD levels outlined by Jimerson et al. (1995).
LSR	Transportation	Restoration/ Resource Protection	LSR wide	Consider and maintain access needed for LSR restoration, stand management, fire protection, etc.
LSR	High Value Areas at risk	Fire	Watershed Wide	Reduce fuel hazard in or adjacent to high value area at risk stands. Objective would be to preserve these stands in the short term from loss to wildfire.

Table VI-4: Data Gaps

Core Topic	Data Gaps
Soils	- Soil erosion sources have not been mapped or specified for location or mechanism. There is no information specific to this watershed regarding soil dependent biological communities. - Field surveys for mass movement features in areas mapped with high susceptibility have not been completed. Also field survey for areas with streambank erosion features. Inventory and monitor for compaction and disturbance features, check for indicators of changes in productivity. -The extent of compaction in this watershed is not quantified for BLM and private lands.
Vegetation	- Plant series data needs to be combined with vegetative condition class to determine management opportunities. For example, information on the amount of acres in the Douglas-fir series is available as is information on the amount of pole stands, but not Douglas-fir pole stands. A second example could be acres of ponderosa pine and white oak being encroached upon by Douglas-fir that require restoration treatments. - Stand exams were taken in 1996 but over the past 9 years tanoak has likely increased but this has not been quantified.
Fire	- A list of smoke-sensitive area residents (for prescribed burning) does not exist for use in burn notification. - BLM does not have the data for fire hazard, wildland fire risk, values at risk, or fuel models for FS lands
Botany	- A comprehensive survey of special status plants (both vascular and nonvascular) has not been completed in the watershed. - A comprehensive analysis of special status plant species and sites (both vascular and nonvascular) in the watershed has not been completed. - Rare fungi surveys have not been completed. Limited information exists on fungi in the watershed (species, occurrences, rare fungi, etc) - Effectiveness of past protection measures for rare plant sites. - Noxious weeds: Systematic surveys have been not been conducted. - Weed treatment effectiveness monitoring results are lacking.
Fisheries	- Comprehensive surveys to monitor relative abundance and distribution of fish species and to classify all streams are needed. Continue benthic macroinvertebrate surveys. Repeating such surveys at 5-10 year intervals would provide better baseline information and trend identification. - Monitor water withdrawal sites for fish passage and proper screening. -GIS fish layer has not been updated with recent surveys
Hydrologic / Riparian / Stream inventory	- Comprehensive information regarding headwater conditions for streams relative to sediment production, water contribution and riparian potential does not exist. - Quantitative stream flow data for Sucker Creek is not current. There is no stream flow data being taken for its tributaries. - No quantification of hydrologic conditions indicating cumulative effect conditions (e.g., extent of equivalent clear cut area, compacted area, TSZ) has been performed for Sucker Creek -GIS hydro layer has not been updated with recent surveys
Wildlife	- Relatively few formal wildlife surveys have been conducted in the watershed. Distribution, abundance and presence of the majority of the species are unknown. Presence / absence information for most special status species is unknown. There exists little information on special status species habitats and condition of these habitats in the watershed. Location of unique habitats such as wallows, mineral licks, and migration

Table VI-4: Data Gaps

Core Topic	Data Gaps
	corridors are for the most part unknown.
Human Use	- Roads: BLM noncapitalized roads and skid trails have not been inventoried. - The last TMO inventory was in 2000. Update TMOs as road conditions change. - Recreation: There has been no comprehensive inventory of the amount or type of recreational use of the area. Not all dispersed recreation trails and mining ditches have been inventoried and mapped. - Mining: A comprehensive inventory of mining shafts / adits has not been done to determine access and safety issues. - Cultural: A comprehensive survey of cultural resources has not been conducted for the watershed. - Special forest products use data is incomplete -OHV trails have not been inventoried or mapped.

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Appendix A: Maps

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Map 3: Government (BLM) Ownership
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Map 6: (Vegetation) Seral Stage on BLM Lands
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Map 15: Fire Risk Rating (non-Forest Service)
Map 16: Fire Fuel Models (non-Forest Service)
Map 17: Fire Value Rating (non-Forest Service)
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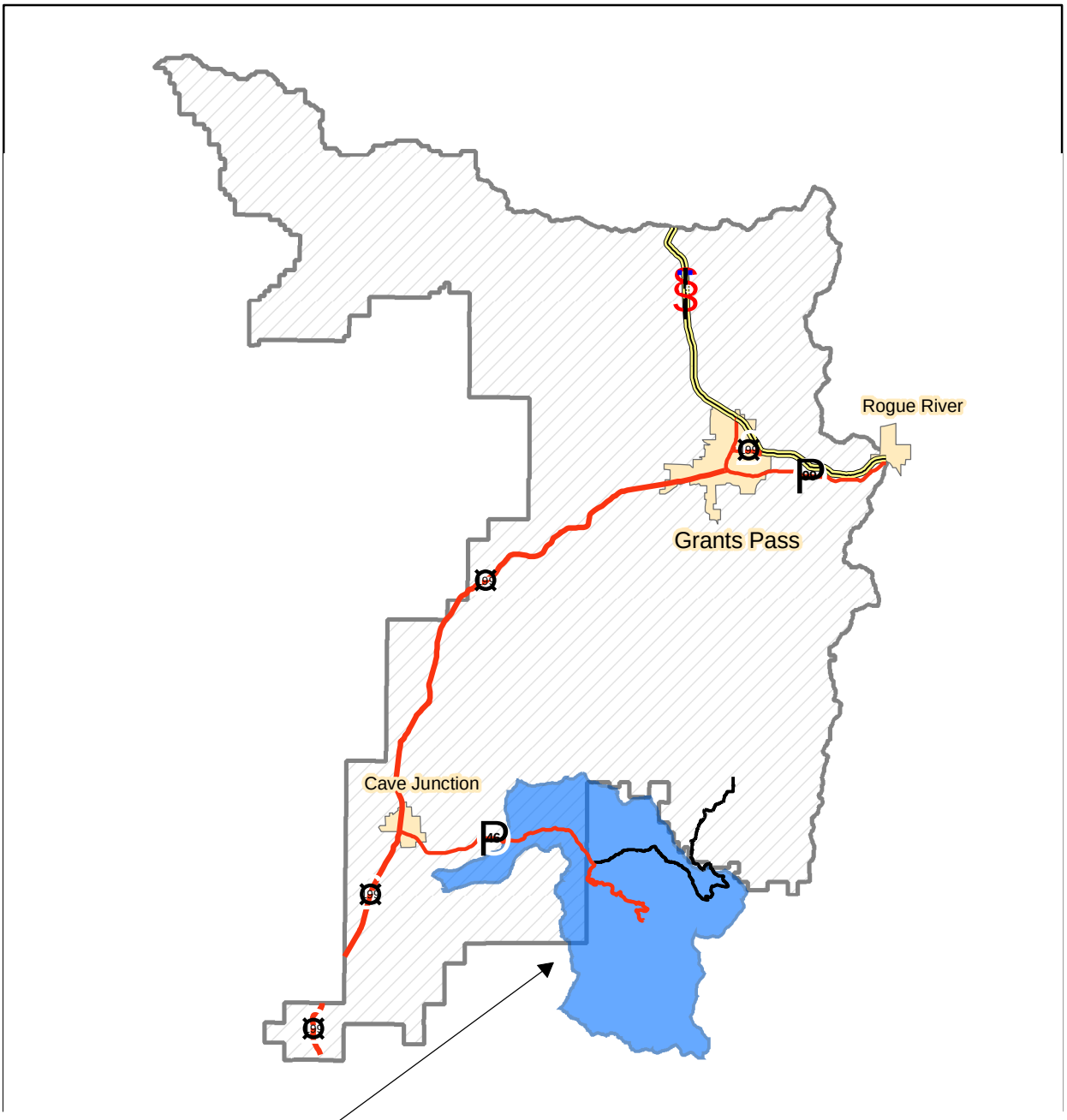
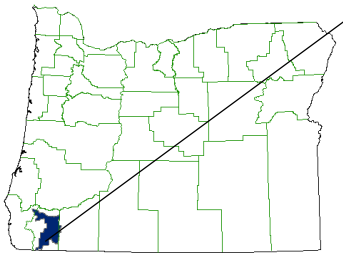
Map 19: Threatened and Endangered Plants
Map 20: General Soil Types (non-Forest Service)
BLM Roads in Sucker Creek Watershed Map (Recommended TMOs)





SUCKER CREEK HYDROLOGIC UNIT BOUNDARY LOCATION

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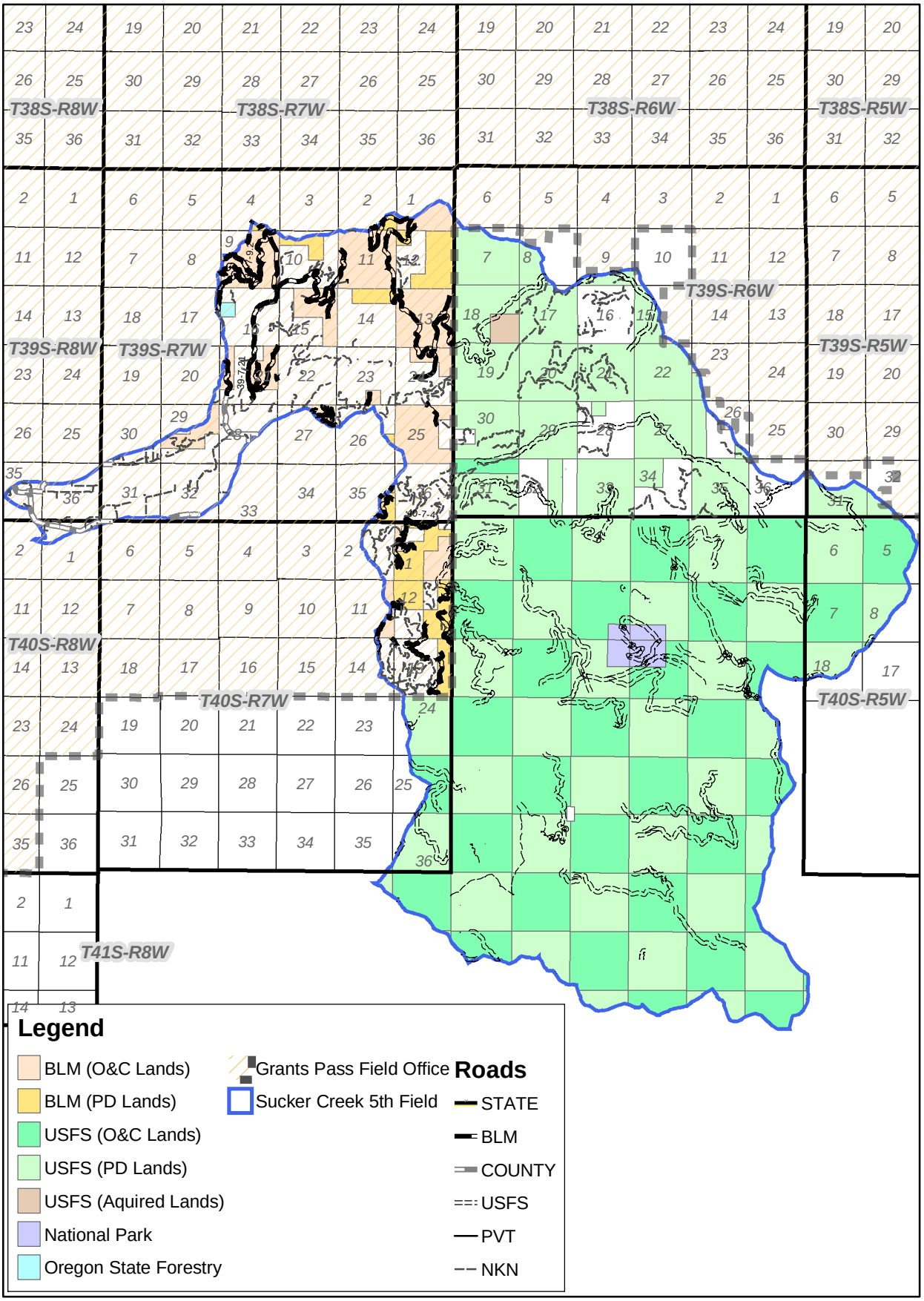

SUCKER CREEK WATERSHED

Map 2
Government Ownership

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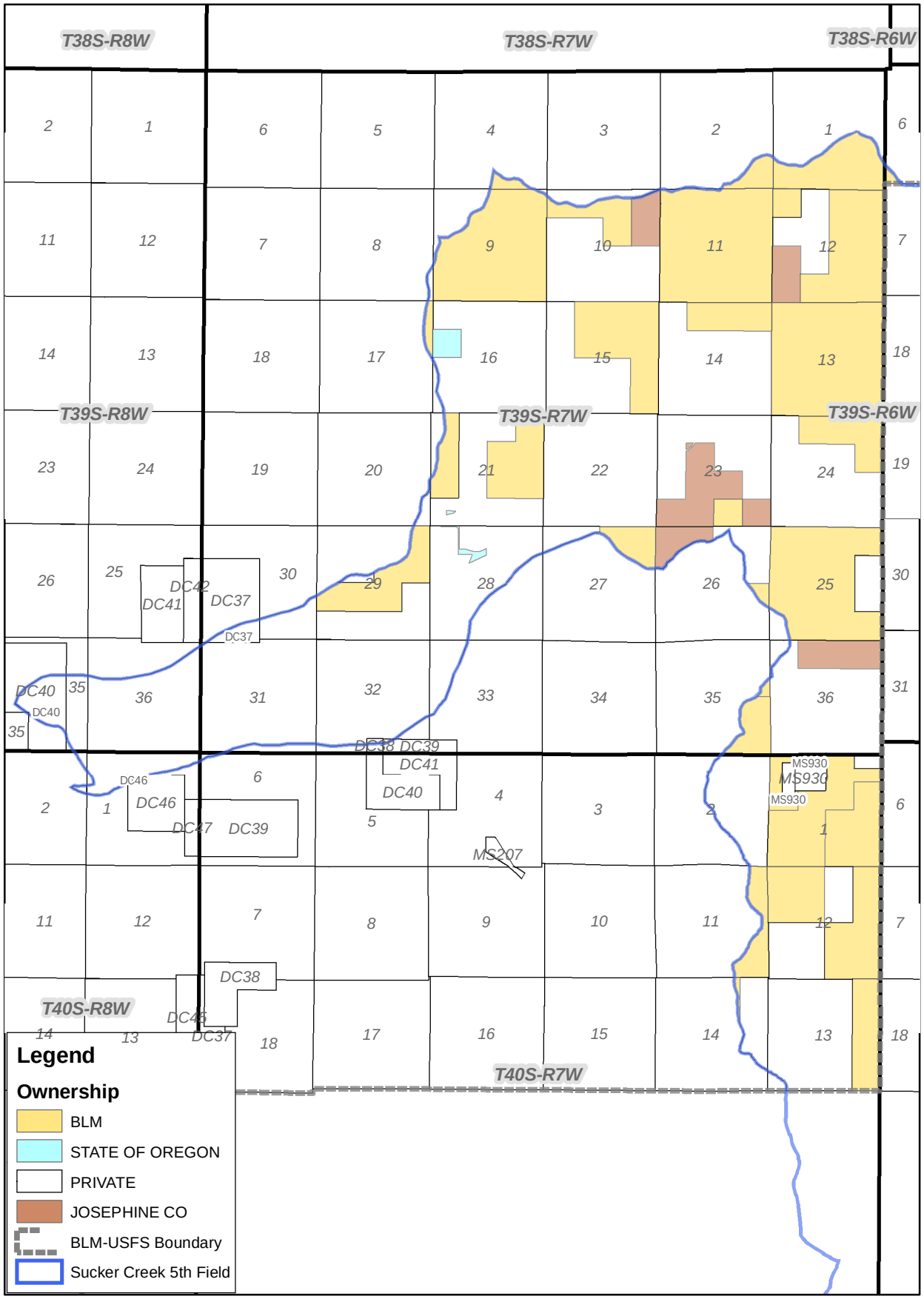

