WEST FORK ILLINOIS RIVER
WATERSHED ASSESSMENT

United States Department of the Interior
Bureau of Land Management
Medford District Office
3040 Biddle Road
Medford, Oregon 97504

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Dear Reader:

The West Fork Illinois River Watershed Analysis (Iteration 1.0) document was completed in June 1997 to provide an ecological context for proposed mineral development, including management recommendations. The focus of iteration 1.0 was the serpentine portion of the watershed on Forest Service lands. The purpose of the current document and analysis is to expand on this earlier analysis by adding the lower elevation BLM land areas. It identifies the various ecosystem components in the lower elevation areas of the West Fork Illinois River fifth field watershed and their interactions at a landscape scale. The analysis looks at historical ecological components, current ecological components and trends. It makes recommendations for future management actions that could be implemented to reach recommended ecological conditions.

As you read this document, it is important to keep in mind that the watershed analysis process is an iterative process. As new information becomes available, the watershed analysis will be updated. It is also important to keep in mind that **this analysis document 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 assessments and formal decision records as required by the National Environmental Policy Act (NEPA), will take these conflicts into consideration. Project planning and land management actions would also be designed to meet the objectives and directives of the Medford District Resource Management Plan (RMP).

This watershed analysis will thus be used as a tool in land management planning and project implementation within the West Fork Illinois River Watershed on Bureau of Land Management (BLM) administered lands. Although ecological information, discussions and recommendations are presented at the landscape scale largely irrespective of administrative ownership, please understand that the BLM will only be implementing management actions on the lands it administers.

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 within the watershed, we would appreciate hearing about them.

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INTRODUCTION

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

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. The West Fork Illinois River Watershed Analysis iteration 1.0 document was completed in June 1997 to provide an ecological context for proposed mineral development, including management recommendations. The focus of iteration 1.0 was the serpentine portion of the watershed on Forest Service lands.

This current watershed analysis will thus document the past and current conditions of BLM administered lands in the West Fork Illinois River Watershed, both physically and biologically. It will interpret the data, identify trends, and make recommendations on managing this watershed toward the desired future condition.

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. From these, key issues will be identified that will 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 of these important ecosystem functions 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 identifies some recommendations for the West Fork Illinois River Watershed taking into account land management objectives and the demand for the watershed's resources. These recommendations will guide management of the watershed's resources toward desired future conditions.

Two key management documents are frequently referred to throughout this analysis. These are:

1. *The Record of Decision for Amendments to U.S. Forest Service and Bureau of Land Management Planning Documents Within 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 Within the Range of the Northern Spotted Owl* (April 13, 1994) (NFP)

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

The West Fork Watershed Analysis Iteration 1.0 (June 1997) is also frequently referenced.

West Fork Illinois River Watershed Analysis
Interdisciplinary Team Members

The following resource professionals are members of the watershed analysis team which prepared the current document:

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Brad Washa	--	Fuels and Fire
Leslie Welch	--	Terrestrial Wildlife and Habitats

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 Illinois River basin or province; 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 Northwest Forest Plan objectives and 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 West Fork Illinois River Watershed is located within the Klamath Mountain Physiographic Province of southwestern Oregon. It is in Josephine County, approximately 25 miles southwest of the city of Grants Pass (Appendix A, Map 1). This 5th field watershed makes up an upper portion of the Illinois River Sub-basin (4th field watershed).

Approximately 14 million years ago, tectonic uplift began and was subsequently shaped by water erosion and deposition into a mountainous terrain with a relatively broad valley floor in the part downstream from O=Brien. Elevation ranges from 1,280 to approximately 4,800 feet. Stream surveys have been completed on approximately 112 miles of waterways, including 19 miles of the West Fork of the Illinois River. Approximately 25% of these waterways provide salmonid habitat. Soils formed from Klamath Province metasedimentary rocks in the southeast part of the watershed, ultramafic rocks mainly in the west (56% of the watershed), a small amount of marine sedimentary rocks between Waldo Hill and Logan Cut, and the broad valley bottom of mixed alluvial material between O=Brien and Cave Junction. The many different soils support diverse forested and non-forested vegetative types. Forests supply wood, recreation, and special products for human purposes 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 58 inches in the northeast to more than 130 inches in the far west (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 (37.8° F) and the highest in August (91.3° F).

D. OWNERSHIP

This West Fork Illinois River Watershed Analysis addresses all BLM lands within the 76,932 acre watershed. Table I-1 notes the general land ownership distribution within the watershed.

Table I-1: Land Ownership in the West Fork Illinois River Watershed

Land Ownership / Administration	Acres	Percent of Total
BLM	5,644	7%
Forest Service	43,500	57%
State/County and Private	27,788	36%
Watershed Total	**76,932**	**100%**

Map 2 (Appendix A) shows the location of BLM-administered land in the watershed.

The NFP and Medford District's RMP made a variety of land use allocations as a framework within which federal land management objectives vary. Table I-2 summarizes these allocations within the watershed. Map 2 (Appendix A) shows the location and distribution of the different land allocations.

Table I-2: Land Status - Land Allocations on BLM-Administered Lands

Land Use Allocation	BLM Acreage	BLM in Watershed	Comments
Matrix	3,622	64%	55.5% of matrix acres (2,009 acres) are withdrawn from the timber base
Special Areas (RNA, ACEC)	1,941	34%	Woodcock Bog RNA, Rough and Ready ACEC and the western portion of French Flat ACEC
Recreation and Public Purposes Lease	81	1%	Illinois River Forks State Park
Riparian Reserves	--	--	777 BLM acres included in other allocations
TOTAL - BLM	**5,644**	**100%**	

The West Fork Illinois River Watershed is a Anon-key watershed.@

There are 5,012 acres in the RMP-designated Illinois Valley Botanical Emphasis Area. These acres cross all other land use allocations in the watershed (USDI 1995).

Riparian reserves border all the streams on federal land in the watershed. These areas are a critical part of the NFP's Aquatic Conservation Strategy 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 structures and functions, benefit fish and riparian-dependent non-fish species, enhance habitats 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

Important federal laws pertinent to management of BLM lands in the watershed include the Clean Water Act (CWA), National Environmental Policy Act (NEPA), Federal Land Policy and Management Act (FLPMA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), and the Oregon and California Lands Act (O&C Act).

F. EROSION PROCESSES

The common erosion processes occurring in this watershed are concentrated flow erosion (sheet / 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 have concentrated runoff in unconsolidated ditches, diverting 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 is important as it 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 effectiveness. High road densities may activate this type of erosion especially during times of increased peak flows (see Road Density section below). Deep, fine-textured soils that occur at the base of upland areas on fans, foot slopes and terraces are most susceptible to stream bank erosion.

Mass movement processes in the watershed occur in the form of debris flows, block slumps, and earth flows. These phenomena occur in different areas and under different conditions but most involve water-saturated soil moving downhill. This type of erosion is important in that many tons of soil may be lost on the hillside. Furthermore, soil moving downhill eventually reaches a stream or waterway and can have detrimental effects. Soils that commonly occur in the watershed are deep on steep slopes.

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 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 timber harvest, road construction or fire.