SUCKER CREEK WATERSHED

Map 3
Government Ownership

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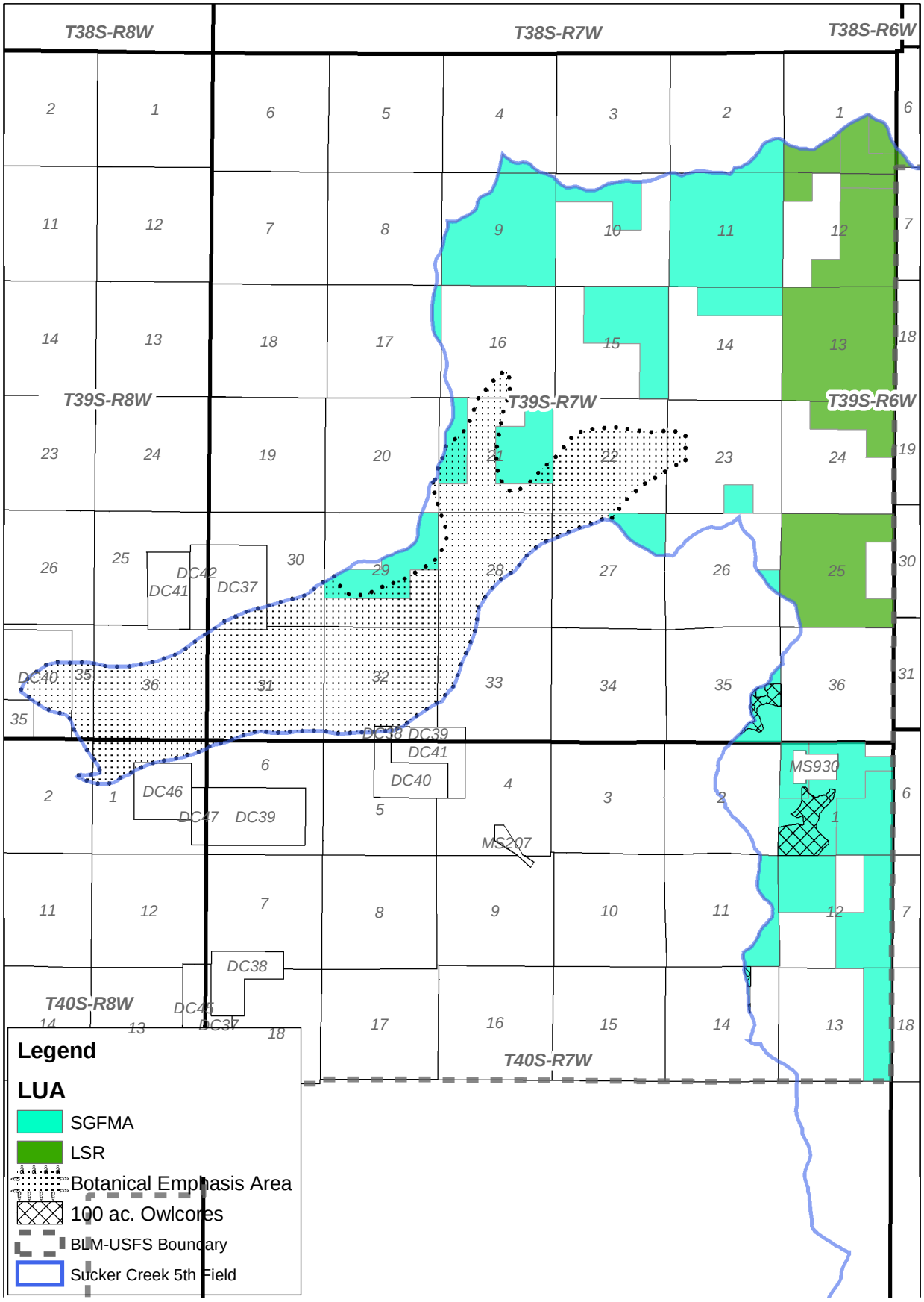

SUCKER CREEK WATERSHED

Map 4
Land Use Allocations

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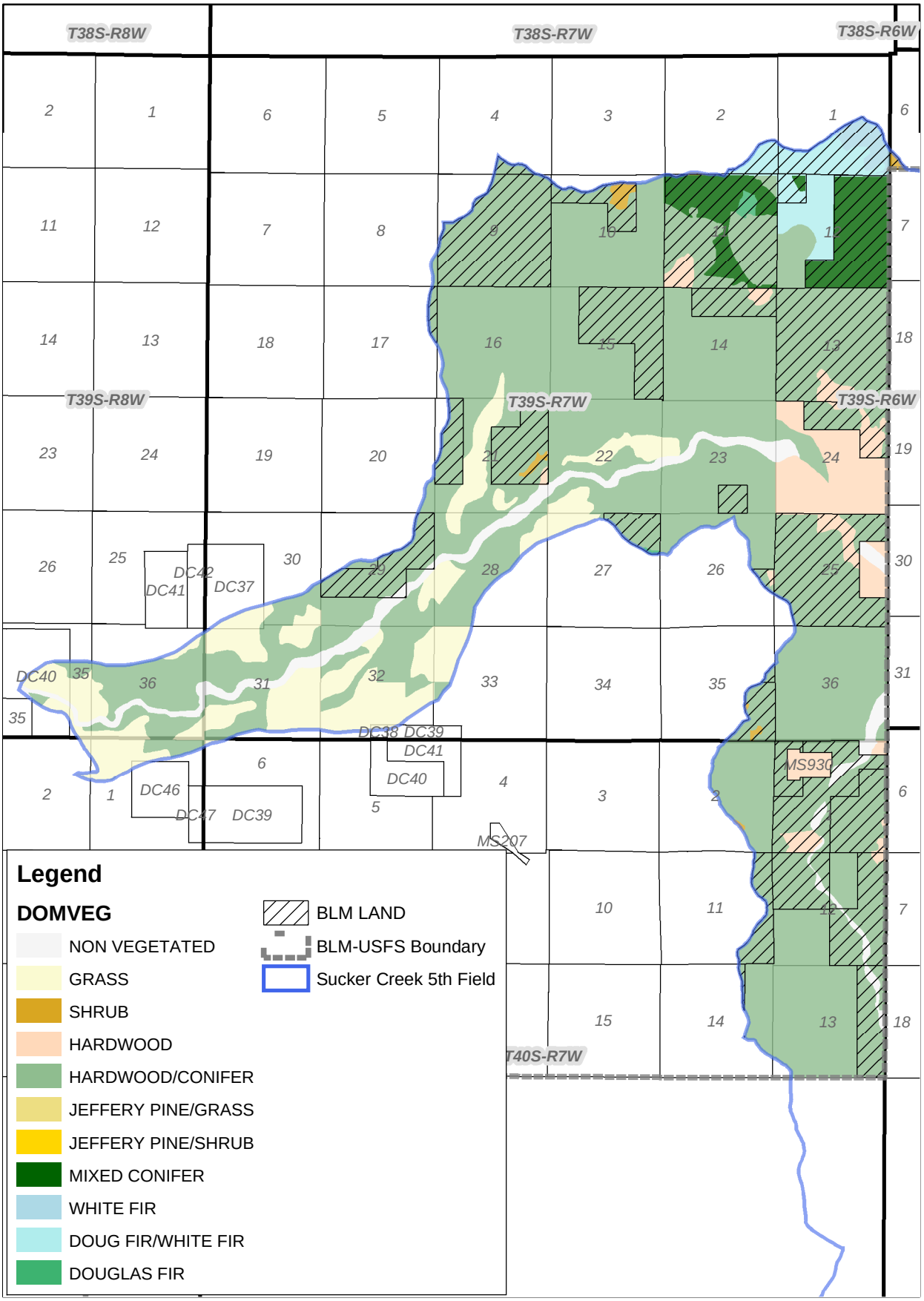

SUCKER CREEK WATERSHED

Map 5
Dominant Vegetation

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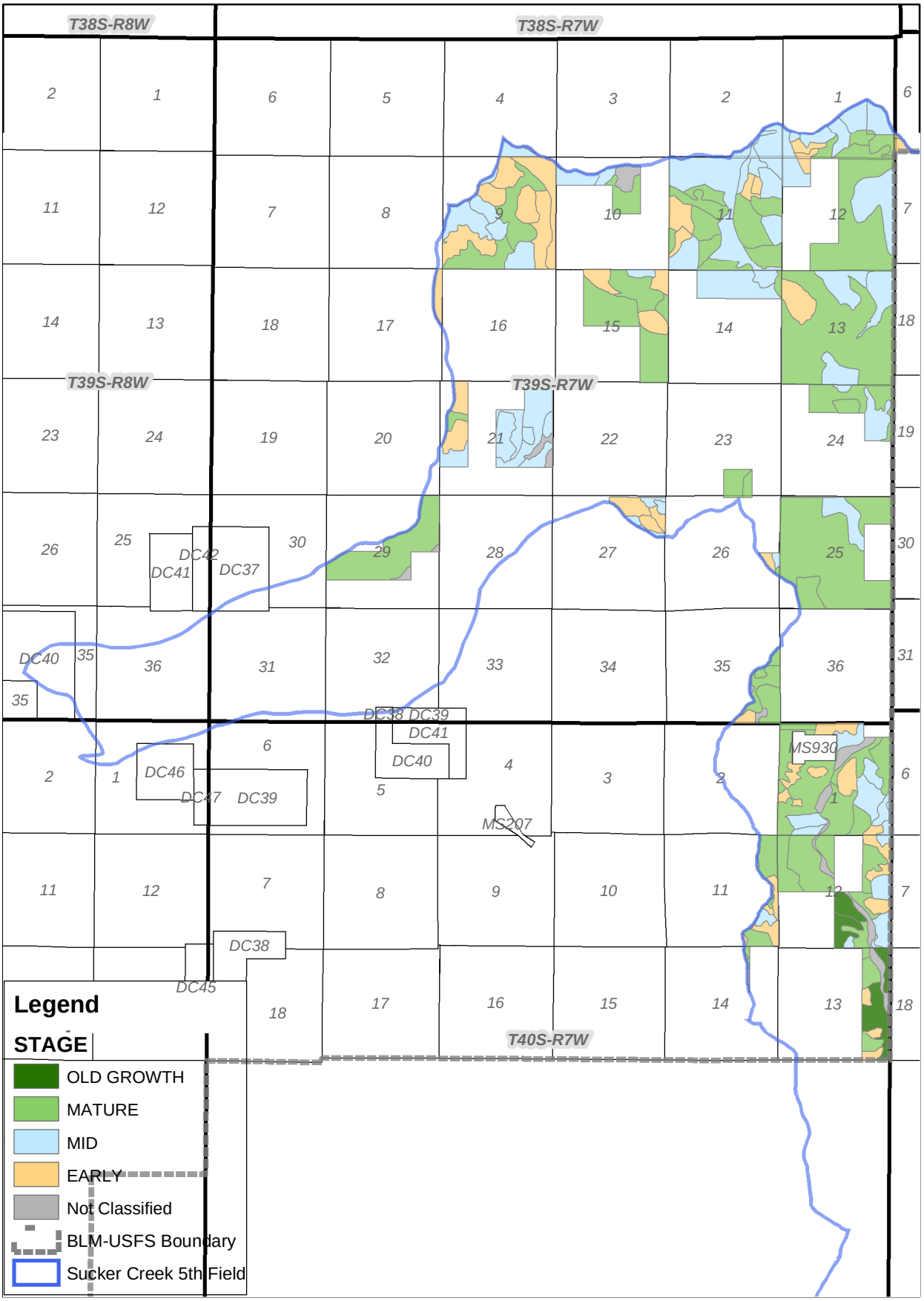

SUCKER CREEK WATERSHED

Map 6
Seral Stage on BLM Lands

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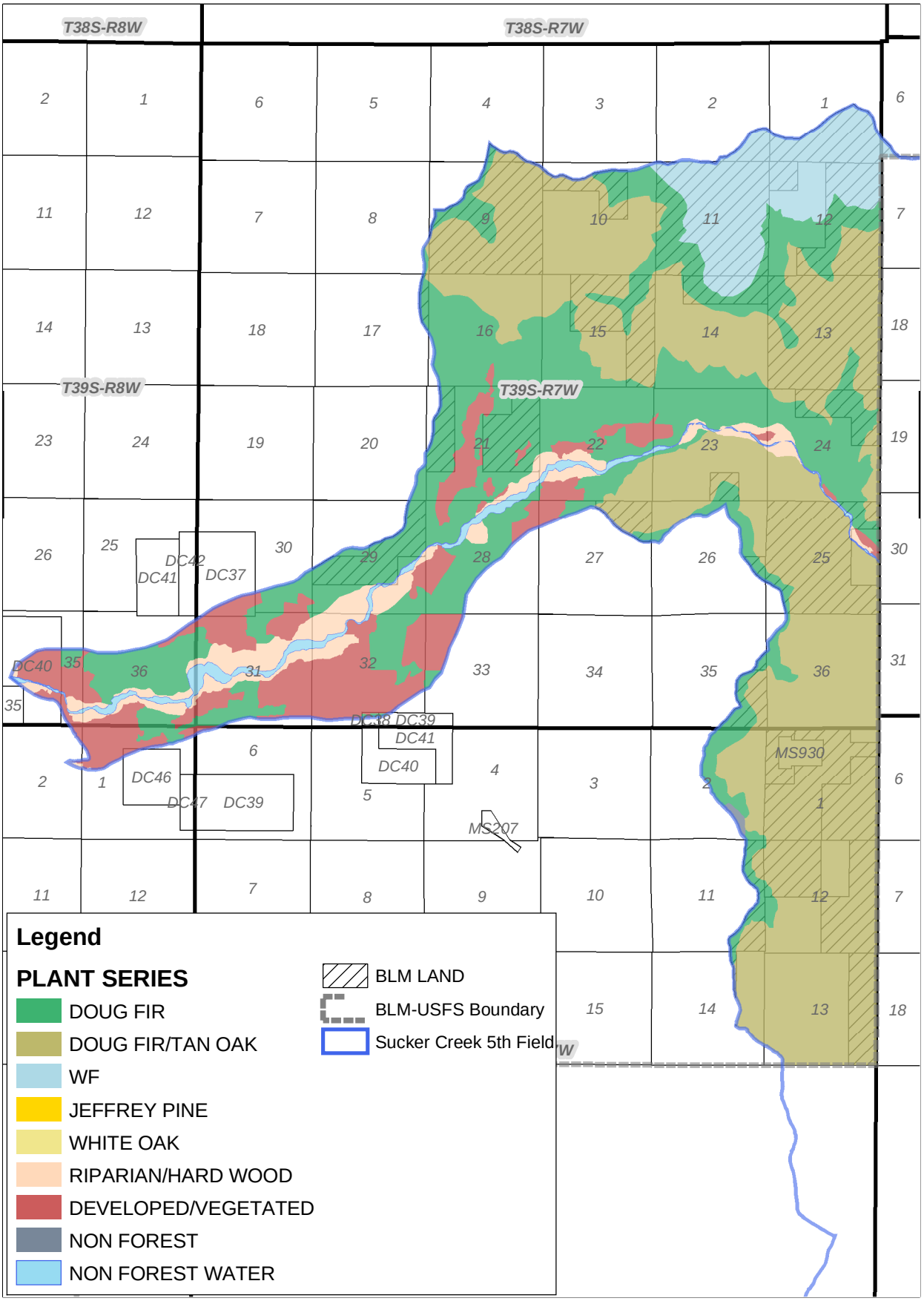

SUCKER CREEK WATERSHED

Map 7
Plant Series

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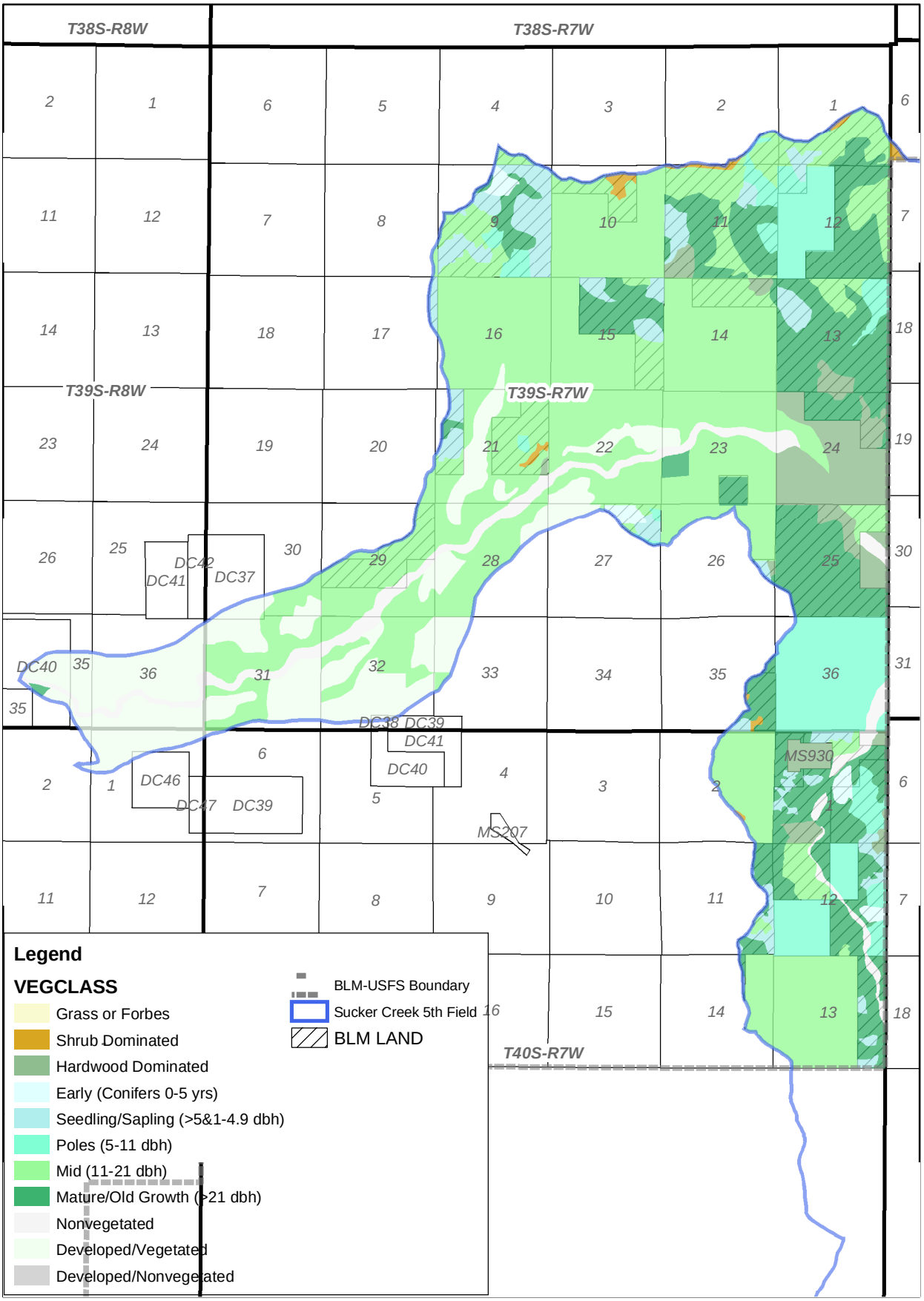

SUCKER CREEK WATERSHED

Map 8
Vegetative Condition Class

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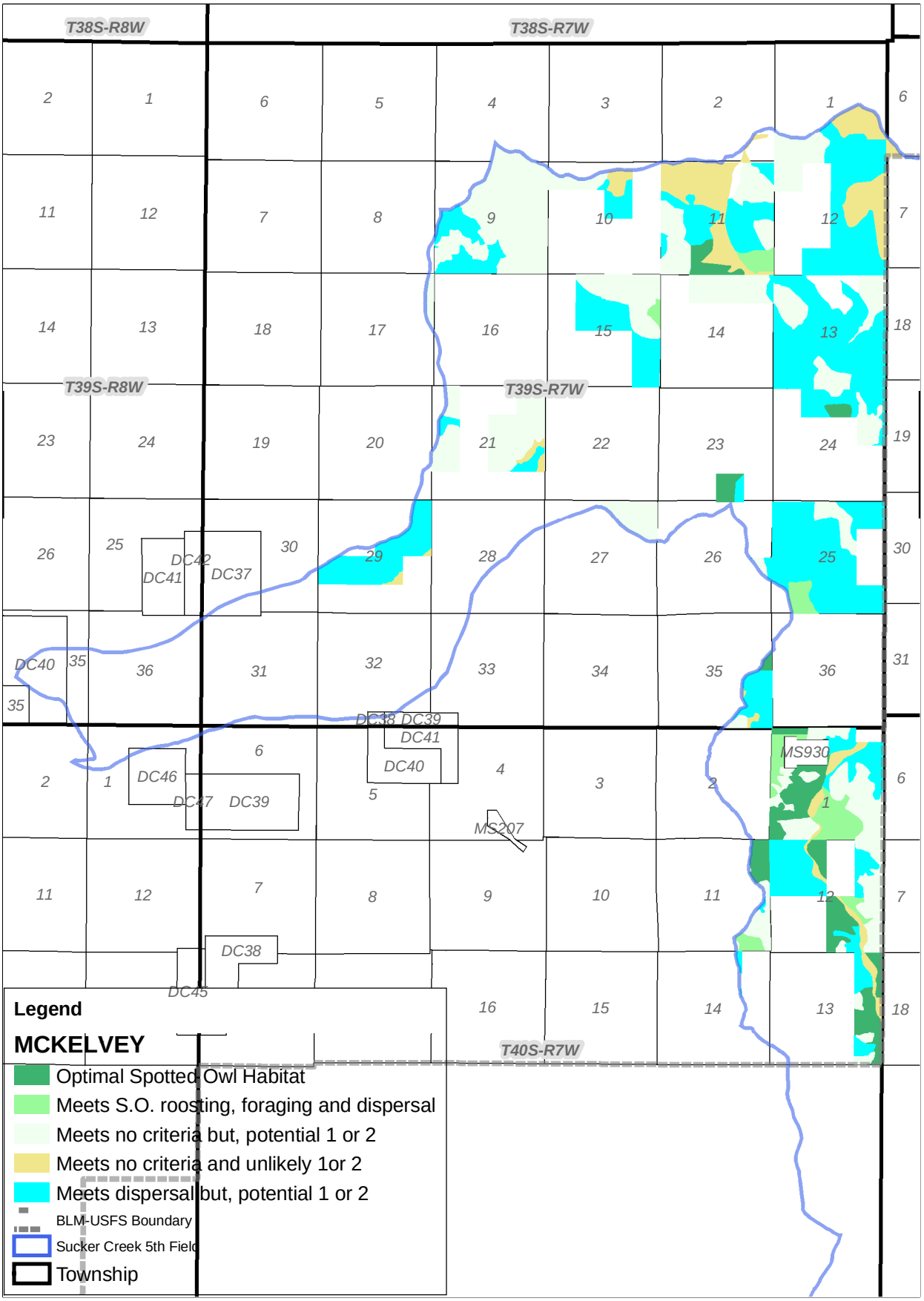

SUCKER CREEK WATERSHED

Map 9
Spotted Owl Habitat

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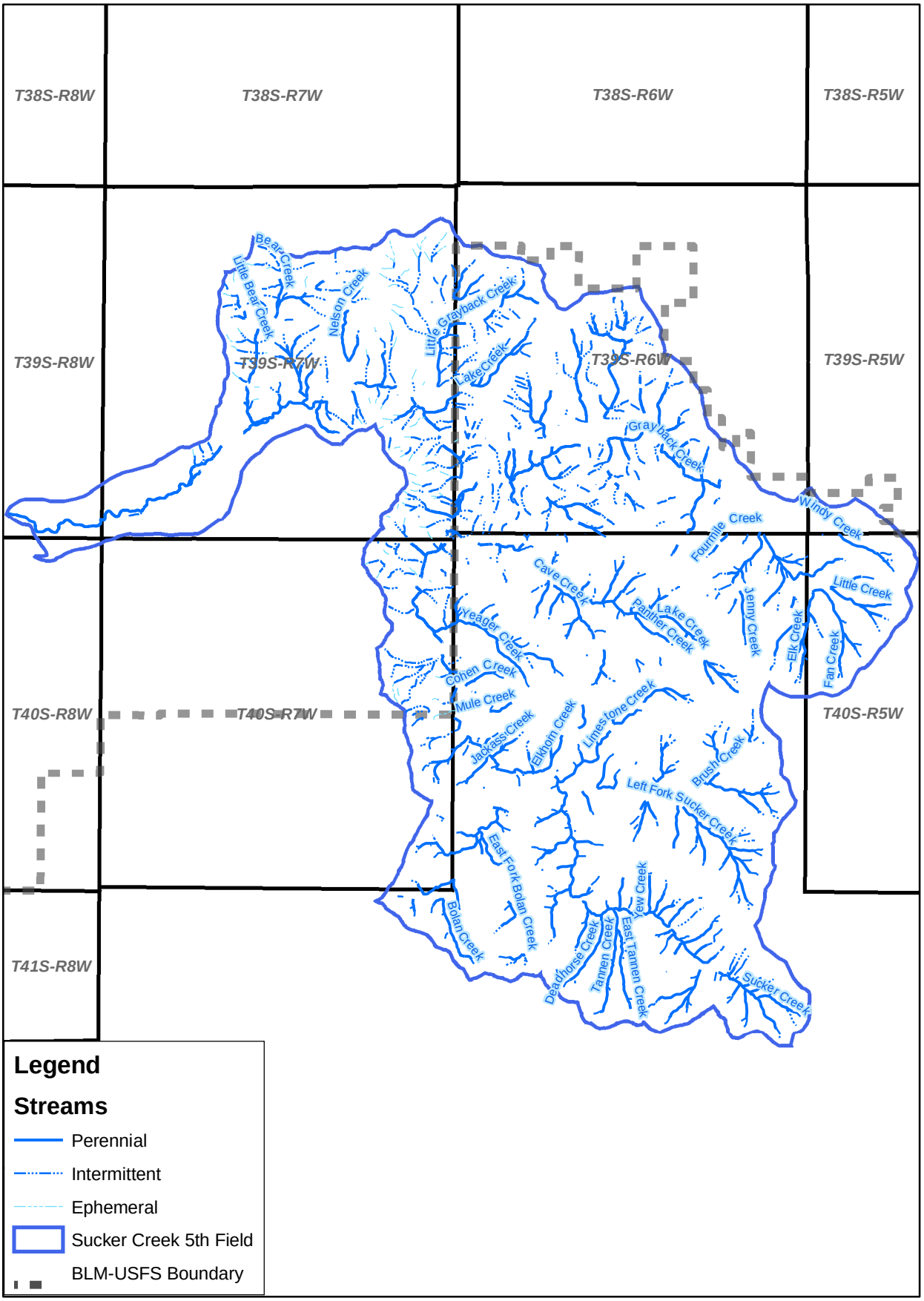

SUCKER CREEK WATERSHED

Map 10
Streams Planflow

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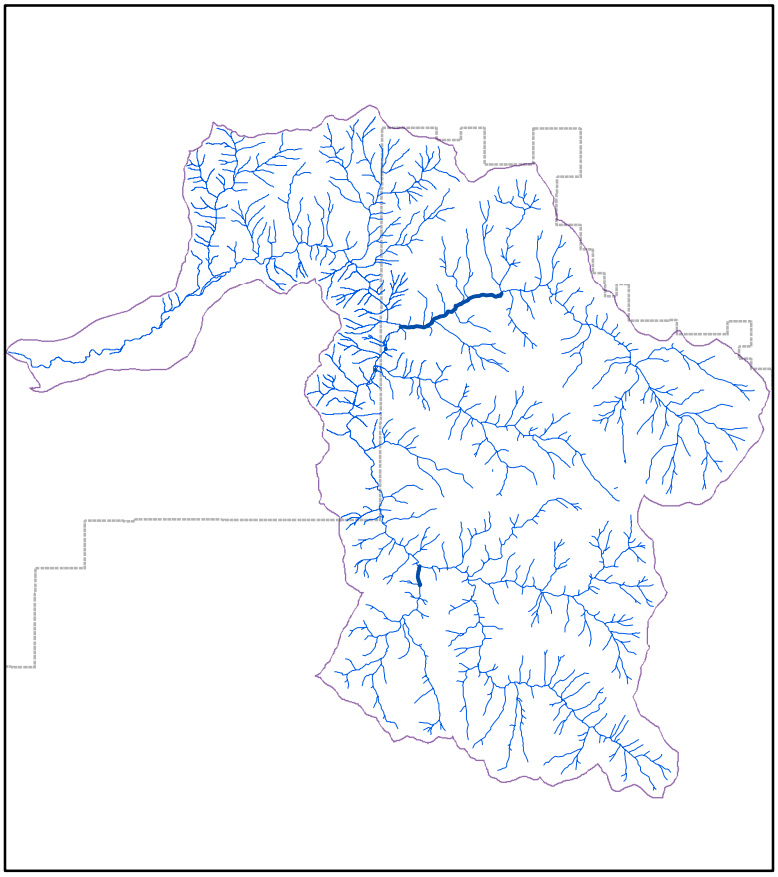

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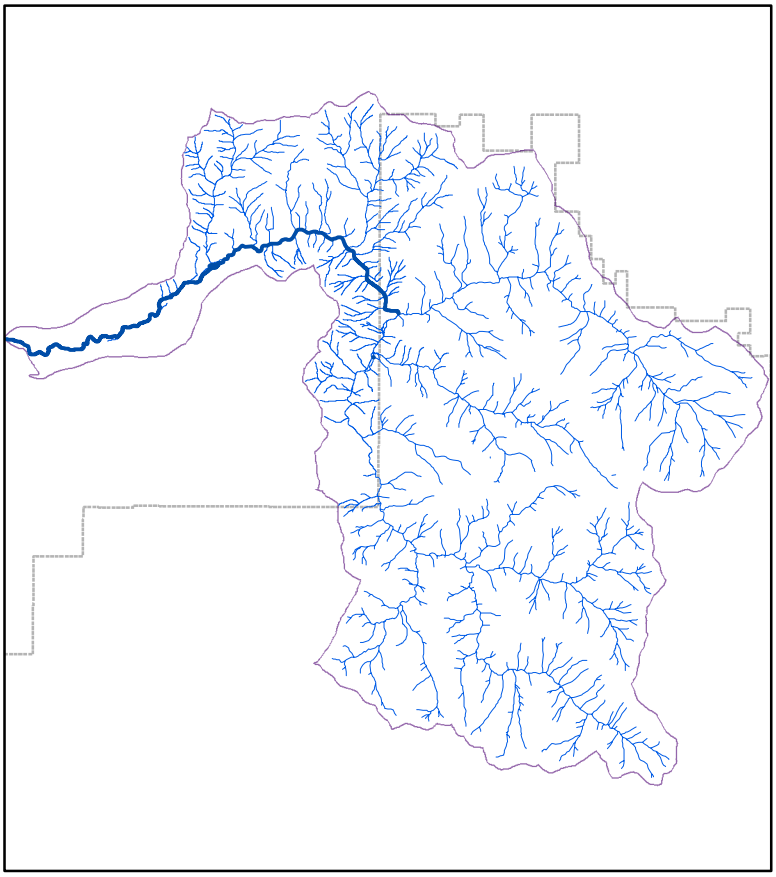

Legend

- *Distribution of fish*
- Streams
- Sucker Creek 5th Field
- BLM-USFS Boundary

SUCKER CREEK WATERSHED

Map 11

Distribution of COHO & CHINOOK Salmonids

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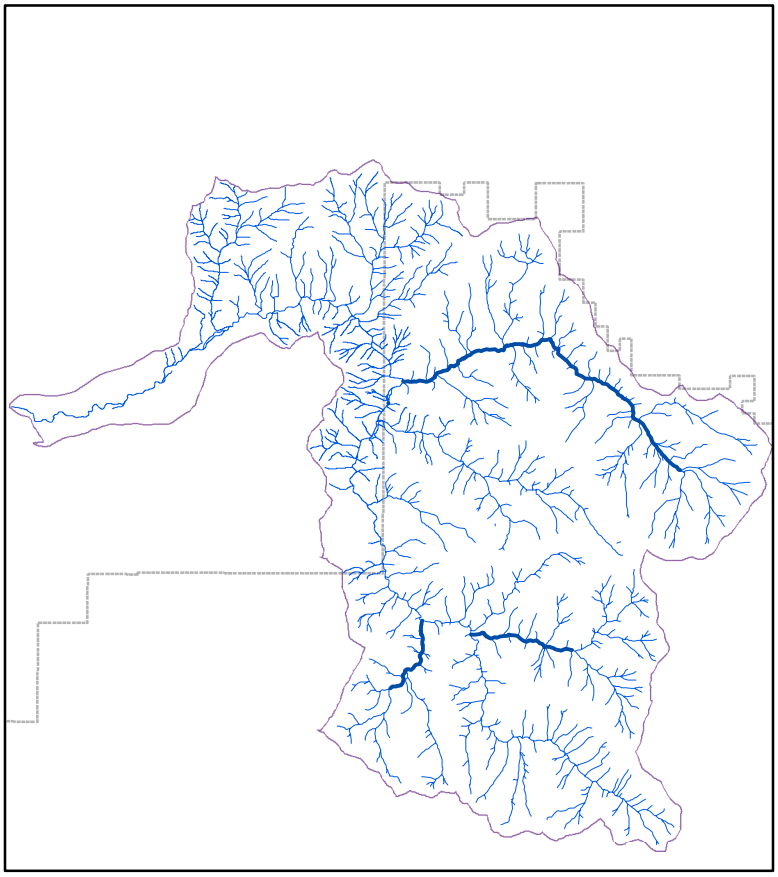
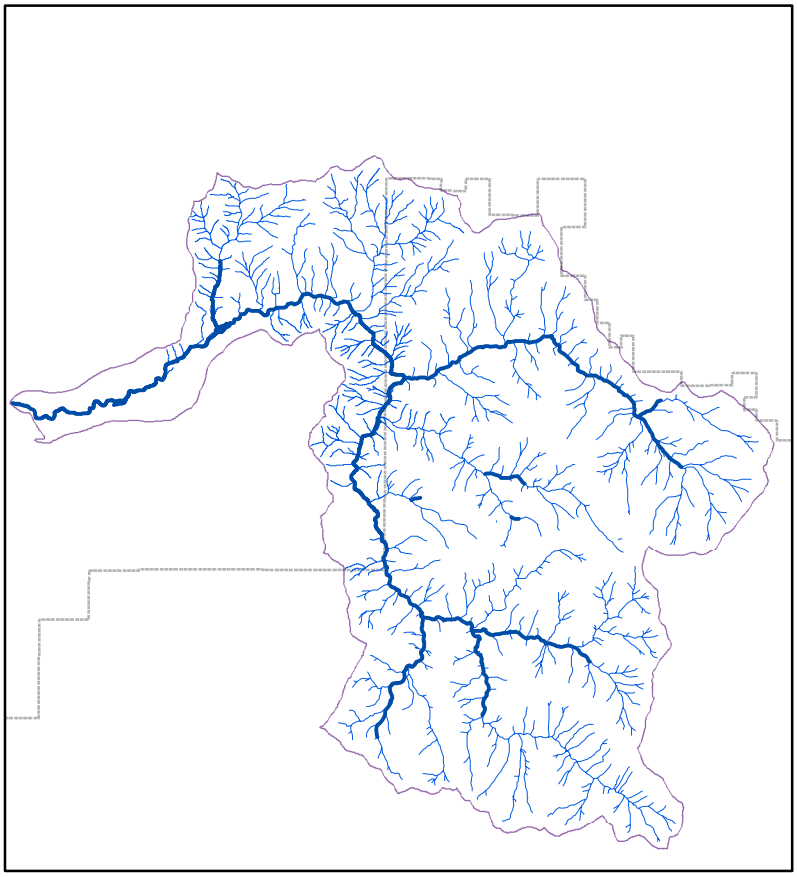
STEELHEAD