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. The West Fork Illinois River Watershed has highly variable road densities. Three areas with high and very high road densities are Lower West Fork Illinois, Middle West Fork Illinois, and Elk Creek. Although some road designs are less impacting than others, in general, high road density and future road development are a concern because roads can intercept surface water and shallow groundwater, routing it to natural drainage ways, which concentrates and increases natural runoff and may cause erosion and sedimentation. Furthermore, peak stream flows may increase compared to stream flows in areas with few or no roads.

G. HYDROLOGY

The stream flow in this watershed 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. Streams flowing from the west side of the watershed, in serpentine areas, are particularly flashy and include Rough and Ready Creek, Upper West Fork of the Illinois, and Whiskey Creek. There are no stream gauges in this watershed.

H. WATER QUALITY

Water quality varies throughout the watershed. The West Fork of the Illinois River, Elk Creek, and Rough and Ready Creek (except North Fork of Rough and Ready Creek) are identified as water quality-limited under various criteria. Non-point water pollution has been identified as moderate to severe in these streams. The types of water quality and pollution are detailed in Chapter III, Current Condition. Observations indicate that other streams in the watershed may warrant examination for water quality limitations, particularly in areas of high summer temperatures, flow modification, and sedimentation.

Rough and Ready Creek is uncommonly clear. This may be due to the lack of disturbance in the watershed, or the dominant presence of ultramafic/serpentine soils. Water chemistry that is attributable to the breakdown of ultramafic/serpentine minerals may cause fine particles to aggregate and drop out of suspension before traveling down stream.

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: 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 a 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 a riffle / pool channel on low gradients with high width to depth ratios.

J. VEGETATION

The West Fork Illinois River Watershed is dominated by mixed conifer and mixed conifer / hardwood forests. Serpentine soils occur extensively in this watershed, particularly at the northwest, east, and western borders of BLM administered lands. These soils generally support the Jeffrey pine plant series but the Douglas-fir, Port-Orford Cedar, and Western White Pine series also occur (perhaps the only occurrence of the Western White Pine series on the Medford district). These serpentine communities are habitat for a number of rare plant species and rare plant communities.

Vegetative conditions across the landscape are highly variable. These conditions developed as a result of geologic conditions, climatic conditions, periodic disturbance and human influence (particularly mining). Existing forested areas date back to the cessation of mining, approximately 1870 - 1880 (Shenon 1933). Fire exclusion has resulted in significant increases in stand density (more stems per acre); shifts in species composition (*e.g.*, increases in fire-intolerant, shade-tolerant species); and changes in stand structure. These transformations have increased the forest=s susceptibility to large, severe fires, epidemic attack by insects and disease, and have affected the quality of the habitat for rare plant species present in the watershed.

Plant communities in the West Fork Illinois River Watershed have been affected by more direct human influences as well. Mining, logging, agriculture, road building and residential development have reduced the acres of late-successional forest within the watershed while increasing the acres in early seral stages. The West Fork Illinois River Watershed contains at least seven major plant series: Douglas-fir , Jeffrey pine, ponderosa pine, Port-Orford cedar, tanoak, white oak and Western White pine. Plant communities (associations) with the same climax dominant(s) are referred to as plant series. The Jeffrey pine series, for example, consists of associations in which Jeffrey pine is the climax dominant (Atzet and Wheeler 1984).

K. SPECIES AND HABITATS

1. Terrestrial

a. Special Status Plants

BLM administered lands lie in the lower elevations of the West Fork Illinois River Watershed. The native plants of the West Fork Illinois River Watershed have been studied by botanists since the late 1800s. Thomas Jefferson Howell identified many of the rarities of the Illinois Valley while living in the historic town of Waldo. The Rough and Ready Creek portion of the watershed was first recognized for its unique botany in the 1930s when the Illinois Valley Garden Club helped to designate the Rough and Ready Botanical Wayside on state of Oregon owned land. Since then the area has drawn amateurs and scholars alike to study the rare species that exist in the watershed. As mentioned in Version 1.0 of the West Fork Illinois Watershed Analysis, some of these species have the main portion of their known range within the watershed.

Version 1.0 lists the special status (or sensitive) species found on Forest Service lands in the watershed. On BLM lands, approximately 41% of lands have been formally surveyed for special status plants as a part of specific project planning work. Many portions of the watershed have, however, been informally surveyed as individuals report populations to the BLM. Over 200 populations of special status plants have been located on BLM land through project surveys or individual efforts. This means that there is roughly one rare plant population every 12 acres in the surveyed areas. Of these populations, twenty three species are represented under varying levels of protection, including Survey & Manage, federally endangered, state endangered, federal candidate, Bureau Sensitive, Bureau Assessment, Bureau Tracking and Bureau Watch. These numbers can only be considered a rough estimate of the actual number of populations and species in the watershed, because records for these species were not always reported completely under informal efforts.

Because of the high occurrence of special status species and their habitat available in the watershed, the possibility for creating special management areas for these species is very high. The majority of the watershed falls within the Botanical Emphasis Area designated by the RMP which states that all actions within the emphasis area must consider the habitat needs of the special status plants. Three special areas are designated under the Medford District RMP as well: the French Flat Area of Critical Environmental Concern (ACEC), portions of which are in the East Fork watershed; the Rough and Ready ACEC; and the Woodcock Bog Research Natural Area (RNA). Each represents different habitats in the watershed with high representations of special status plant species. Two other areas show potential for RNA designation: one in the Waldo Lookout/Allen Gulch area (this is mostly in the east Fork Illinois watershed), and one along the West Fork Illinois. Both of these areas offer unique serpentine plant associations that have either not been adequately described or have not been represented in the statewide Research Natural Areas.

b. Wildlife

The diversity of soil types and vegetative communities in the West Fork Illinois River Watershed provides potential habitat for a range of sensitive animal species. Relatively few formal wildlife surveys have been conducted in the watershed. Distribution, abundance and presence of the majority of the species are unknown.

Within the West Fork Illinois River Watershed, there are over 200 vertebrate and thousands of invertebrate wildlife species that might occur. This includes potential habitat for 46 vertebrate special status species (15 mammals, 19 birds, and 12 reptiles and amphibians). In addition, an array of Survey and Manage invertebrate species may occur in the vicinity (see Chapter III, 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 46 special status species, 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). The NFP has identified additional Survey and Manage wildlife species that probably occur in the watershed (see Chapter III, Current Condition).

2. Aquatic

The West Fork Illinois River Watershed comprises 20% of the Illinois River Sub-basin. The West Fork Illinois River Watershed is less productive for salmonids than the East Fork Illinois River Watershed. The watershed is dominated (56%) by serpentine conditions, which are characterized by a lack of many of the attributes of optimal salmonid habitat (USDA, USDI 1997). There are approximately 800 acres of riparian reserves on BLM land within the watershed. Approximately 80% of this area is comprised of White Oak and Jeffrey Pine plant series or is non-vegetated. Therefore, 80% of the BLM Riparian Reserve acreage is dominated by serpentine-influenced vegetation.