CUTTHROAT



Legend

- *Distribution of fish*
- Streams
- Sucker Creek 5th Field
- BLM-USFS Boundary

SUCKER CREEK WATERSHED

Map 12

Distribution of STEELHEAD & CUTTHROAT

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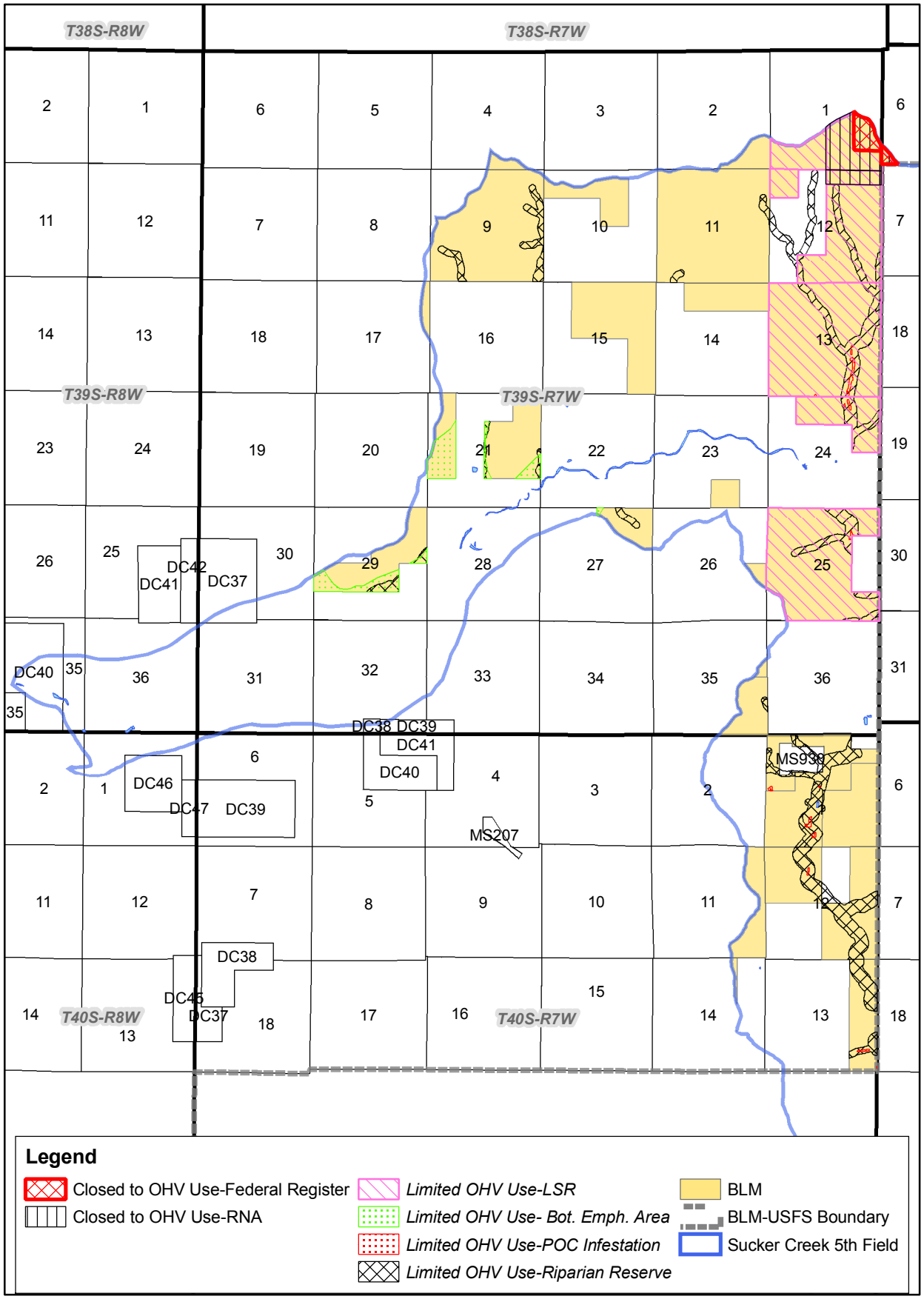

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SUCKER CREEK WATERSHED

Map 13
OHV Allocations

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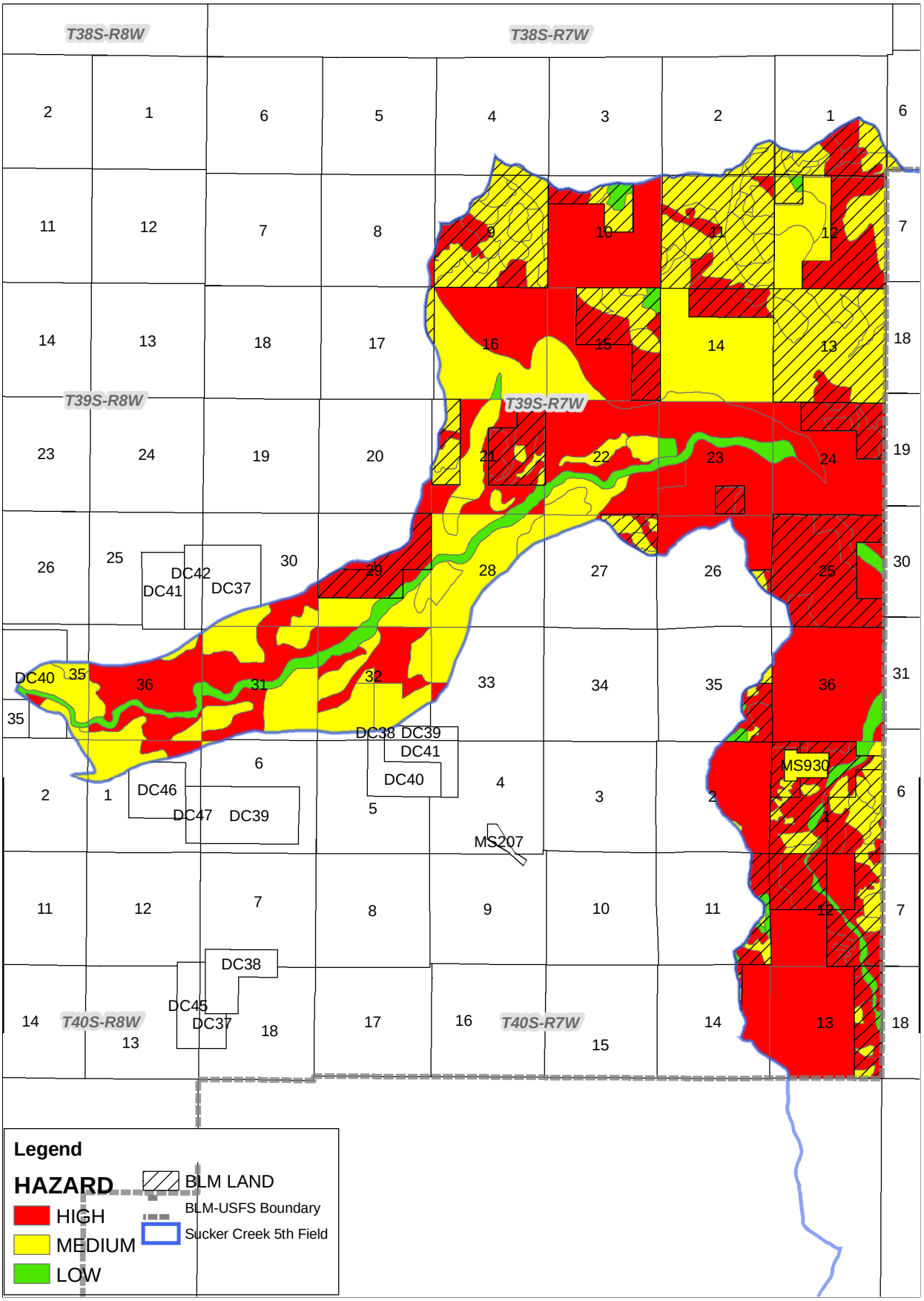

SUCKER CREEK WATERSHED

Map 14
Fire Hazard Rating

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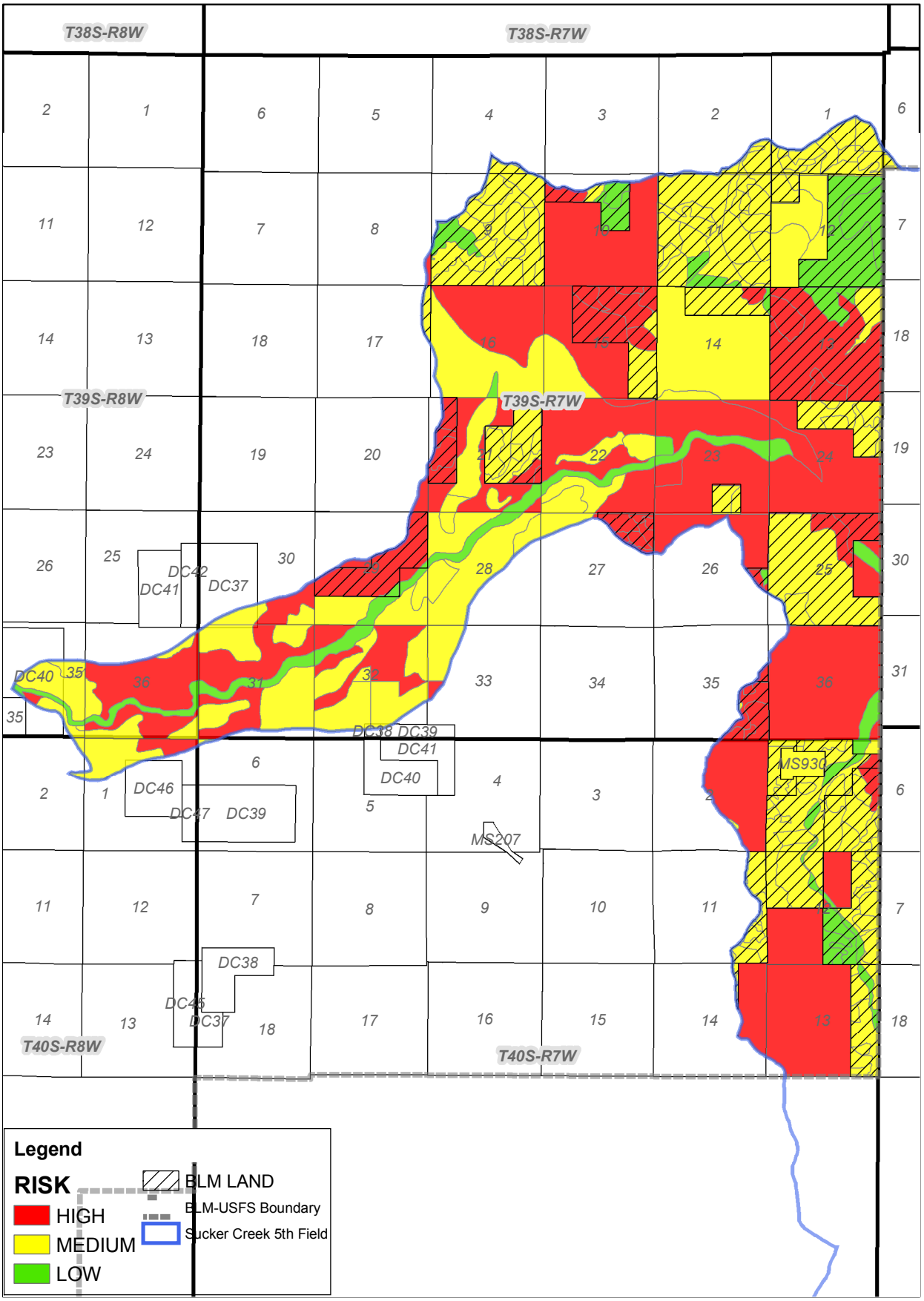

SUCKER CREEK WATERSHED

Map 15
Fire Risk Rating

1:80,000

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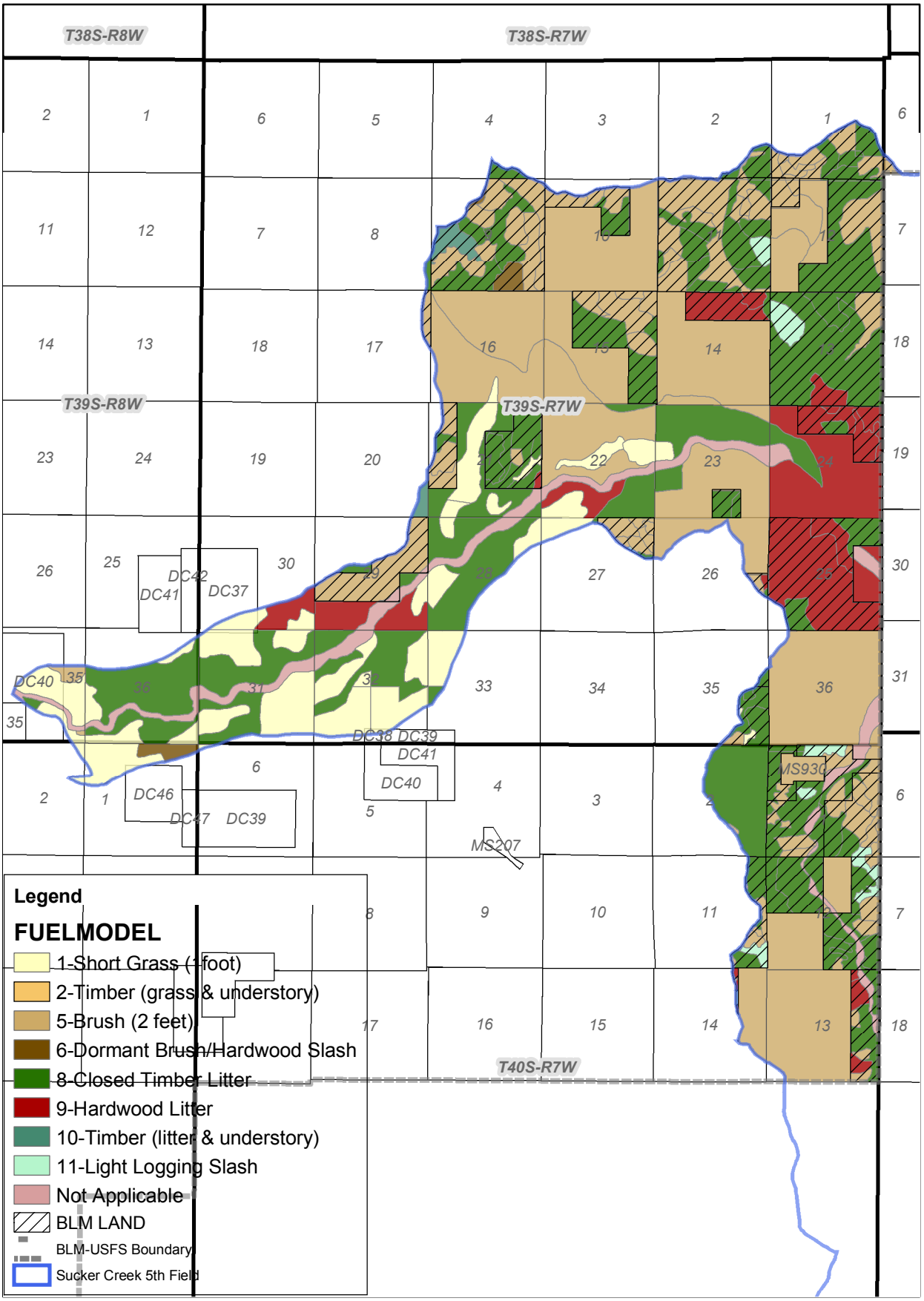

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SUCKER CREEK WATERSHED

Map 16
Fire Fuel Models

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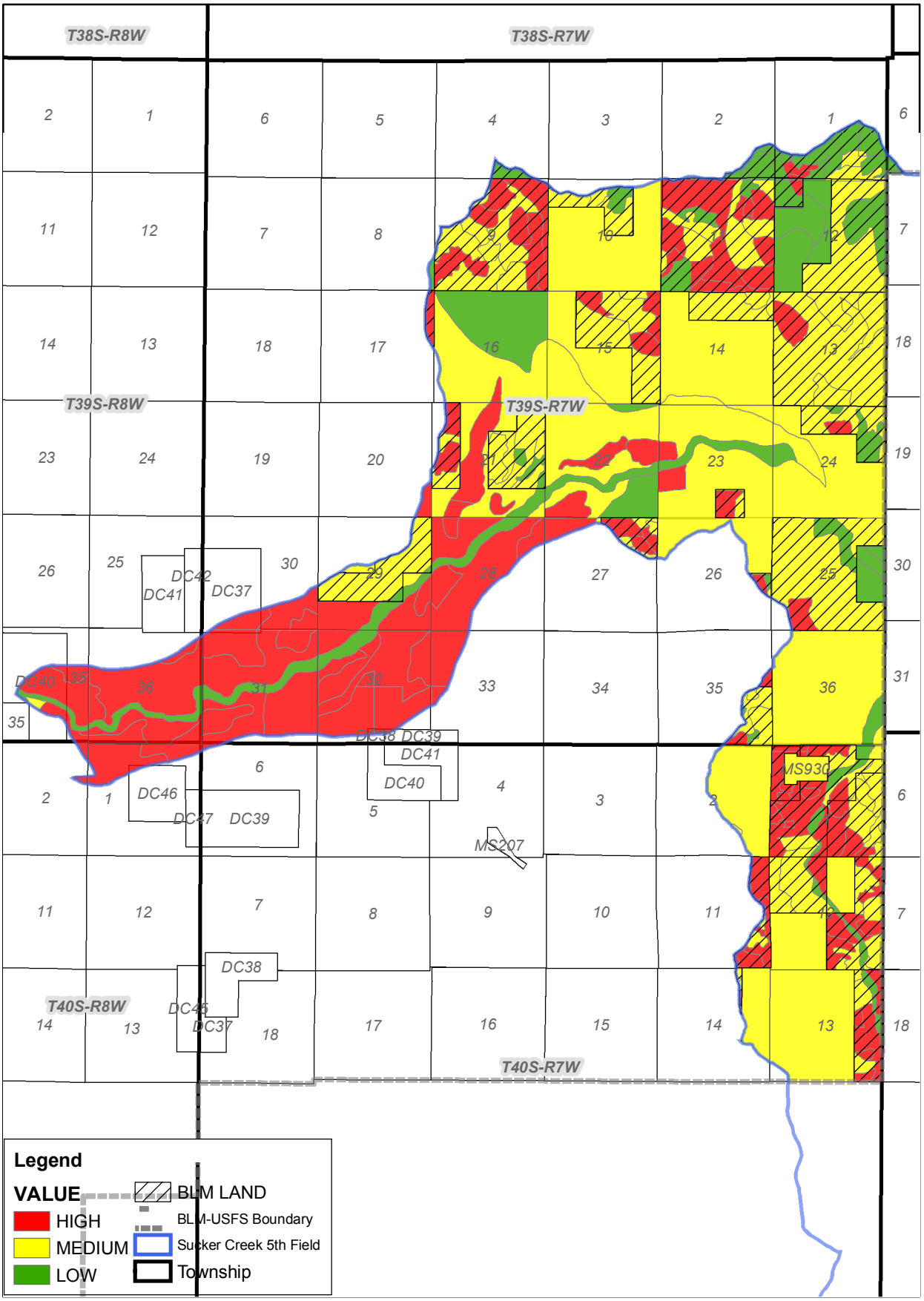

BLM PORTION SUCKER CREEK WATERSHED

Map 17
Fire Value Rating

1:80,206

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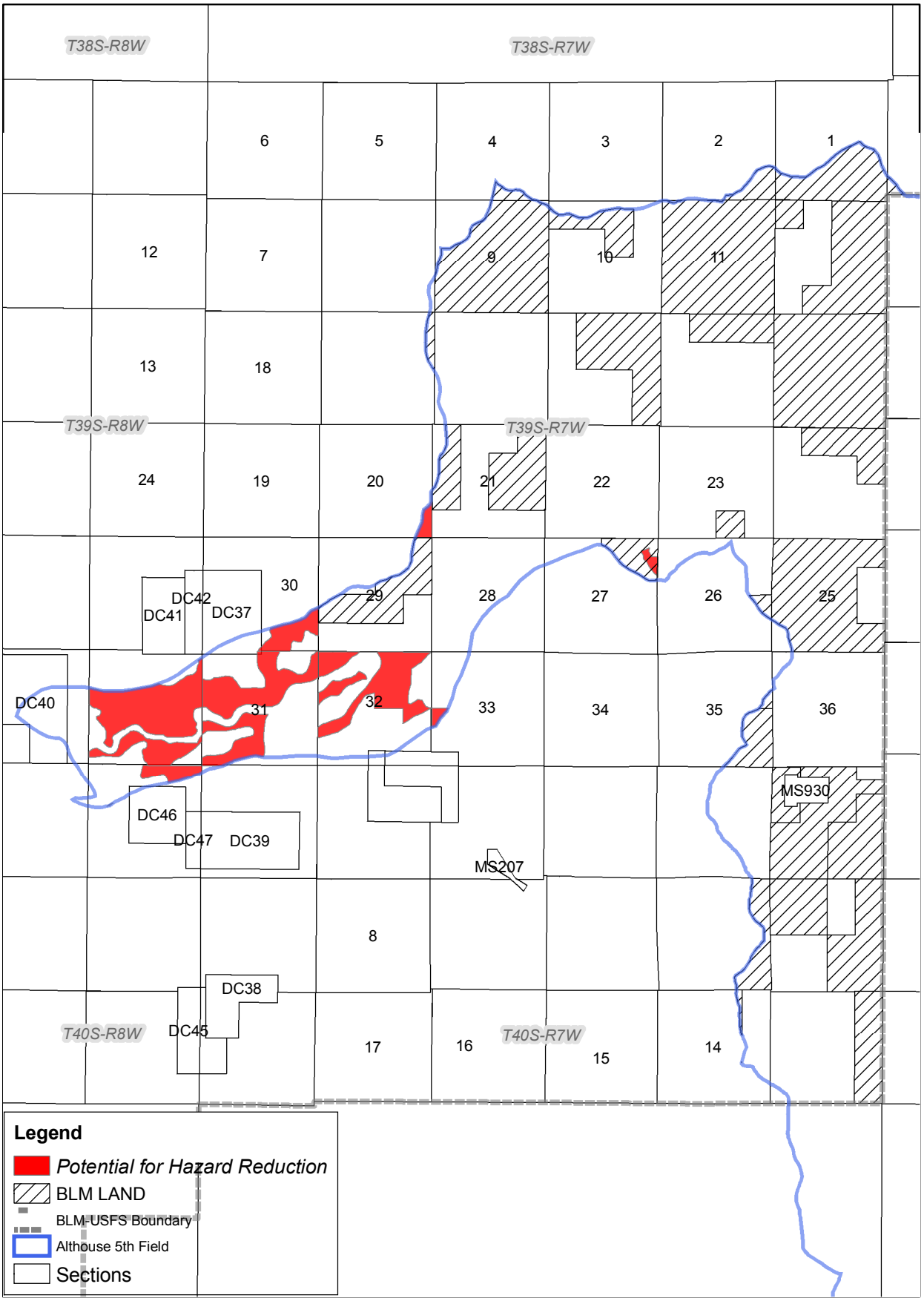

SUCKER CREEK WATERSHED

Map 18

Potential High Priority Hazard Reduction Treatment Areas

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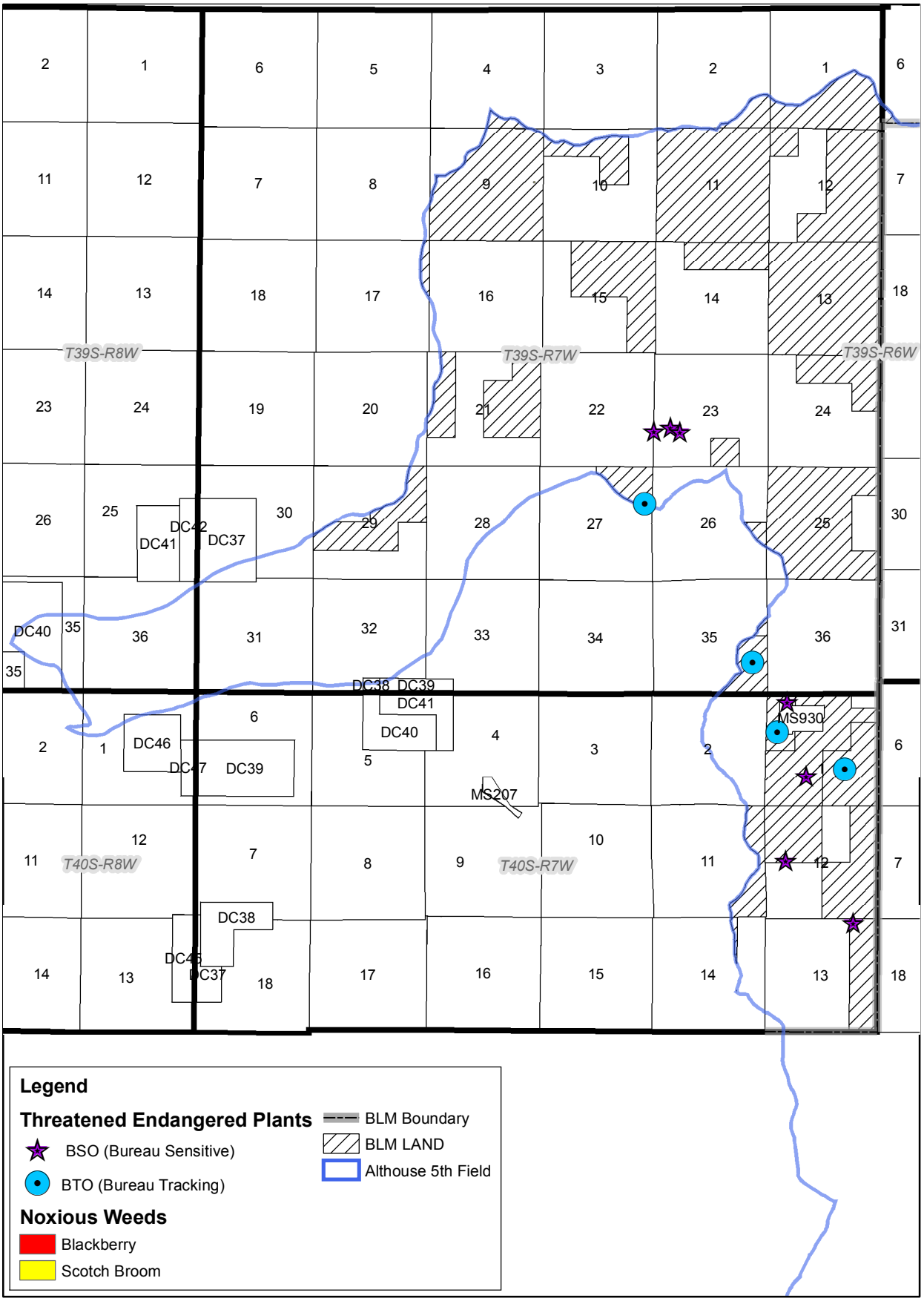

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SUCKER CREEK WATERSHED

Map 19
Threatened and Endangered Plants

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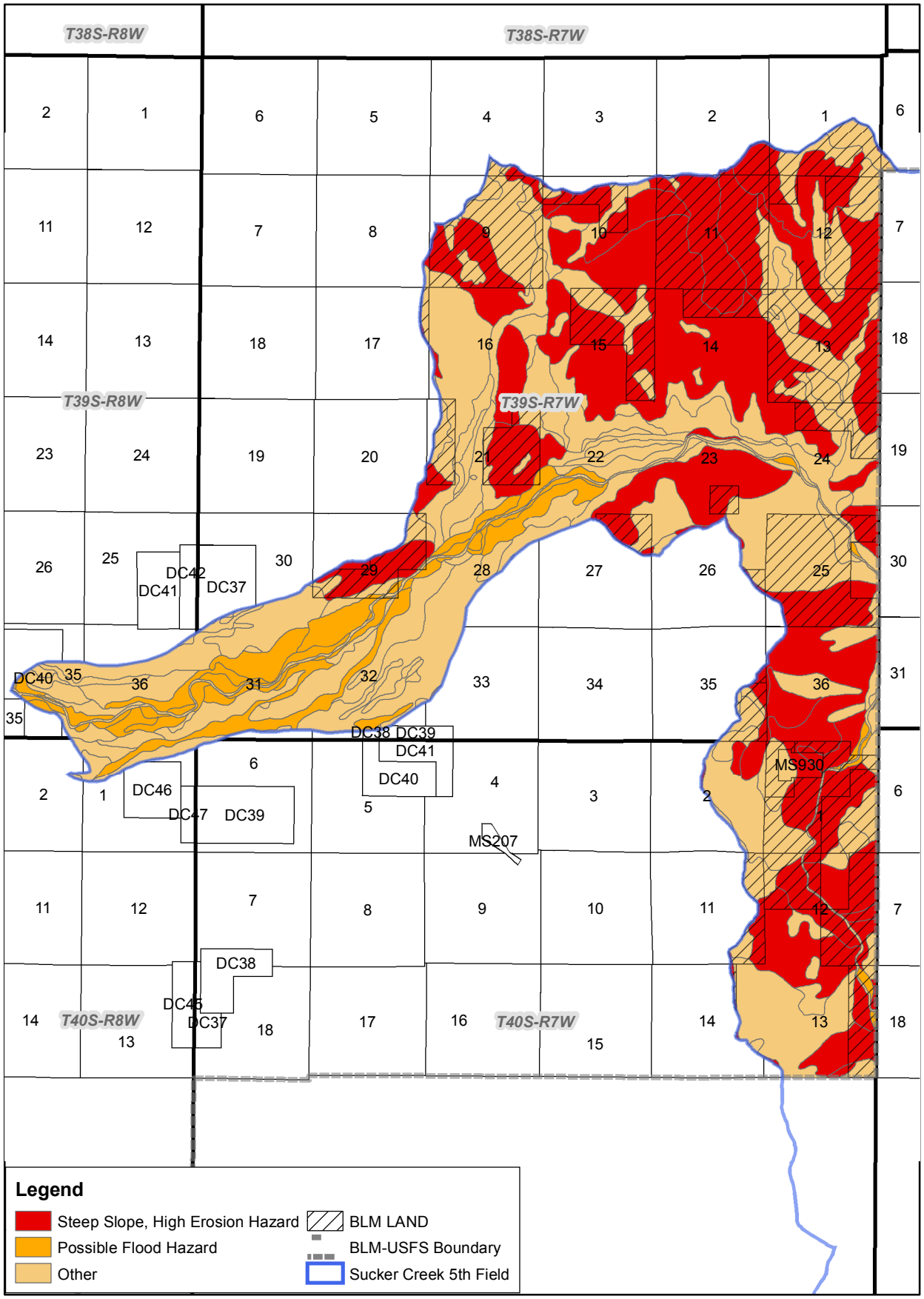

SUCKER CREEK WATERSHED

Map 20
General Soil Types

1:80,000

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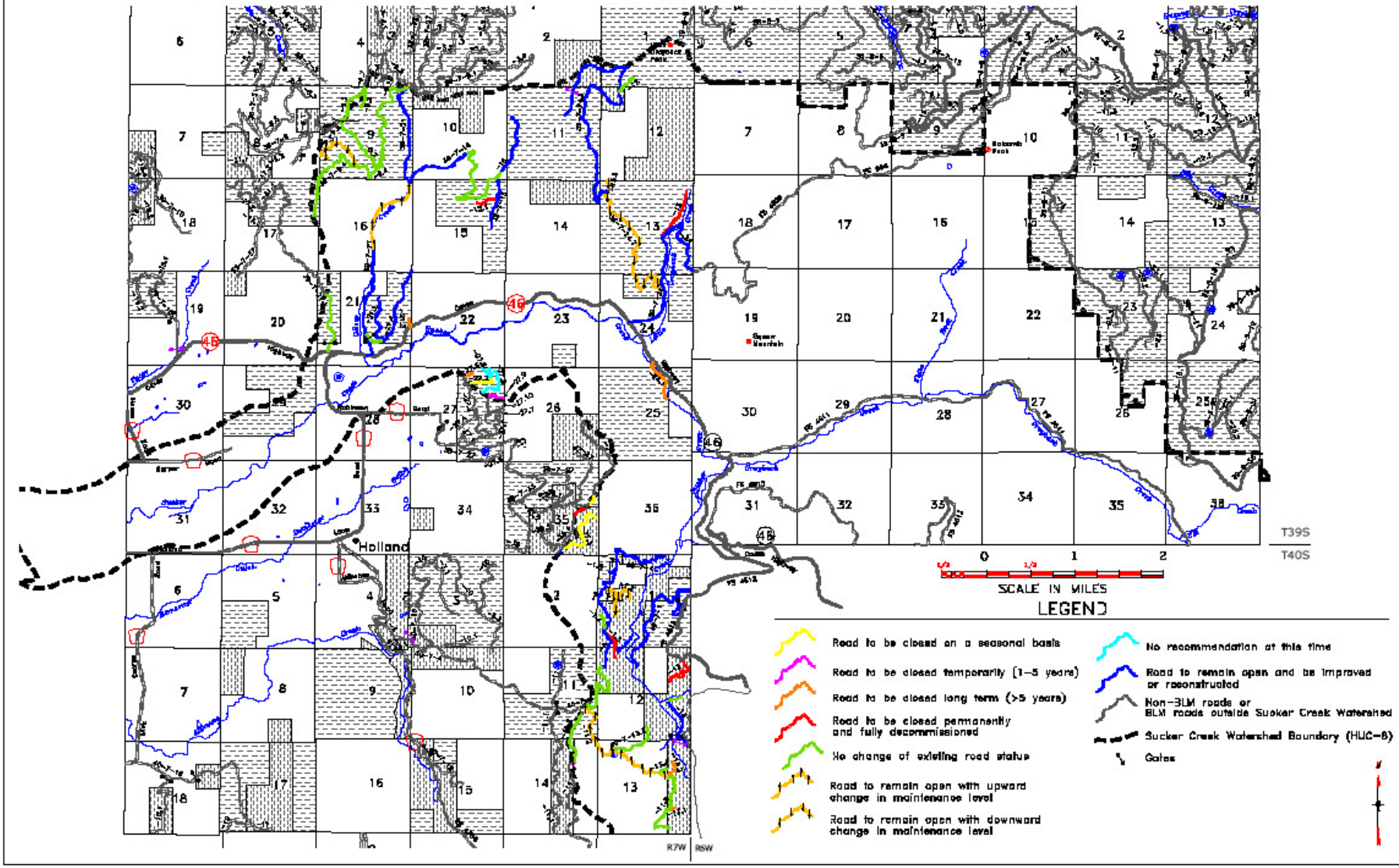
d:\home\dglover\misc\gp_rab - polygon
d:\home\dglover\suckerwa\sc_blm_lli - polygon
d:\home\dglover\suckerwa\sc_soil - polygon
d:\home\dglover\suckerwa\sc_diss_sec - polygon
d:\home\dglover\misc\gp_twp_poly - polygon

RECOMMENDED TMO's FOR BLM ROADS IN THE SUCKER CREEK WATERSHED



Appendix B: Mining Claim Information

A mining claimant or operator has the right to prospect and develop the mining claim as authorized by the General Mining Laws and amendments, and BLM regulations.