Factors such as stream temperature, number and depth of pools, large woody material, riparian complexity, road / stream crossings and sedimentation are key to the survival of salmonids and to fish productivity. Of these habitat factors, stream temperature is the factor most affected by past disturbance to the riparian areas. Rearing salmonids require a water temperature of 58°F for optimum survival condition. Stream temperature is primarily dependent upon the exposure of the water to direct sunlight. The shade component of a riparian area is determined by factors such as canopy cover, aspect, and channel valley form (V-shaped vs flat). In the riparian reserves on the National Forest lands in the watershed, over 66% of the largest trees have been removed compared to the pre-harvest condition (WFIWA 1.0). Although exact numbers are not known, Riparian Reserves on BLM land may have followed a similar trend. Riparian vegetation on perennial streams is currently dominated by sapling/pole and small size trees. Due to the exclusion of fire for the past 70 years, serpentine riparian zones have become increasingly dominated by shrubs, while non-serpentine riparian zones have become overly dense with encroaching trees.

3. Fluvial Streams

Cutthroat trout, winter steelhead, coho and chinook salmon are found in the West Fork Illinois River Watershed. Each is a cold water species and requires a complex habitat, especially in its early life stages. ODFW considers steelhead and coho populations in the watershed as declining (USDA, USDI 1997). 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 stream flows in the summer months; 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; channelization of streams in the canyons and lowlands; and blockages of migration corridors.

Most streams on BLM land in the watershed have not been surveyed for physical habitat. Several streams which have been surveyed for fish by other federal agencies have some portion of their length on BLM land (see fish distribution, Chapter 3).

L. FIRE

Fire has been identified as the key natural disturbance factors within the West Fork Illinois River Watershed. The majority of the West Fork Illinois River Watershed has historically experienced a low to mixed severity fire regime. Low severity fire regimes are associated with frequent fires of low intensity. Fire frequency in the watershed would be similar to the nearby Applegate River Watershed, which is estimated to have been 7-20 years at the elevations below 3,500 feet (USDA USDI, 1998). In a low severity fire regime most of the dominant trees are adapted to resist low intensity fire. One such adaptation is the development of thick bark at a young age. This limits overstory mortality and most of the fire effects occur on small trees in the understory. Fires in a low severity regime 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 keep sites open so that they are less likely to burn intensely even under severe fire weather conditions.

Fire regime modification in the Pacific Northwest, due to prolonged fire exclusion, has increased fuel loads and fuel continuity, resulting in more severe fire effects (Agee 1993). Furthermore, the pattern of frequent, low intensity fire ended. Dead and down fuel and understory vegetation are no longer periodically removed. This creates a trend of ever increasing amounts of available fuels. The longer interval between fire occurrences creates higher intensity stand-destroying fires 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). The significance of this is that the historic vegetative types that existed prior to Euro-American settlement cannot be maintained in the present fire regime that has resulted from fire exclusion. The serpentine communities are one such area within the watershed that is a fire dependent community. While much remains unknown about the interaction of fire within areas of serpentine, the presence of various fire adapted species indicate a strong adaptation to fire.
The Jeffrey pine series has a fire return interval of 20 to 50 years (Atzet and Wheeler 1982). Jeffrey pine associations are likely to support small, patchy fires and less likely to suffer catastrophic stand destroying fire due to low fuel loading and widely spaced canopies. Although most sites are open and quick to dry, little fuel is produced, and fuel continuity is usually lacking, resulting in low intensity fires that have not, in most cases, significantly altered species composition. Jimerson (1995) notes variable potential for fire exclusion to cause change in the successional pathways of the associations in his Jeffrey pine series in northern California.

Jimerson (1995) also describes shrubs invading and usurping space of herbaceous species within these Jeffrey pine series. Kagan (1989) speculated that *Senecio hesperius* abundance declined at Cedar Log Flat RNA in the absence of fire, as evidenced by extremely high cover of native grass. Borgias and Beigel (1996) observed that the dominant species of serpentine savannas regenerated readily following wildfire; however the effect of fire on special status plants of serpentine systems is uncertain (Jimerson 1995, Borgias and Beigel 1996).

Other fire adapted species within the serpentine community include western white pine and knobcone pine (*Pinus attenuata*). Knobcone pine is an obligate fire type with a strict closed-cone habit. Serotinous cones are one such adaptation towards fire that knobcone pine exhibit. This adaptation, along with the general absence of animal agents that might open cones, leaves the species dependent upon stand-destroying crown fire for reproduction. Fire creates seed bed conditions favorable for germination and seedling recruitment. Most plant species cannot compete with knobcone pine on such poor sites. The discontinuous nature of serpentine prevents all the pines in an area from being killed by any one fire (Vogl 1973).

Natural fires are probably less frequent in knobcone pine forests than in other western closed-cone communities (McCune 1988). The infertile sites where knobcone pine occurs support little undercover. Litter layers are usually moderate (Horton 1949). Fire is essential for the completion of knobcone pine's life cycle. Cones of senescent or dead trees must be opened by fire to perpetuate the groves before trees succumb and add the unopened cones to the decomposing litter (Vogl 1967).

M. AIR RESOURCES

Factors that affect air quality include meteorology and emission sources. Atmospheric stability is of primary importance in emission dispersal. The stability of the air determines the amount of vertical mixing that can occur, which disperses pollutants. Stable air prevents mixing and traps pollutants at the ground level. Unstable air facilitates mixing and dispersal of pollutants.

Seasonal patterns in weather and pollutant emissions influence air quality. The weather pattern in late fall and winter is one of periods of stable air occurring between storm events. These stable periods inhibit dispersion by reducing atmospheric mixing. During the winter, motor vehicles produce more carbon monoxide, and home heating produces fine particulate (PM_{10} and $PM_{2.5}$) when wood is used as a fuel. These factors combine to produce a higher pollution level for these pollutants during winter (ODEQ 1993).

Atmospheric ventilation is usually better during spring and summer. Less carbon monoxide and particulates are produced during this time. These pollutants are normally not a problem during these seasons (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 resulting "smog" are the major concerns in the summer season.

Pollution that impacts the Illinois Valley are 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 motor vehicles, motor boats, off-highway vehicles, and aircraft. The major impact to air quality in the Illinois Valley is smoke. Pollutants of concern include fine particulate (PM_{10} and $PM_{2.5}$) and carbon monoxide (CO).

N. HUMAN USES

The land ownership pattern of the West Fork Illinois River Watershed was molded in the late 1800's and early 1900's. The lands in the watershed in the mid 1800's were public lands owned by the United States and administered by the General Land Office. 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 West Fork Illinois River Watershed, it is apparent that ownership of several 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 dispersed recreation, timber production / harvesting, mining, light industrial uses, tourism, harvest of forest products and agriculture. Recreational use of the area is dispersed and includes off-highway vehicle (OHV) use, hunting, mountain biking and horseback riding. There are currently many non-designated trails and foot paths in the area. There is also evidence of historical uses of the watershed related mainly to mining.

II. KEY ISSUES

The purpose of this section is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the watershed (Federal Guide for Watershed Analysis, Version 2.2, 1995).