The operator or claimant will be allowed to build structures and occupy the site where such uses are incidental to mining and approved in writing by the appropriate BLM Authorized Officer. The use and occupancy of a mining claim will be reviewed on a case-by-case basis to determine if such uses are reasonably incident. A letter of concurrence will be issued only where the operator shows that the use or occupancy is incidental to mining and that substantially regular mining activity is occurring. Issuance will be subject to the operator complying with all state, federal, and local governmental codes and regulations. This means that in addition to meeting the requirements to mine on a regular basis the claimant will need to meet the standards of the Oregon Uniform Building Codes and all state sanitation requirements.

The filing of mining claims gives the claimant the rights and ownership of the minerals beneath the surface of the lands encumbered by the mining claims. In most cases, management of the surface of the claims rests with the appropriate federal agency having jurisdiction.

The claimant or operator has the right to use that portion of the surface necessary to the development of the claim. In some instances, the claimant or operator may, for safety or security reasons, limit the public access at the location of operations. Where there are no safety or security concerns, the surface of the mining claims is open to the public.

In some instances the surface of the mining claim is managed by the claimant. These are usually claims that were filed before August 1955 and determined valid at that time. The claimants in these cases have the same rights as outlined above. However, they have the right to eliminate public access across that area where they have surface rights.

Appendix C: Road Information

1. Definitions

BLM Capitalized Roads: The BLM analyzes Bureau-controlled roads to determine capitalized or noncapitalized classification. During this analysis, the BLM considers many elements including the present and future access needs, type of road, total investment, and the road location. Each capitalized road is identified with a BLM road number and a capitalized value. BLM capitalized roads are managed and controlled by the BLM.

BLM Noncapitalized Roads and Skid Trails: BLM noncapitalized roads and skid trails are not assigned a capitalized value. Noncapitalized roads are generally jeep roads and spur roads that exist due to intermittent public and administrative use. Skid trails are ground disturbances, created under a timber sale, that have not been restored to their natural condition.

Non-BLM Roads and Skid Trails: Non-BLM roads and skid trails are administered by private land owners or other governmental agencies. The BLM has no control over these roads.

Quarries: Quarries are areas of land suitable for use as a rock source to develop aggregate material for the surfacing of roads, rip rap for slope protection, rock for stream enhancement projects, and for other miscellaneous uses. Examples of data elements for quarries: active quarry, depleted quarry.

Road Data Elements: Information on data elements is available through the Medford District road record files, right-of-way (R/W) agreement files, easement files, computer road inventory program, GIS maps, transportation maps, aerial photos, and employee knowledge of existing road systems. When data gaps are determined to exist, field data will be gathered to eliminate the gaps and at the same time existing data element information will be verified. Some information on private roads does exist, but the majority will need to be researched by the BLM through privately-authorized field investigations and answers to BLM's request for information from private land owners. Examples of data elements for roads: road density, road surface, surface depth, road use, road drainage, road condition, road grade, gates, R/W agreements, easements, maintenance levels, and barricades.

Transportation Management Objectives (TMOs): The TMO recommends one or several management actions for each Bureau controlled road in an analysis area as determined by present and future road management needs. TMOs support the attainment of many of the *Standards and Guidelines* of the Northwest Forest Plan as well as the Management Action/Direction of the Districts' ROD/RMPs (Western Oregon Transportation Management Plan, June 1996). TMO acronyms used in the tables in this section are as follows:

NULL No recommendation - the TMO has not been completed or no decision has been made yet.
UCG No change of existing road status.
IMP Road to be improved or reconstructed.
OMLU Road to remain open and there will be an upward change in the maintenance level.
OMLD Road to remain open and there will be an downward change in the maintenance level.
OR2T Road to be converted to a trail and left open.
CSC Road to be closed on a seasonal basis.
CST Road to be closed temporarily (from one to five years).
CDR Road to be closed long term (for more than five years).
CFD Road to be closed permanently and fully decommissioned.
COB Road to be closed permanently and completely obliterated.
RFI Road to be removed from inventory. (Decommissioned, not built, no access, etc.)

2. Definition of Columns in Watershed Road Information Tables

TMO Recommended:
Improve: may include installing culverts, drainage dips or water bars for erosion control, out sloping the road prism, and aggregate surfacing or re-surfacing.
Decommission: includes installing a berm/log barricade and allowing the road surface to naturally revegetate.
Surface Type: NAT = Natural, PRR = Pit Run, GRR = Grid Rolled, ABC = Aggregate Base Course, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment

Access Rights: BA = BLM administrative use only, BP = BLM and public use, PVT = Private but BLM allowed, NKN = Unknown

BLM Maintenance Levels (Under Column for Cus. Mtn. and Opr. Mtn):
Level 1: This level is the minimal custodial care as required to protect the road investment, adjacent lands, and resource values. Normally, these roads are blocked and not open for traffic or are open only to restricted traffic. Traffic would be limited to use to high-clearance vehicles. Passenger car traffic is not a consideration. Culverts, waterbars / dips and other drainage facilities are to be inspected on a three-year cycle and maintained as needed. Grading, brushing, or slide removal is not performed unless they affect roadbed drainage. Closure and traffic restrictive devices are maintained.

Level 2: This level is used on roads where management requires the road to be opened seasonally or for limited passage of traffic. Traffic is generally administrative with some moderate seasonal use. Typically these roads are passable by high-clearance vehicles. Passenger cars are not recommended (user comfort and convenience and are not considered priorities). Culverts, waterbars / dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted as necessary only to correct drainage problems. Brushing is conducted as needed (generally on a three-year cycle) only to facilitate passage of maintenance equipment. Slides may be left in place provided that they do not affect drainage and there is at least 10 feet of usable roadway.

Level 3: This level is used on intermediate or constant service roads where traffic volume is significantly heavier approaching a daily average of 15 vehicles. Typically, these roads are native or aggregate surfaced, but may include low use bituminous surfaced road. This level would be the typical level for log hauling. Passenger cars are capable of using most of these roads by traveling slow and avoiding obstacles that have fallen in the travelway. Culverts, waterbars / dips and other drainage facilities are to be inspected annually and maintained as needed. Grading is conducted annually to provide a reasonable level of riding comfort. Brushing is conducted annually or as needed to provide concern for driver safety. Slides affecting drainage would receive high priority for removal, otherwise they would be removed on a scheduled basis.

Level 4: This level is used on roads where management requires the road to be opened all year and has a moderate concern for driver safety and convenience. Traffic volume is approximately a daily average of 15 vehicles and will accommodate passenger vehicles at moderate travel speeds. Typically, these roads are single lane and bituminous surfaced, but may also include heavily-used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis, although a preventative maintenance program may be established. Problems are repaired as soon as discovered.

Level 5: This level is used on roads where management requires the road to be opened all year and has a high concern for driver safety and convenience. Traffic volume exceeds a daily average of 15. Typically, these roads are double or single lane bituminous, but may also include heavily used aggregate surfaced roads as well. The entire roadway is maintained on an annual basis and a preventative maintenance program is also established. Brushing may be conducted twice a year as necessary. Problems are repaired as soon as discovered.

Road Closure information:

Closure status:
OP - Open
SC - Seasonal closure - Temporary
ST - Short term closure - Temporary (1-5 yrs)
DR - Decommission of road - Long term > 5 yrs)
FD - Full decommission of road - Permanent
OB - Obliteration of road - Permanent

Closure reason:
WLD - Wildlife / big game hunting concerns
OWL - Northern Spotted Owl
FSH - Fisheries
REC - Recreation
MNT - Maintenance problem
OTE - Other threatened & endangered species
ADM - Administrative reasons
POC - Port-Orford-cedar protection
NOX - Noxious weed control
OTH- Other

Closure device:
BLD- Boulders
CBL - Cable
EBM - Earth berm
GT - Gate (location if other than this road)
INA - Inaccessible (vegetation or other blockage)
LOG - Log barricade
GR - Guard rail
JW - Concrete (jersey wall)
FNC - Fence
SGN - Sign
OTH- Other

Table C-1: Roads Data Report

Road Number	Road Name	TMO Rec.	O&C Miles	PD Miles	Other Miles	Total Miles	Surface Type	Road Width	Surface Depth	Who Controls	Access Rights	Maint. Level	Who Maintains	Road Class
39 S 07 W 09.02__	BEAR CK DIV W	UCG	2.72	0.00	0.00	2.72	ASC	14'	6"	BLM	BP	3	BLM	LOC
39 S 07 W 09.04__	BEAR CK DIV SP A	UCG	2.14	0.00	0.02	2.16	ASC	14'	6"	BLM	BA	3	BLM	LOC
39 S 07 W 09.05__	BEAR CK DIV W SP	OMLD	0.75	0.00	0.00	0.75	ASC	14'	6"	BLM	BP	2	BLM	LOC
39 S 07 W 12.00__	LITTLE GRAYBACK SP	UCG	0.19	0.09	0.00	0.28	NAT	16'		BLM	BP	2	BLM	LOC
39 S 07 W 13.00__	LITTLE GRAYBACK C	CFD-P	0.49	0.00	0.00	0.49	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 13.01__	LITTLE GRAYBACK SP	UCG	0.14	0.00	0.00	0.14	PRR	14'	6"	BLM	BP	2	BLM	LOC
39 S 07 W 15.00__	E FK BEAR SP	IMP	0.42	0.00	0.00	0.42	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 15.01__	BEAR EAST SPUR	CFD-P	0.31	0.00	0.00	0.31	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 16.00A	E FK BEAR CK	IMP	0.05	0.00	0.75	0.80	PRR	17'	6"	BLM	BP	3	BLM	LOC
39 S 07 W 16.00B	E FK BEAR CK	UCG	0.92	0.00	0.54	1.46	PRR	14'	6"	BLM	BP	3	BLM	LOC
39 S 07 W 16.00C	E FK BEAR CK	IMP	0.59	0.00	0.11	0.70	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 21.00A	BEAR CREEK	IMP	0.84	0.00	0.41	1.25	ASC	18'	6"	BLM	BP	4	BLM	COL
39 S 07 W 21.00B	BEAR CREEK	OMLU	0.00	0.00	1.00	1.00	ASC	18'	6"	BLM	BP	4	BLM	LOC
39 S 07 W 21.00C	BEAR CREEK	IMP	1.10	0.00	0.00	1.10	ASC	18'	6"	BLM	BP	4	BLM	LOC
39 S 07 W 21.01__	KELLY CREEK	UCG	2.25	0.38	0.91	3.54	ASC	14'	6"	BLM	BP	3	BLM	COL
39 S 07 W 21.02A	BEAR CAVES RIDGE	UCG	0.20	0.00	0.00	0.20	ASC	18'	4"	BLM	BP	2	BLM	LOC
39 S 07 W 21.02B	BEAR CAVES RIDGE	IMP	0.61	0.00	0.00	0.61	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 21.03__	BEAR CAVES RIDGE	CDR	0.10	0.00	0.00	0.10	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 21.04A	BEAR CAVES RIDGE	IMP	0.42	0.00	0.00	0.42	ASC	18'	4"	BLM	BP	2	BLM	LOC
39 S 07 W 21.04B	BEAR CAVES RIDGE	IMP	0.62	0.00	0.00	0.62	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 24.00__	LITTLE GRAYBACK	IMP	1.66	0.00	0.54	2.20	ABC	17'	6"	BLM	BP	3	BLM	LOC
39 S 07 W 24.01A	SUCKER CREEK	CDR	0.01	0.00	0.07	0.08	ABC	14'	6"	BLM	BP	2	BLM	LOC
39 S 07 W 24.01B	SUCKER CREEK	CDR	0.40	0.00	0.00	0.40	ABC	14'	6"	BLM	BP	2	BLM	LOC
39 S 07 W 24.02A	LITTLE GRAYBACK	OMLD/IMP	1.93	0.00	0.00	1.93	PRR	16'	8"	BLM	BP	2	BLM	LOC
39 S 07 W 24.02B	LITTLE GRAYBACK	IMP	1.73	0.77	0.00	2.50	NAT	16'		BLM	BP	2	BLM	LOC
39 S 07 W 24.02C	LITTLE GRAYBACK	IMP	0.68	0.45	0.00	1.13	NAT	16'		BLM	BP	2	BLM	LOC
39 S 07 W 27.02B	ROBINSON HILL A	NULL	0.18	0.00	0.00	0.18	NAT	14'		BLM	BP	2	BLM	LOC
39 S 07 W 27.03__	ROBINSON HILL B	NULL	0.74	0.00	0.00	0.74	GRR	14'	8"	BLM	BP	2	BLM	LOC
39 S 07 W 27.06__	ROBINSON HILL SP	NULL	0.15	0.00	0.00	0.15	NAT	14'		BLM	BP	2	BLM	LOC
40 S 07 W 01.00__	SUCKER CK SPIT	IMP	2.01	0.00	0.00	2.01	NAT	14'		BLM	BP	2	BLM	LOC
40 S 07 W 01.01__	FRENCH PEAK SP	OMLD	0.28	0.23	0.00	0.51	ABC	14'	6"	BLM	BP	2	BLM	LOC
40 S 07 W 01.02__	FRENCH PEAK SP	OMLD	0.15	0.18	0.00	0.33	ABC	14'	6"	BLM	BP	2	BLM	LOC
40 S 07 W 01.03_	FRENCH PEAK SP	OMLD	0.00	0.30	0.00	0.30	NAT	14'		BLM	BP	1	BLM	LOC
40 S 07 W 01.04__	FRENCH PEAK SP	UCG	0.00	0.17	0.00	0.17	ABC	14'	6"	BLM	BP	2	BLM	LOC

Road Number	Road Name	TMO Rec.	O&C Miles	PD Miles	Other Miles	Total Miles	Surface Type	Road Width	Surface Depth	Who Controls	Access Rights	Maint. Level	Who Maintains	Road Class
40 S 07 W 01.05_	GOLDEN SUCKER SP	IMP	0.16	0.00	0.08	0.24	NAT	14'		BLM	BP	2	BLM	LOC
40 S 07 W 04.00B3	TARTER GULCH	UCG	0.40	0.57	0.00	0.97	ABC	17'	6"	BLM	BP	3	BLM	LOC
40 S 07 W 04.00C	TARTER GULCH	IMP	0.36	1.36	0.47	2.19	ABC	14'	4"	BLM	BA	2	BLM	LOC
40 S 07 W 11.02A	LONGVIEW TARTAR	OMLU	0.48	0.00	0.00	0.48	ABC	16'	6"	BLM	BP	3	BLM	LOC
40 S 07 W 11.02B	LONGVIEW TARTER	OMLU	0.00	0.00	0.11	0.11	ASC	16'	6"	BLM	BA	3	NKN	LOC
40 S 07 W 11.02C	LONGVIEW TARTER	OMLU	0.00	0.00	0.85	0.85	ASC	16'	6"	BLM	BA	3	NKN	LOC
40 S 07 W 11.02D1	LONGVIEW TARTER	OMLU	0.03	0.00	0.17	0.20	ASC	16'	6"	BLM	BA	3	NKN	LOC
40 S 07 W 11.02D2	LONGVIEW TARTER	UCG	0.00	0.52	0.41	0.93	ASC	16'	6"	BLM	BA	2	NKN	LOC
40 S 07 W 11.05A	BOLEN LAKE	UCG	0.48	0.00	0.00	0.48	PRR	14'	6"	BLM	BP	2	BLM	LOC
40 S 07 W 11.05B	BOLEN LAKE	UCG	0.00	0.00	0.19	0.19	PRR	17'		PVT	PVT	2	NKN	LOC
40 S 07 W 12.00__	SUCKER CREEK SP	UCG	0.00	0.56	0.00	0.56	NAT	14'		BLM	BP	2	BLM	LOC
40 S 07 W 13.00__	YEAGER CREEK	IMP	0.91	0.00	0.00	0.91	NAT	14'		BLM	BP	2	BLM	LOC
40 S 07 W 13.01__	LONGVIEW TARTER SP	CDR	0.00	0.10	0.00	0.10	ASC	16'	6"	BLM	BA	1	BLM	LOC
40 S 07 W 13.02__	LONGVIEW TARTER SP	CDR	0.02	0.21	0.00	0.23	ASC	14'	6"	BLM	BA	1	BLM	LOC
40 S 07 W 13.03__	GOLDEN CHAMP	CST	0.00	0.35	0.39	0.74	ASC	17'	4"	BLM	BA	2	BLM	LOC
40 S 07 W 13.04_	LONG SPUR	CST	0.00	0.00	0.10	0.10	ABC	14'	6"	PVT	PVT	2	NKN	LOC

Table C-2: Supplemental Data Report

Road Number	Road Grade				Road Drainage							Brush	Comments
	0-10%	*10-20%*	*20+%*	for 20+% ADV/FAV	18" CMP	24" CMP	36" CMP	48" CMP	60" CMP	Water Dips	Condition G/F/P/U	Yes/No	
39 S 07 W 09.02__	1.95				20	1					F	Y	
39 S 07 W 09.04__	1.09	0.52			14	4	(30")				P	Y	POOR DRAINAGE, RUTS, SMALL CUTBANK SLIDES, LARGE IMPASSABLE SLIDE
39 S 07 W 09.05__	0.75				10						F	Y	
39 S 07 W 12.00__	0.28					2					F	Y	
39 S 07 W 13.00__	0.30	0.19									P	Y	NO DRAINAGE STRUCTURES, OVERGROWN
39 S 07 W 13.01__	0.14				1					1	F	Y	LARGE POTHOLES
39 S 07 W 15.00__	0.03	0.39								6	P	Y	DEEP RUTS, INADEQUATE DRAINAGE, VERY OVERGROWN
39 S 07 W 15.01__	0.20	0.10								1		Y	RUTS, HEAVILY OVERGROWN
39 S 07 W 16.00A	0.34	0.46			5		(30") 2				F	Y	DEEP RUTS, SOME SMALL CUTBANK SLIDES
39 S 07 W 16.00B	0.59	0.87			4		(30") 1			4	F	Y	
39 S 07 W 16.00C	0.56	0.14			2	1	1			2	F	N	
39 S 07 W 21.00A	1.25				6	2	1		(80") 1		F	N	
39 S 07 W 21.00B	0.87	0.13			7		3		(72") 2		F	N	SLIDE DAMAGE @ MP 0.11
39 S 07 W 21.00C	.96	.14			9		30")				F	N	
39 S 07 W 21.01__	0.35	.38			8						F	Y	
39 S 07 W 21.02A	0.13	.07			2						F	Y	
39 S 07 W 21.02B	0.61				3				(WB) 10	3	F	Y	SOME WATERBARS NOT WORKING
39 S 07 W 21.03__	0.10										F	Y	ROAD OVERGROWN, BARELY DETECTABLE
39 S 07 W 21.04A	0.42				6						F	Y	MODERATELY OVERGROWN
39 S 07 W 21.04B	0.62				2						F	Y	POTHOLES, INADEQUATE DRAINAGE
39 S 07 W 24.00__	2.13	0.07			13	1			(66") 1	114"	F	N	POTHOLES IN OILED PORTION

Road Number	Road Grade				Road Drainage							Brush	Comments
	0-10%	*10-20%*	*20+%*	for 20+% ADV/FAV	18" CMP	24" CMP	36" CMP	48" CMP	60" CMP	Water Dips	Condition G/F/P/U	Yes/No	
39 S 07 W 24.01A	0.08												ROAD INACCESSIBLE
39 S 07 W 24.01B	0.73												ROAD INACCESSIBLE
39 S 07 W 24.02A	0.44	1.49			13					5	F	Y	RUTS
39 S 07 W 24.02B	1.13	1.37			12	1				8	F	Y	RUTS
39 S 07 W 24.02C	1.03	0.10								4	F	N	RUTS
39 S 07 W 27.02B	0.18				1					1	F	Y	
39 S 07 W 27.03__	0.62	0.12			6						F	Y	
39 S 07 W 27.06__	0.01	0.14			1						F	Y	
40 S 07 W 01.00__	1.45	.56							(WB) 12	4	P	Y	MANY SHALLOW RUTS, LARGE PASSABLE FILL FAILURE AND SOME SMALL CUT BANK SLIDES
40 S 07 W 01.01__	0.41	0.10			4						F	Y	SHALLOW RUTS ON THE STEEPER GRADES
40 S 07 W 01.02__	0.15	0.18			3						F	Y	
40 S 07 W 01.03_	0.05	0.15	0.10	ADV					(WB) 2		P	Y	LARGE CUTBANK SLIDE, INADEQUATE DRAINAGE FOR THE STEEPNESS OF GRADE
40 S 07 W 01.04__	0.09	0.08			2						F	Y	STEEP GRADE AT START OF ROAD NEEDS DRAINAGE STRUCTURES
40 S 07 W 01.05_	0.18	0.06									P	Y	DEEP RUTS, NO DRAINAGE STRUCTURES
40 S 07 W 04.00B3	0.76	0.21			8						F	N	
40 S 07 W 04.00C	2.19				24	2	1	(30") 1			P	Y	PASSABLE FILL FAILURES AND WASHOUT
40 S 07 W 11.02A	0.40	0.08			1	1				2	G	N	
40 S 07 W 11.02B	0.11				1						F	N	WHEEL TROUGHS IN GRAVEL
40 S 07 W 11.02C	0.49	0.36			4	3	(30") 1	(15") 2	(12") 1	4	F	N	SEVERAL UNDERSIZED CULVERTS
40 S 07 W 11.02D1	0.20				1						F	N	
40 S 07 W 11.02D2	0.61	0.32			7	1					F	N	SMALL CUT BANK SLIDES BEHIND LOG BARRICADE, FILL CRACK AT DRAW CROSSING NEAR END OF ROAD
40 S 07 W 11.05A	0.48				5					1	F	Y	POTHOLES
40 S 07 W 11.05B	0.19				1						F	N	A FEW SHALLOW RUTS

Road Number	Road Grade				Road Drainage							Brush	Comments
	0-10%	***10-20%***	***20+%***	for 20+% ADV/FAV	18" CMP	24" CMP	36" CMP	48" CMP	60" CMP	Water Dips	Condition G/F/P/U	Yes/No	
40 S 07 W 12.00__	0.10	0.35	0.05	ADV	2	1					P	Y	MANY DEEP RUTS AND POTHOLES
40 S 07 W 13.00__	0.71	0.09			5					6	P	N	OVERGROWN AND UNMAINTAINRED BEYOND MP 0.72
40 S 07 W 13.01__		0.10			1						P	N	
40 S 07 W 13.02__	0.17	0.06			1						F	N	
40 S 07 W 13.03__	0.08	0.30			2						F	N	RUTS
40 S 07 W 13.04_	0.10										F	N	NO DRAINAGE STRUCTURES

Table C-3: Transportation Management Objectives Sucker Creek watershed

Road Number	TMO Decision	Maint Level	Road Length	Surface Type	Closure Information		
					Status	Reason	Closure device
39 S 07 W 09.02	UCG	3	2.72	ASC	Open		
39 S 07 W 09.04	UCG	3	2.16	ASC	Open		
39 S 07 W 09.05	OMLD	2	0.75	ASC	Open		
39 S 07 W 12.00	UCG	2	0.28	NAT	Open		
39 S 07 W 13.00	CFD	2	0.49	NAT	Open		
39 S 07 W 13.01	UCG	2	0.14	PRR	Open		
39 S 07 W 15.00	IMP	2	0.42	NAT	Open		
39 S 07 W 15.01	CFD	2	0.31	NAT	Open		
39 S 07 W 16.00A	IMP	3	0.80	PRR	Open		
39 S 07 W 16.00B	UCG	3	1.46	PRR	Open		
39 S 07 W 16.00C	IMP	2	0.70	NAT	Open		
39 S 07 W 21.00A	IMP	4	1.25	ASC	Open		
39 S 07 W 21.00B	OMLU	4	1.00	ASC	Open		
39 S 07 W 21.00C	IMP	4	1.10	ASC	Open		
39 S 07 W 21.01	UCG	3	3.54	ASC	SC	ADM	GT
39 S 07 W 21.02A	UCG	3	0.20	ASC	SC	ADM	GT
39 S 07 W 21.02B	IMP	2	0.61	NAT	ST	ADM	EBM
39 S 07 W 21.03	CDR	1	0.10	NAT	DR	MNT	INA
39 S 07 W 21.04A	IMP	2	0.42	ASC	SC	ADM	GT
39 S 07 W 21.04B	IMP	2	0.62	NAT	SC	ADM	GT
39 S 07 W 24.00	IMP	3	2.20	ABC	OP		
39 S 07 W 24.01A	CDR	1	0.08	ABC	DR	MNT	INA
39 S 07 W 24.01B	CDR	1	0.40	ABC	DR	MNT	INA
39 S 07 W 24.02A	OMLD/ IMP	2	1.93	PRR	OP		
39 S 07 W 24.02B	IMP	2	2.50	NAT	OP		
39 S 07 W 24.02C	IMP	2	1.13	NAT	OP		
39 S 07 W 27.02B	NULL	2	0.18	NAT	SC	WLD	GT
39 S 07 W 27.03	NULL	2	0.74	GRR	SC	WLD	GT
39 S 07 W 27.06	NULL	2	0.15	NAT	SC	WLD	GT
40 S 07 W 01.00	IMP	2	2.01	NAT	SC	ADM	GT
40 S 07 W 01.01	OMLD	1	0.51	ABC	OP		
40 S 07 W 01.02	OMLD	1	0.33	ABC	OP		
40 S 07 W 01.03	OMLD	1	0.30	NAT	OP		
40 S 07 W 01.04	UCG	2	0.17	ABC	OP		
40 S 07 W 01.05	IMP	2	0.24	NAT	OP		
40 S 07 W 04.00B3	UCG	3	0.97	ABC	OP		
40 S 07 W 04.00C	IMP	2	2.19	ABC	OP		

40 S 07 W 11.02A	OMLU	3	0.48	ABC	OP		
40 S 07 W 11.02B	OMLU	3	0.11	ASC	OP		
40 S 07 W 11.02C	OMLU	3	0.85	ASC	OP		
40 S 07 W 11.02D1	OMLU	3	0.20	ASC	OP		
40 S 07 W 11.02D2	UCG	2	0.93	ASC	ST	ADM	Log (MP 0.40)
40 S 07 W 11.05A	UCG	2	0.48	PRR	OP		
40 S 07 W 11.05B	UCG	2	0.19	PRR	OP		
40 S 07 W 12.00	UCG	2	0.56	NAT	OP		
40 S 07 W 13.00	IMP	2	0.91	NAT	ST	ADM	GT
40 S 07 W 13.01	CDR	1	0.10	ASC	ST	ADM	LOG (40-7-11.2[D2])
40 S 07 W 13.02	CDR	1	0.23	ASC	ST	ADM	LOG
40 S 07 W 13.03	CST	2	0.74	ASC	ST	ADM	LOG
40 S 07 W 13.04	CST	2	0.10	ABC	ST	ADM	EBM

Appendix D: Wildlife Information

Table D-1: Spotted Owl Sites with Provincial Home Ranges that include BLM Lands in the Sucker Creek watershed

Site	Level of Protection	Last Year Surveyed	Last Year Active	Last Year w/Young
Claim Ridge	Approximately 100 acre core (in Matrix)	2005	2005	----
Number 7 Gulch	Approximately 100 acre core (in Matrix)	2005	1996	1992
Seven & ¾ Gulch	Approximately 100 acre core (in Matrix)	2005	1994	1992
Squaw Mountain	Activity Center (in Large LSR)	2002	2000	----
Tiger Spring	Approximately 100 acre core (in Matrix)	2005	2000	1996

Appendix E: Fire Management Planning - Hazard, Risk, and Value At Risk Rating Classification Method and Assumptions

A. HAZARD

Hazard rating is based on the summation of points assigned using the six elements as follows:

1) Slope (%):

	Points
0-19	5
20-44	10
45+	25

2) Aspect (Degrees):

	Points
316-360, 0-67	5
68-134, 294-315	10
135-293	15

3) Slope Position:

	Points
Upper 1/3	5
Midslope	10
Lower 1/3	25

4) Fuel Model:

	Points
Grass 1, 2, 3	5
Timber 8	5
Shrub 5	10
Timber 9	15
Shrub 6	20
Timber 10	20
Slash 11	25
Shrub 4	30
Slash 12, 13	30

5) Ladder Fuel Presence:

Use when stem dbh is ≥ 5" (vegetation condition class 6). Exceptions are based on stand conditions.

	Points	
Ladder Fuel Absent:	0	
Present on <1/3 of area; vertical continuity is > or <50%.	5	
Present on 1/3 to 2/3 of area; vertical continuity is <50%.		15
Present on 1/3 to 2/3 of area; vertical continuity is >50%.		25
Present on >2/3 of area; vertical continuity is <50%.	30	
Present on >2/3 of area; vertical continuity is >50%.	40	

6) Summary Rating:

POINTS	HAZARD RATING
0-45	LOW
50-70	MODERATE
75-135	HIGH

B. RISK

Assigned based on human presence, use, and lightning occurrence.

High Risk: population centers are in or within 1/4 mile of the area; good access with many roads; relatively high incidence of lightning; has high level of human use.

Moderate Risk: People use the area informally; summer and fall use as a main travel route or for infrequent recreational activities. Lightning occurrence is typical for the area.

Low Risk: the area has limited human access and infrequent use. Fire risk is mainly from lightning with only rare risk of human caused fire.

C. VALUE AT RISK

Best assigned through interdisciplinary process. Based on human and resource values in planning areas. Can be based on land allocations, special use areas, human improvements/monetary investment, residential areas, agricultural use, structures present, soils, vegetative conditions, and habitat. Examples:

High Value: ACEC, RNA, LSR, Special Status species present, critical habitats, recreation area, residential areas, farming, vegetation condition and McKelvey ratings of 81, 82, 71, 72; vegetation condition of 4 and 5. Caves, cultural, or monetary investment present. Riparian areas.

Moderate Value: Granitic soils, informal recreation areas and trails. Vegetation and McKelvey rating of 85, 75, 65.