Key issues are identified in order to focus the analysis on the unique elements of the watershed. Key issues are addressed throughout the watershed analysis process within the context of the related core questions. The key issues identified are summarized in Table II-1. A short narrative which discusses the relevance of each key issue in the watershed follows this table. The issues are not presented in any order of relative importance.

Table II-1: Key Issues

Key Issues	Related Core Topic
Fire - The historic fire regime has been altered through fire exclusion and other management practices, impacting the flora, fauna and fire hazard. The wildland/urban interface has been identified as a Acommunity at risk@ in the National Fire Plan.	Vegetation, Species and Habitats, Human Uses
Ultramafic / Serpentine Soils - 54% of the watershed consists of ultramafic/serpentine derived soils. This is very high. It results in extensive unique serpentine plant communities and fragile soils with unusual restoration and management challenges.	Erosion Processes, Water Quality, Vegetation
Water Quality and Quantity - Issues include: high summer water temperatures, variable water clarity, flow modification, flashy stream flows, and unusual water chemistry in areas dominated by ultramafic/serpentine mineralogy.	Erosion Processes, Hydrology, Stream Channel, Water Quality, Species and Habitats (Aquatic)
Fisheries Values - Fisheries values are high. The majority of wild coho in the entire Rogue River Basin spawn in the Upper Illinois with approximately 10% of these spawning in the West Fork Illinois River Watershed. Elk and Wood Creeks, primary coho streams, are high priority for habitat maintenance and restoration	Stream Channel, Species and Habitats, Water Quality, Hydrology
Botanical Values - Botanical values are exceptionally high in the watershed due to a unique assemblage of plant communities, high incidence of rare plants, very high concentration of endemics, an RMP designated botanical emphasis area, potential RNA and global botanical significance (World Conservation Union).	Species and Habitat
Special Areas - There are three special areas (2 ACECs and one RNA) designated in the watershed. These sites have a high density of rare plants and unique assemblage of plant communities. These sites are also being impacted by incompatible uses such as OHV use, target shooting and illegal dumping.	Species and Habitat, Vegetation, Water Quality, Human Uses, Erosion Processes
Late-Successional Forest Habitat Connectivity - Late-successional forest patches are small, reducing connectivity in the watershed and between late-successional reserves for some species.	Vegetation, Species and Habitat
Cultural and Historic Sites - Many historical and cultural sites or features represent some of the best evidence of the region's past mining activity.	Human Uses, Vegetation, Stream Channel

A. FIRE

Fire exclusion has created vegetative and fuel conditions with high potential for large and destructive wildland fires that can be difficult to suppress. The watershed as a whole has a large area that is at a high risk of wildfire. Such high-severity, stand-destroying wildfire presents a threat to human life, property, and most resource values within the watershed. Management activities can reduce the potential for unwanted stand-destroying type fires through hazard reduction treatments. Public acceptance of these hazard reduction management activities will be critical for the long-term health and stability of the forest ecosystem within 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.

B. ULTRAMAFIC/ SERPENTINE SOILS

Fifty four percent of the total watershed (including USFS) consists of ultramafic/serpentine derived soils. The usual extent of these types of soils ranges from 20 to 35% within the Illinois River Sub-basin (except USFS, Middle Illinois, which has 50%). Issues include:

$ High extent of unique serpentine plant communities on fragile soils (see below)
$ Fragile soils (TPCC) with unusual restoration challenges due to high clay content, very little surface litter and duff protection of mineral soils.
$ Other management problems that include history of instability, low germination rates and slow growing rates of plants usually used for erosion control.

C. WATER QUALITY AND QUANTITY

Several streams are 303(d) listed as water quality limited due to high summer water temperatures: West Fork Illinois River, Rough and Ready Creek, and Elk Creek. High water temperatures in the streams in the watershed may be due to agricultural water withdrawals, loss of riparian vegetation, and naturally occurring low percentage of riparian canopy cover in serpentine areas.

The West Fork Illinois River is 303(d) listed for flow modification. There is extensive stream flow modification on the low gradient streams in the watershed. This may result in very low summer stream flows. There are agricultural withdrawals, and some mining ditches that intercept runoff and divert stream water causing reduced stream flows.

Highly variable levels of water clarity have been recorded within the stream network which may correlate with soil mineralogy. Flashy flows are common for streams that generally flow out of subwatersheds that are dominated by ultramafic/serpentine soils. Unusual water chemistry (aluminum, chromium, nickel, and magnesium) also typifies watersheds dominated by ultramafic/serpentine soil

(Rough and Ready Creek Watershed).

D. FISHERIES VALUES

The anadromous fishery of the Illinois River Sub-basin is viewed as a stronghold for wild anadromous fish repopulation in the Rogue River Basin. The West Fork Illinois River Watershed produces an estimated 10% of the coho in the Illinois River Sub-basin. Most of these are produced in Elk Creek. Both Elk and Wood Creeks are of high value for coho production and have a high priority for maintenance and restoration of habitat. Habitat factors which limit production on these creeks are associated with water withdrawal and removal of riparian vegetation. The ownership along Elk Creek and its tributaries is primarily private. Historic mining ditches may intercept flows and increase the drainage network. In the case of Logan Cut, the ditch provides additional fish habitat. Rough and Ready Creek subwatershed comprises close to one-third of the West Fork Illinois River Watershed, yet little is known about the character of its anadromous fishery and little data is available. There are five diversions for water withdrawal on Rough and Ready Creek. Two of the diversions may act as migration barriers to juvenile salmonids.

E. BOTANICAL VALUES

The West Fork Illinois River Watershed is one of the most botanically rich watersheds within the Medford District. This is due to the juxtaposition of serpentine to forested habitats throughout the watershed. The majority of the watershed falls in the Resource Management Plan designated Botanical Emphasis Area. The majority of the special status species found are endemic to the serpentine soils of the Klamath-Siskiyou ecoregion. This ecoregion was designated as an area of global botanic significance by the World Conservation Union (DellaSela et al. 1999). Protection of the serpentine habitats in this watershed is of high priority because of the rarity of most of the special status species. Threats include mining, OHV damage and encroachment of serpentine openings by shrubs due to fire suppression. Other special status plants are found in the forested habitats of the watershed especially along forest edges and others are found in the remnants of valley oak savannah found in the watershed.

F. SPECIAL AREAS

There are three designated special areas in the watershed. These sites represent unique plant communities and have a preponderance of rare plants but are often adversely impacted by damaging activities such as OHV use, target shooting and illegal dumping. There are 488 acres of the French Flat ACEC in the watershed. Issues surrounding this area include OHV damage to the meadows and rare plants. Rough and Ready ACEC is entirely in the watershed. Issues surrounding this ACEC include mining claims, illegal dumping, and inappropriate OHV use. Woodcock Bog RNA is in the northern part of the watershed. Issues surrounding this area include right of way requests and past illegal water diversions.

G. LATE-SUCCESSIONAL FOREST CONNECTIVITY

Douglas-fir mature and late-successional habitat connectivity in the watershed is primarily influenced by the following factors: 1) the extensive serpentine influenced soils and, 2) human activities such as logging, mining, agriculture and land development.

Approximately 54% of the watershed has serpentine influenced soils. While serpentine sites may produce late-successional forests, they seldom produce Douglas-fir late-successional forest habitat. This type of late-successional forest habitat is typically characterized by large diameter trees (<21"), canopy closure <60%, complex vertical structure and both snags and down wood. On non-serpentine sites, the quantity and distribution of late-successional forest habitat has been heavily modified by human activities including a long history of fire suppression and exclusion.

H. CULTURAL AND HISTORIC SITES

There are a number of historical and cultural sites / features in the watershed. The majority of these sites and features are related to mining. These sites include a portion of the proposed National Register historic district in section 15 and 22 and 33, Logan Cut mining ditch, the Waldo Cemetery and the Wimer Road, a stage route to the coast. These sites, especially the proposed historic district, are some of the best examples of mining history in the region as discussed in the Draft Management Plan for the Historic Waldo Placer Mining District (completed in August 2000, and the National Historic Nomination (submitted to the Oregon State Historic Preservation Office in August 2000).

III. CURRENT CONDITION

A. PURPOSE

The purpose of this section is to develop detailed information relevant to the key issues and to document the current range, distribution, and condition of the relevant ecosystem elements.

B. CLIMATE

The West Fork Illinois River 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 20 to 25% of the watershed is above 2,500 feet and in elevation in the transient snow zone (TSZ). The TSZ is where shallow snow packs accumulate and then melt throughout the winter in response to alternating cold and warm fronts. Most of the TSZ is in the west portion of the watershed. Average annual precipitation in this watershed ranges from approximately 58 to 130+ inches. The least amount of rain falls in the northeast portion of the watershed and the most, in the far west portion of the watershed at higher elevations.

C. 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 to occur. Streambank erosion is a function of exposed use streambanks 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 which allows for detachment of soil particles that travel as sediment in the flowing water. Sediment is then deposited where flow rates diminish.

Areas that are particularly susceptible to concentrated flow erosion consist of soils of variable parent materials on steep slopes. The following general soil groups fall into this category: All steep (>35% slope) soils or ultramafic, metamorphic, and gabbro diorite parent materials (see Soil Depth and Parent

Material map in USFS West Fork Illinois River Watershed Analysis). Of these, the soils derived from Gabbro and Diorite are most erosive due to low cohesiveness and minimum levels of organic binders in the upper layer. Also of concern are the soils derived from ultramafic minerals. These soils have high magnesium content and low calcium. Plant communities usually contain only a few species that grow slowly and are tolerant of this condition, arranged in a scattered distribution. This results in thin duff and litter layers. These soils have surface textures ranging from gravelly sandy loam to cobbly clay loam. These soils have high erosion hazard due to the severity of the slope. The steep slopes give flowing water high erosive energy as it increases 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 (see Road Density discussion below).

b. Streambank Erosion

Another process that commonly occurs in the watershed is streambank erosion. This is the loss of streambanks through sloughing, block failure or scouring by high stream flows.

In this watershed, streambank erosion occurs as a result of high peak stream flow combined with exposed deep, fine, and medium-textured soils that make up the streambanks where streams are Rosgen type A or B (see Stream Channel section below). The watershed experienced a 30 to 40 year storm event in January, 1997. This is an example of an event that would generate high peak stream flows that may have caused streambank erosion in this watershed at sites where bank protection and root strength were limited. The following general soil groups are susceptible: All soils that are greater than 40 inches deep.

c. Mass Movement or Mass Wasting

Forms of mass movement that may occur in the watershed include debris flows, block slumps, and earthflows. These usually occur rapidly and during periods of deep saturation (*e.g.,* the latter half of winter and early spring). A debris flow is a moving mass of soil, rock, and plant material that moves relatively linearly downslope. They often remove all vegetation and scour the bottom to bedrock. This leaves a steep-sided draw with or without intermittent stream flow. Soils most susceptible to debris flow are those formed in gabbro and diorite parent material. A block slump is a type of landslide that occurs on the side of a slope where a block or large mass of soil and weathered parent material moves downslope leaving a slip plane. This results in a bulge or bench on the slope with an over-steep headwall above it. Parts of the slump may continue to move in a series of episodes leaving a step appearance and several benches. Soils most susceptible to block slumps are those that are formed from metamorphosed parent material and occur on steep slopes. Earthflows are characterized by over-thickened clay-rich soils that, when saturated, will Aooze@ slowly downslope. Soils most susceptible to earthflow are deep, clayey soils formed in ultramafic and metamorphic parent material.

There have been no surveys of mass movement features on BLM land. The FS has observed mass movement features in the Elk Creek subwatershed and historic features in the Rough and Ready subwatershed (See Physical Settings section of Iteration 1.0 (USDA-USDI 1997)

2. Road Densities

Roads on sloping ground intercept surface water and shallow groundwater. The water is commonly routed by the road to a draw or other natural drainageway that is part of the natural stream system. This process causes drainage water to reach streams quicker than would naturally occur. The more roads that exist in a particular area, the more the increase of peak stream flow. With an increase of peak stream flow, streambanks are more susceptible to erosion as the stream channel adjusts to the change in flow pattern. Additional stream sediment caused by this phenomenon comes predominately from eroded streambanks. Other sources of stream sediment are the road surface, slough from steep road banks, and eroded channels created by flows at drainage outlets downslope.

The above gives a general perspective on high road densities. Road design and locations on the landscape, however, produce varying effects. For example, an outsloped road with waterdips, a rocked surface and outlet filters would produce fewer effects than a lower slope natural-surfaced road with ditches. This is because of differences in proximity to the stream system, degree of concentration / distribution of surface water flow due to road design, and differences in the amount of protection of the road surface.

When measured at the 6th field sub-watershed level within the West Fork Illinois watershed, there is a large range of road densities: from low (about 2 miles / square mile) to very high (over 6 miles / square mile). Generally, the higher road density areas are on non-BLM land. The subwatersheds with high to very high road densities (based on available data) include the Lower West Fork Illinois, the Middle West Fork Illinois, and Elk Creek.

D. HYDROLOGY

Map 8 includes those streams for which hydrologic data is available. There are approximately 93 miles of order 2 through 6 streams shown on Map 8. There are 19 miles of the West Fork of the Illinois River in the mapped area.

Stream orders are defined by how many streams come together to create a larger stream. A stream that is at the headwaters and has no tributaries is a first order stream. When two first order streams flow together at the point that they join, the stream becomes a second order stream, and so on.

First and second order streams in the watershed have a major influence on downstream water quality since they comprise an overwhelming majority of the total stream miles in the planning area. Beneficial uses by these streams include aquatic species and wildlife. Most first and second order streams in the watershed are characterized by intermittent and ephemeral stream flow. They are generally very narrow and V-shaped with steep gradients. Large woody debris, which dissipates stream energy and slows channel erosion, is a key component of these headwater streams. The amount of large woody debris in first and second order streams in the planning area has been reduced as a result of timber harvest and prescribed burning. This loss of woody debris contributes to reduced channel stability and increased sediment movement downstream during storm events (USDI 1994).