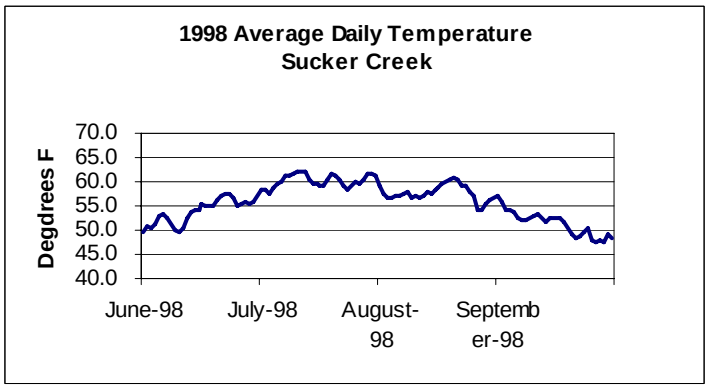
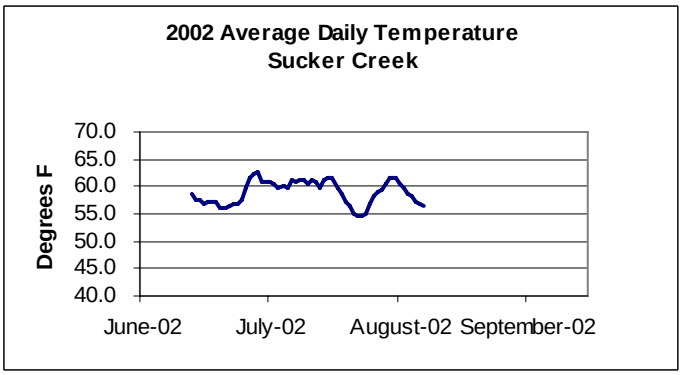
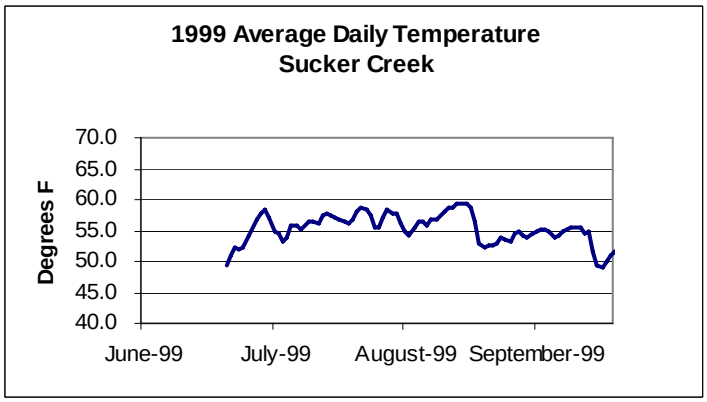
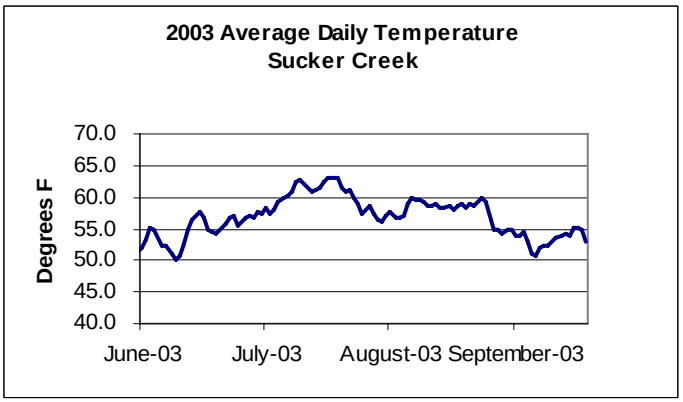
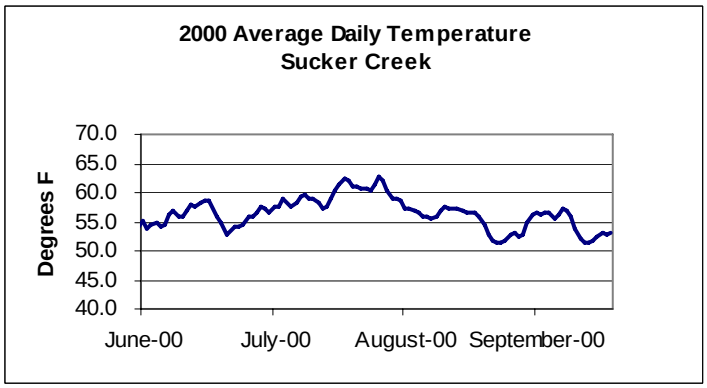
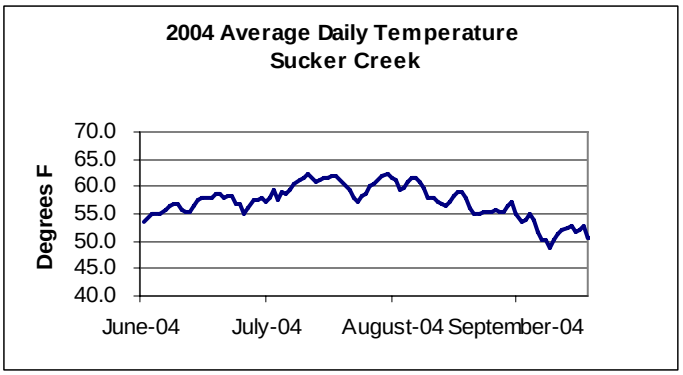
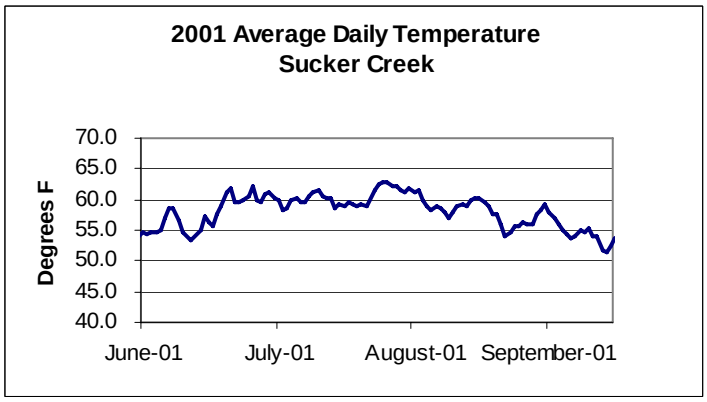
Low Value: Vegetation condition class 1, 2, 3; and vegetation 5, 6, 7 with McKelvey rating 4.

Appendix F: Historic Vegetation Condition

Vegetation Condition Circa 1918 (Interpretation of Revestment Notes)								
Legal	**Survey Date**	**Volume**	**Volume Percent**	**Mature**	**Plant Series**	**Burn**	**Mine**	**Remarks**
39-7-9								
NENE	10/3/18	975 MBF	RF- 95	Y	DF			Coarse fir
NWNE	10/3/18	750 MBF	RF- 90, SP-10	Y	DF			Very good SP
SWNE	10/2/18	875 MBF	RF- 100	N	DF			Large, coarse fir
SENE	10/2/18	975 MBF	RF- 95	N	DF			Fair timber
NENW	10/3/18	425 MBF	RF-80, SP-20	N	PINE	X		Poor timber
NWNW	10/3/18	525 MBF	RF-90, SP-10	N	DF	X		Scrubby SP, poor DF
SWNW	10/2/18	425 MBF	RF-90	N	DF	X		Scrubby Pine, poor fir
SENW	10/2/18	1100 MBF	RF-90	Y	DF			Very good SP
NESW	10/1/18	415 MBF	RF-70, SP-30	N	DF/PINE			Poor fir; Fair SP
NWSW	10/1/18	650 MBF	RF-60, SP-40	Y	DF/PINE			Very good SP
SWSW	9/30/18	650 MBF	RF-80, SP-20	Y	DF/PINE			Poor timber
SESW	9/30/18	450 MBF	RF-80, SP-20	N	DF/PINE			Poor timber
NESE	10/1/18	875 MBF	RF-95, SP-5	Y	DF			Fair fir & cedar, poor SP
NWSE	10/1/18	550 MBF	RF-90, SP-10	N	DF			Poor timber; scattered, brushy
SWSE	9/30/18	425 MBF	RF-80, SP-20	N	DF/PINE			Poor timber
SESE	9/30/18	700 MBF	RF-95, WC-5	Y	DF/PINE			Fair timber
Section Notes: Better than average timber in this section for the district. Pine is "anything but uniform," and badly scattered, but there are "splendid" big trees in the open.								
39-7-11								
NENE	10/8/18	200 MBF	RF-40, YP-50, RC-10	N	PINE	X		Past burn killed ½ the timber; scrubby
NWNE	10/8/18	65 MBF	SP-60, YP-40	N	PINE			Manzanita & scrub trees
SWNE	10/8/18	700 MBF	RF-70, SP-20, YP-10	N	DF/PINE			Open West side/ timbered East
SENE	10/8/18	575 MBF	RF-70, SP-10, YP-10, RC-10	N	DF/PINE	X		Good SP
NENW	10/8/18	0		N				Bald mountain side; manzanita
NWNW	10/8/18	0		N				Small manzanita
SWNW	10/8/18	450 MBF	RF-70, SP-20, YP-10	N	DF/PINE			Poor timber
SENW	10/8/18	0		N				Open; manzanita & scrubby trees
NESW	10/7/18	75 MBF	RF-70, YP-30	N				Open w/ a few large pines
NWSW	10/7/18	1000 MBF	RF-65, SP-35	N	DF/PINE			Poor Timber
SWSW	10/6/18	575 MBF	RF-75, SP-25	N	DF/PINE			Poor timber
SESW	10/6/18	375 MBF	RF-50, SP-50	N	DF/PINE			Poor, scattered timber

Vegetation Condition Circa 1918 (Interpretation of Revestment Notes)								
Legal	**Survey Date**	**Volume**	**Volume Percent**	**Mature**	**Plant Series**	**Burn**	**Mine**	**Remarks**
NESE	10/7/18	900 MBF	RF-95, SP-5	Y	DF/PINE			Large fir; good SP
NWSE	10/7/18	375 MBF	RF-95, SP-5	N	DF/PINE			Open ridge; timbered E. of ridge
SWSE	10/7/18	45 MBF	RF-45, SP-35, YP-20	N	OAK			Open; manzanita, oak, & scrub timber
SESE	10/6/18	50 MBF	RF-50, YP-50	N	PINE	X		Very good YP; oak/manzanita
Section Notes: South slope of Grayback Mountains; steep, high altitude, scrubby, and brushy.								
39-7-13								
NENE	9/22/18	750 MBF	RF-70, SP-10, YP-10, WC-10	N	DF/PINE	X		Brushy, burned this year; most timber in creek bottoms
NWNE	9/21/18	175 MBF	RF-60, YP-40	N	DF/PINE			Scattered timber; little brush
SWNE	9/21/18	650 MBF	RF-60, YP-30, SP-5, C-5	N	DF/PINE			Good pine & cedar along creek
SENE	9/22/18	425 MBF	RF-65, WC-20, YP-5, SP-10	N	DF/PINE	X		Partly burned this year
NENW	9/20/18	125 MBF	RF-60, YP-20, WC-20	N	DF/PINE			Timber along creek only
NWNW	9/19/18	350 MBF	RF-50, YP-35, SP-15	N	PINE	X		Very good YP
SWNW	9/19/18	850 MBF	RF-60, SP-15, YP-20, WC-5	N	DF/PINE			South side open; spring
SENW	9/20/18	475 MBF	RF-85, YP-10, SP-5	N	DF/PINE			Good YP
NESW	9/20/18	525 MBF	RF-85, YP-10, SP-5	N	DF/PINE			Scattered, fair timber
NWSW	9/19/18	350 MBF	RF-60, SP-20, YP-20	N	DF/PINE			Poor timber; small slide in NW corner
SWSW	9/19/18	250 MBF	RF-50, SP-20, YP-30	N	DF/PINE			Scattered timber; 50 cords of black oak
SESW	9/20/18	400 MBF	RF-70, SP-5, YP-20, WC-5	N	DF/PINE			Scattered timber
NESE	9/22/18	325 MBF	RF-75, YP-15, WC-10	N	DF/PINE			Scattered timber
NWSE	9/21/18	775 MBF	RF-95, WC-5	N	DF/PINE			Timber along creek; scattered on hillside
SWSE	9/21/18	425 MBF	RF-95, WC-5	N	DF/PINE			
SESE	9/22/18	500 MBF	RF-45, YP-35, SP-20	N	DF/PINE			Scattered timber
Section Notes: Red fir on side hills is coarse and defective; the white cedar along creek bottoms is fair but does not compare to coast cedar.								
39-7-15								
NWNE	10/4/18	450 MBF	RF-90, SP-10	N	DF/PINE			Good pine
SWNE	10/4/18	175 MBF	RF-10, SP-30, YP-60	N	DF/PINE			Brushy; scattered timber
SENE	10/5/18	360 MBF	RF-90, SP-5, YP-5	N	DF/PINE			Quite open; poor fir

Vegetation Condition Circa 1918 (Interpretation of Revestment Notes)								
Legal	**Survey Date**	**Volume**	**Volume Percent**	**Mature**	**Plant Series**	**Burn**	**Mine**	**Remarks**
NENW	10/4/18	600 MBF	RF-90, SP-10	N	DF/PINE			Open from ridge south
SENW	10/4/18	150 MBF	RF-30, YP-50, SP-20	N	DF/PINE			Scattered, scrubby timber
NESE	10/5/18	325 MBF	RF-75, SP-10, YP-15	N	DF/PINE			Very scattered pine
SESE	10/5/18	150 MBF	RF-15, SP-35, YP-50	N	DF/PINE			Quite open
Section Notes: Sparsely timbered; good for grazing. Fir along N. slope is fair quality.								
39-7-21								
NENE	10/5/16	0		N	OAK			Scrub oak
SWNE	10/5/16	20 MBF	SP-100					
SENE	10/5/16	25 MBF	YP-100	N	DF/PINE			Reforesting with 4-10” red fir
NWNW	10/5/16	80 MBF	SP-35, YP-65	N	DF/PINE			
SWNW	10/5/16	210 MBF	SP-40, YP-35, RF-25	N	DF/PINE			
NWSW	10/5/16	40 MBF	YP-100	N	DF/PINE			30” Trees
NESE	10/4/16	0	RF-95, YP-5	N	DF/PINE			Reforesting with 4-10” red fir
NWSE	10/5/16	25 MBF	YP-100	N	DF/PINE	X		
39-7-23								
NWSW	9/23/18	325 MBF	RF-95, YP-5	N	DF/PINE	X		Burned last year, clearing brush
SWSE	9/23/18	550 MBF	RF-90, YP-10	N	DF/PINE			Scattered timber
Section Notes: Two isolated 40s on a hill overlooking Sucker Cr. Poor grade fir and badly scattered pine.								
39-7-25								
NENE	9/17/18	100 MBF	RF-100	N	DF			Badly scattered timber
NWNE	9/17/18	825 MBF	RF-85, YP-5, SP-5, WC-5	N	DF/PINE			Brushy; 30-50” timber
SWNE	9/17/18	575 MBF	RF-50, SP-25, YP-15, WC-10	N	DF/PINE			Heavy brush in SW
NENW	9/15/18	675 MBF	RF-75, SP-20, YP-5	N	DF/PINE			Brushy
NWNW	9/16/18	725 MBF	RF-60, SP-25, YP-15	N	DF/PINE	X		Partly burned this year
SWNW	9/16/18	200 MBF	RF-60, SP-25, YP-15	N	DF/PINE	X		Heavy brush, scattered timber, burned this year
SENW	9/16/18	305 MBF	RF-60, SP-25, YP-15	N	DF/PINE	X		“
NESW	9/17/18	100 MBF	RF-75, YP-25	N	DF/PINE	X		Partly burned this year; large fir
NWSW	9/18/18	100 MBF	RF-50, SP-25, YP-25	N	DF/PINE	X		
SWSW	9/18/18	390 MBF	RF-95, SP-5	N	DF/PINE	X		Fire this year cleared brush & burned most timber W. of ridge

Vegetation Condition Circa 1918 (Interpretation of Revestment Notes)								
Legal	**Survey Date**	**Volume**	**Volume Percent**	**Mature**	**Plant Series**	**Burn**	**Mine**	**Remarks**
SESW	9/18/18	225 MBF	RF-90, YP-10	N	DF/PINE	X		Heavy brush except for the part burned this year; spring
NWSE	9/17/18	310 MBF	RF-90, YP-5, SP-5	N	DF/PINE	X		Scattered timber; brushy except for the part burned
SWSE	9/18/18	300 MBF	RF-90, YP-10	N	DF/PINE	X		Scattered timber; partially burned this year
SESE	9/18/18	625 MBF	RF-80, SP-10, WC-10	N	DF/PINE	X		Heavy brush except for the part burned
Section Notes: Defective, poor grade timber. Timber is in patches on hillsides with large brush openings in between and fair quality fir along creeks.								
39-7-35								
NENE	9/26/18	150 MBF	RF-70, YP-15, SP-15	N	DF/PINE	X		Brush land w/ scattered timber; burned clear this year
NWNE	9/26/18	575 MBF	RF-70, YP-15, SP-15	N	DF/PINE	X		Badly burned N. of creek
SENE	7/14/25	320 MBF	RF-80, YP-15, SP-5	N	DF/PINE	X		Dense brush; scattered timber
NENW	9/26/18	300 MBF	RF-70, YP-25, SP-5	N	DF/PINE	X		Scattered timber; partially burned this year
NWNW	9/26/18	200 MBF	RF-25, YP-50, SP-25	N	DF/PINE	X		Scattered timber; partially burned this year
39-6-15								
NENE	6/15/20	1880 MBF	RF-95, SP-5	Y	DF/PINE			14-44”
SENE	6/15/20	2600 MBF	RF-95, SP-5	Y	DF/PINE			22-48”
40-7-1								
SENE	7/15/25	440 MBF	RF-85, YP-10	N	DF/PINE			Scattered timber; dense brush
NWNW	7/13/25	390 MBF	RF-80, SP-5, YP10, RC-5	N	DF/PINE			Scattered timber; dense brush
SWNW	7/13/25	410 MBF	RF-90, POC-5	N	DF/PINE			Scattered timber; dense brush
39-6-3								
NESW	7/14/25	60 MBF	RF-60, YP-40	N	DF/PINE			Scattered timber; open glades & brush
Totals Ninety-one 40 acre segments (3,640 acres) were suryeyed between 1918 and 1925. 10% would be considered mature stands by today’s standards. 3080 acres (84%) were DF/Pine dominated. 1000 acres (27%) indicated fire activity.								

Appendix G: Stream Temperature – Sucker Creek