Third and fourth order streams comprise roughly 20 to 30% of the stream miles in the watershed. Many of these streams support fish or directly contribute to the water quality of fish-bearing streams. Third and fourth order streams are generally perennial, fairly narrow, have stream gradients of less than 5%, and have U-shaped channels. During winter storms, these streams can move large amounts of sediment, nutrients, and woody material. Channel condition of these streams varies and depends upon the inherent channel stability and past management practices. The amount of large woody debris contributed to these streams has been reduced by past management practices in the riparian areas (USDI 1994).

Fifth and sixth order streams make up less than 10% of the stream miles in the watershed. These streams support fish and provide other beneficial uses. Fifth order and larger streams tend to be wider, have flatter gradients and have a noticeable floodplain. Flood events play a major role in the channel condition of these larger streams. Actions on adjacent upland areas and on non-BLM-administered land have adversely affected some of these stream segments (USDI 1994).

Forest stands along all streams on BLM-administered land generally contain trees of sufficient size to provide a future source of large woody debris. However, past practices such as salvage logging from stream channels, leaving inadequate numbers of conifers in riparian areas, and removing debris jams to improve fish passage have reduced the amount of large woody debris in fifth order and larger streams (USDI 1994).

E. WATER QUALITY/QUANTITY

Water quality varies throughout the West Fork Illinois River Watershed. The Oregon Department of Water Quality (DEQ) has monitored or collected water quality data from various sources on the streams and water bodies of 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". The most recent stage of this process has been the publication for public review of Oregon's 1998 Section 303(d) Decision Matrix by the DEQ.

Table III-1 lists those streams in the West Fork Illinois River Watershed currently listed as water quality limited. It is based on the DEQ's 1998 303(d) List Decision Matrix.

Table III-1: Oregon DEQ=s 303(d) Listed Streams				
Stream & Segment	**Parameter / Criterion**	**Basis for Consideration**	**Supporting Data or Info**	**Listing Status**
West Fork of Illinois River: Mouth to California Border	Flow Modification Summer Temperature (Fish Rearing, 64°F)	IWR often not met; Flow Data(USGS) USFS & Krebs Data	Depressed populations of Coho (ODF&W) Exceeded Std. 1992, 1996	303(d) 303(d)
Elk Creek: Mouth to Calif. Border	Summer Temperature (Fish Rearing, 64°F)	USFS	Exceeded Std. 1993, 1996	303(d)
Rough and Ready Creek: Mouth of North/South Confluence	Summer Temperature (Fish Rearing, 64°F)	Krebs & Audubon Society	Exceeded Std. 1992, 1996	303(d)
South Fork Rough and Ready Creek	Summer Temperature (Fish Rearing, 64°F)	Audubon Society	Exceeded Std. 1996	303(d)

Streams that are 303(d) listed are water quality limited. They are required to be managed under Water Quality Management plans. Because the West Fork Illinois River is the mainstem stream in this watershed, all streams that feed into the river will be included in the Water Quality Management Plan. It does not, however, appear that many of the streams in this watershed were included in the original inventory as there is no data available. This includes Woodcock Creek and Mendenhall Creek. These streams appear to be possible candidates for testing of temperature, sedimentation and flow modification. Wood Creek has the status of "Need Data" (303d category). It is a candidate for water quality limited status (Flow Modification, Habitat Modification, and Temperature) but, due to insufficient data, a determination was not possible when the list was made. Future data collection may change this status.

1. Water Temperature

Many factors contribute to elevated stream temperatures in the West Fork Illinois River Watershed. Low summer stream flows, hot summer air temperatures, low-gradient valley bottoms, some south aspects, lack of riparian vegetation, and high channel width-to-depth ratios result in stream temperatures that can stress aquatic life. Natural conditions that can affect stream temperature are climate (high air temperatures), below-normal precipitation (low flows), wildfire (loss of riparian vegetation) and floods (loss of riparian vegetation). Human disturbances affecting stream temperatures include water withdrawals, channel alterations and removal of riparian vegetation through logging, mining, grazing or residential clearing (USDI 1998a). Logging, mining, and residential clearing are the three forms of human disturbance that are most evident in this watershed. Some streams in natural (undisturbed) condition may have temperatures that exceed DEQ standards due to lack of vegetation for shade, particularly in rocky, serpentine areas, and warm summer temperatures in this watershed.

The DEQ has established that the seven (7) day moving average of the daily maximum shall not exceed the following values unless specifically allowed under a Department-approved basin surface water temperature management plan:

- 64° F
- 55° F during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels.

2. Water Clarity and Sediment

Rough and Ready Creek is uncommonly clear. The West Fork Illinois River Watershed Analysis version 1.0 lists NTU readings for various streams (samples taken in January, 1995). Rough and Ready Creek, by far, had the least turbidity. This difference is attributed to the lack of disturbance in Rough and Ready Creek subwatershed while other subwatersheds were subject to varying amounts of disturbance. Soils with high subsurface clay are most likely to create turbidity (USDA; USDI 1997). Though disturbance levels may be low in the Rough and Ready Creek subwatershed, the ultramafic/serpentine soils are high in subsurface clay and the surface mineral soil is commonly exposed in openings, in areas where there is little vegetation.

Another factor causing high clarity may be the unusual water chemistry attributed to weathering of ultramafic/serpentine minerals. USGS has tested water chemistry at various sites in the Rough and Ready Creek system. When compared to background levels, test levels of stream water had high levels of Chromium, Nickel, and Magnesium in a base solution dominated by carbonates (USGS 1998). In this aqueous environment, these elements can occur as multivalent cations that attract multiple clay particles. These large clay aggregates drop out of suspension, forming sediment. There is no known field survey information that corroborates this hypothesis.

For further discussion of sediment in streams and sources of sediment see Forest Service watershed analysis (version 1.0) for this watershed.

3. Stream Flow

Stream flow in tributary streams fluctuates with the seasonal variation in precipitation. Generally, tributary streams respond quicker to a storm then the mainstem stream. Streams on the west side of the West Fork Illinois River Watershed drain predominately ultramafic/serpentine uplands with clayey soils and where stream flow is particularly flashy.

Logan Cut is an old (roughly 100 years) mining ditch located in T40S, R8W, sections 9, 10, and 15. It takes water out of the East Fork of the Illinois Watershed and shunts it over to the West Fork of the Illinois. It is acting as a perennial interrupted (pools remain in the dry period) fish stream. Logan Cut is augmenting flow to West Fork of the Illinois River as it withdraws water out of the East Fork system. Logan Cut is a deep straight channel located on a gently sloping terrace and alluvial fan.

a. Peak Flow

Maximum peak flows generally occur in December, January and February. No flow data specific to the West Fork Illinois watershed is available. The maximum flow in the last 38 years of flow gage data on the Illinois River 2.5 miles northwest of Kerby, is 92,200 CFS on December 22, 1964 (USGS 2000).

Upland disturbances can result in increased magnitude and frequency of peak flows which may result in accelerated streambank 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.

Much of watershed, and particularly the west portion of it, is made up of ultramafic/serpentine soil (USDA, USDI 1997). A great deal of this area is sparsely vegetated especially where soils are shallow, less than 20 inches to weathered bedrock. The combination of shallow clayey soils and lack of vegetative cover is indicative of low overall water retention. During storms much of the precipitation will run off the surface. Also, 30 to 40% of the same west portion of the watershed is subject to rain on snow events, that is, it is located in the Transient Snow Zone (TSZ). Rain on snow events amplify surface runoff especially in open areas with little canopy cover and therefore amplify peak stream flows.

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 (forest product harvest and conversion of sites to agricultural use), and rural development. Quantification of these effects on stream flow in the watershed is not available. Roads quickly intercept and route subsurface water 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 within 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 within this watershed has not been quantified for BLM and private lands. Overall, however, as there has been little past management on BLM lands instances of significant soil compaction are unlikely.

Vegetation removal reduces water interception and transpiration and allows more precipitation to reach the soil surface and drain into streams or become groundwater. Until the crown closures reach previous levels, a site is considered to be hydrologically unrecovered. 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 transient snow zone is of particular concern due to alterations of the stream flow regime and resultant increased peak flow magnitudes (USDI 1998a).

No hydrologic cumulative effects analysis (*e.g.*, extent of equivalent clear cut area, compacted area, TSZ, and road density by subwatershed) has been performed for the West Fork Illinois River Watershed.

b. Low Flow

There is no stream flow gage data for the West Fork of the Illinois River or its tributaries. Low summer flows in the West Fork Illinois River Watershed reflect low summer rainfall and are exacerbated by periods of below-normal rainfall. The lowest flow recorded since 1962 downstream of the watershed in the Illinois River at a gauge site 2.5 miles northwest of the town of Kerby was 12 cubic feet per second on August 24, 1992 (USGS 2000).

4. 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. Quality is also probably variable due to the presence of serpentine/ultramafic rock and the related minerals. Water rights have been issued for some fens in the watershed. However, right of way authorization has not been acquired from BLM.

F. STREAM CHANNELS

A system of stream classification has been developed by Rosgen that is useful in assessing various types of streams as to their sensitivity to disturbance and their recovery potential. Table III-2 provides a description of the classifications for the type of streams common in the watershed. The classifications are symbolized by a combination of letters and numbers. The first letter represents the stream type; the number represents the channel material.

Table III-2: Rosgen Stream Classification		
Stream Type	**General 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 West Fork of the Illinois River is stream type C or straightened type which may be a type F. Some segments in the upper part, upstream from Rough and Ready Creek appear to be stream type B flowing through old stream terraces. Table III-3 indicates how streams of these types typically behave.

Table III-3: Rosgen Management Interpretations of Various Stream Types					
Stream Type	**Sensitivity to Disturbance**	**Recovery Potential**	**Sediment Supply**	**Streambank 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

Ref.: Rosgen, D. *Applied River Morphology*

G. VEGETATION

1. Description

Vegetation data on BLM land was compiled in 2000. The plant series listed below were identified and mapped within the West Fork Illinois River Watershed.

Basal area (BA) provides a relative measure of site productivity and is used here. 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 series is named for. The following discussion indicates the relative productivity of each of the series in the watershed.

a. Douglas-fir (*Pseudotsuga menziesii* ((Mirb.) Franco.))

Douglas-fir is the most common tree species in southwestern Oregon. Sites within the Douglas-fir series average 254 ft^2BA / 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. Jeffrey Pine (*Pinus jeffreyi* (Grev. & Balf.))

The Jeffrey pine series is confined to areas of ultramafic (serpentine and serpentine influenced) soils (Atzet and Wheeler 1982). Serpentine areas dominated by Jeffrey pine may have the lowest productivity of any conifer series in the Klamath Province with an average basal area of 83 ft^2/acre (Atzet and Wheeler 1984). While not considered important in terms of timber production, these sites are floristically diverse supporting many special status plants. They also have value as unique habitats for a variety of wildlife species.

c. Ponderosa Pine (*Pinus ponderosa* (Laws.))

Forests in the ponderosa pine series average approximately 170 ft^2BA/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 over the last 70 years, overall cover of ponderosa pine has decreased (Atzet and Wheeler 1982).

d. Tanoak (*Lithocarpus densifloras* (Hook. & Arn.) (Rehd.))

In general tanoak sites are considered productive. Average total basal area for this series is 262 ft2/acre (Atzet and Wheeler 1984). The tanoak series occurs where both 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 the success of fire suppression efforts over the last 70 years, overall presence of this species has increased in the watershed.

e. White Oak (*Abies concolor* ((Gord. & Glend.)Lindl.))

The white oak series occurs at low elevations and is characterized by shallow soils. Average basal area is 46 ft^2/acre. Although Oregon 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 better 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 repeated natural occurrence (Stein 1990). The natural fire regime of this series is one of high frequency and low intensity. Due to the success of fire suppression efforts over the last 70 years, overall presence of this species has decreased in the watershed.

While not formally mapped in the watershed, the Port-Orford cedar series is present as inclusions in larger mapping units. Port-Orford cedar (POC) requires high daytime humidity. Consequently, POC is associated with stream channels, lower slope positions, or other areas that meet the humidity criteria.

Port-Orford cedar has the ability to tolerate the chemical composition of ultramafic soils and can compete well there as long as the above mentioned humidity criteria are met. Productivity on ultramafic soils is lower than that seen on non-ultramafics. Basal area averages about 166 ft^2/acre on ultramafic soils compared to 401 ft^2/acre on non-ultramafic soils (Atzet and Wheeler 1984). Port-Orford cedar is susceptible to an exotic pathogen, *Phytophthora lateralis* (PL), which is present on both Forest Service and BLM lands within the watershed. Areas with POC downstream from or adjacent to PL infestations are considered to be at risk.

Also present in the West Fork Illinois River Watershed, is what appears to be the first mapped occurrence of the western white pine series on the Medford District. The series has been located along the West Fork of the Illinois River. It appears to be a riparian plant community as its location is closely aligned with the channel of the river. Jimerson (1995) found that stand replacement fires occurred with regularity within this series in northwestern California between 1820 and 1910. After 1910, fire events were of lower intensities, perhaps the result of fire suppression. The occurrence of knobcone pine with western white pine in the West Fork Illinois River Watershed lends support to the conclusion that stand destroying fires took place. Overall, productivity in this series is low, averaging 122 ft^2 BA/acre.

Knobcone pine has serotinous cones which usually require the high temperatures from fire to open and disperse seed. The presence of knobcone pine indicates high intensity fires have occurred there in the past. Knobcone pine occurs in one plant association in the western white pine series and two plant associations in the Jeffrey pine series. In all cases, the overall cover is low (less than 10%) and the constancy is high, with knobcone pine occurring in at least 67% of the plots in these 3 associations.

Tables III-4 and III-5 summarizes the extent of each of these series and vegetation condition class in the West Fork Illinois River Watershed on other than Forest Service lands. Plant series acres for the all Forest Service lands and all lands in California are a data gap.

Table III-4: Major Plant Series on Lands other than Forest Service Lands

Plant Series	BLM		Non-Federal		BLM and Non-Federal	
	Acres	%	Acres	%	Acres	%
Douglas-fir	1,808	32%	6,166	38%	7,975	36%
Jeffrey pine	3,047	53%	2,290	14%	5,337	24%
Non-Vegetated, Non-Forest, or Grass	150	3%	3,557	22%	3,707	17%
Ponderosa pine	63	1%	62	0%	125	1%
Tanoak	479	9%	4,252	26%	4,731	21%
Unknown Series - Riparian Hardwood	32	1%	0	0%	32	0%
White Oak	65	1%	128	1%	193	1%
Totals	**5,644**	**100%**	**16,455**	**100**	**22,100**	**100%**

Data Source = BLM GIS

Table III-5: Vegetative Condition Class On Non-Forest Service Lands						
	BLM		Non-Federal		BLM and Non-Federal	
Vegetative Condition Class	Acres	%	Acres	%	Acres	%
Grass or Forb (Vegetation Class 1)	132	2.3%	36	0.2%	168	0.8%
Shrub (Vegetation Class 2)	1,163	20.6%	965	5.9%	2,128	9.6%
Hardwood dominated (Vegetation Class 3)	146	2.6%	189	1.1%	335	1.5%
Early (stand age < 10 years) (Vegetation Class 4)	17	0.3%	21	0.1%	38	0.2%
Seedling/Sapling (aver. stand DBH < 5") (Vegetation Class 5)	157	2.8%	158	1.0%	315	1.4%
Poles (average stand DBH 5" to 11") (Vegetation Class 6)	374	6.6%	845	5.1%	1,219	5.5%
Mid (average stand DBH 11" to 21") (Vegetation Class 7)	2,485	44.0%	9,473	57.6%	11,958	54.1%
Mature (average stand DBH > 21") Vegetation Class 8)	1,020	18.1%	1,247	7.6%	2,267	10.3%
Non-Vegetated - Vegetation Class 9 (never vegetated and never will be)	150	2.7%	247	1.5%	397	1.8%
Developed/Vegetated (Vegetation Class 10)	0	0.0%	3,274	19.9%	3,274	14.8%
Total	**5,644**	**100%**	**16,455**	**100%**	**22,099**	**100%**

Table III-6 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-6: Plant Series Acres by Vegetation Condition Class on BLM Lands				
	Matrix		Riparian Reserves	
Plant Series/Vegetative Condition Class	Acres	% by series	Acres	% by series
Douglas-fir - Vegetation Class 4	17	<1%	0	0%
Douglas-fir - Vegetation Class5	131	8%	16	12%
Douglas-fir - Vegetation Class 6	374	23%	0	0%
Douglas-fir - Vegetation Class 7	518	31%	87	64%
Douglas-fir - Vegetation Class 8	613	37%	33	24%
Total Douglas-fir	1,653	100%	136	100%
Jeffrey Pine - Vegetation Class 1	0	0%	3	<1%
Jeffrey Pine - Vegetation Class 2	991	40%	141	32%
Jeffrey Pine - Vegetation Class 7	1,482	60%	300	68%
Total Jeffrey Pine	2,473	100%	444	100%
Non-Vegetated - Vegetation Class 9 (never vegetated and never will be)	29	100%	121	100%
Total Non-Vegetated	29	100%	121	100%
Ponderosa Pine - Vegetation Class 2	30	63%	0	0%
Ponderosa Pine - Vegetation Class 7	17	35%	6	43%
Ponderosa Pine - Vegetation Class 8	1	2%	8	57%
Total Ponderosa Pine	1,653	100%	14	100%
Riparian Hardwood Vegetation Class 3	1	100%	31	100%
Total Riparian Hardwood	1	100%	31	100%
Tanoak - Vegetation Class 3	48	10%	0	0%
Tanoak - Vegetation Class 7	70	15%	5	31%
Tanoak - Vegetation Class 8	344	75%	11	69%
Total Tanoak	462	100%	16	100%

Table III-6: Plant Series Acres by Vegetation Condition Class on BLM Lands				
Plant Series/Vegetative Condition Class	Matrix		Riparian Reserves	
	Acres	% by series	Acres	% by series
White Oak - Vegetation Class 3	49	100%	16	100%
Total White Oak	49	100%	16	100%

2. Landscape Patterns

a. Precipitation Gradient

There is a strong precipitation gradient within the watershed. Annual rainfall amounts range from approximately 130" per year in T41S, R9W, Section 9 to less than 60" annually in T40S, R8W, Section 33; a distance of less than 10 air miles. To further illustrate this point, T41S, R9W, Section 9 has a change in rainfall amount from 128" per year at the northeast corner to 100" annually at the east section line; a change of 28" of precipitation in one air mile.

b. Serpentine Soils

There is an extensive acreage of serpentine soils present in this watershed. This type of soil occurs on approximately 43,000 acres within the watershed or 56% of the acres. These soils provide habitat for a number of rare plant species. More than half of the BLM lands within the West Fork Illinois River Watershed are serpentine (54% or 3,047 acres). This compares to about 14% of non-Federal acres (2,290 acres). Distribution of serpentine soils is along both the western and eastern boundaries of the analysis area.

c. Small Diameter Trees

In terms of acreage, the most common size of trees within the watershed is between 5 and 21" DBH. Trees in this size class occur on about 60% of the watershed: 13,177 acres. On non-Federal lands, 10,318 acres (62.7% of all non-Federal acres) and on BLM lands, there are 2,895 acres (50.6 % of BLM acres) in this size class. This size class occurs throughout the watershed including near the towns of Cave Junction and O=Brien.

d. Early Seral Stage

One of the least common tree sizes within the watershed is less than 5" DBH (353 acres or 1.6% of the acres analyzed). There are 179 acres (1.1%) of the total non-federal acres in a <5"DBH size class. For BLM land, 174 acres are classified in this diameter range (3.1% of all BLM acres). Most of these units / acres are the result of past timber harvest activities.

e. Plant Series

The three most common plant communities within the watershed are Douglas-fir, Jeffrey pine, and tanoak. Together they make up 81.6% of the watershed or 18,043 acres. The Douglas-fir series is most common, occurring on 36.1% of the acres or 7,975 acres. On non-Federal lands, this series is found on 6,166 acres of 37.5 % of non-Federal lands. On BLM lands, the Douglas-fir series is found on 32.0% of the acres for a total of 1,808 acres. The second most common plant series in the watershed occurring on approximately 24.1% of the acres is Jeffrey pine. Amounts and distribution of this series is listed above under AB. Serpentine Soils@. The third most common plant series in the watershed is tanoak. This plant series occurs on 4,731 acres within the watershed or 21.4% of all the acres analyzed (approximately 90% non-federal).

f. Late-Successional Habitat in Riparian Reserves

Within Riparian Reserves, approximately 76.5% of the acres (595 acres) are not capable of providing Douglas-fir late-successional forest habitat (multiple canopy layers and canopy closures over 60%). These acres are in the ponderosa pine, Jeffrey pine, and white oak series or are currently non-vegetated in vegetation condition class 9. Out of the 23.5% (183 acres) of the Riparian Reserves that are capable of supporting Douglas-fir late-successional forest habitat, 5.7% (44 acres) is currently in vegetation class 8.

g. Western White Pine

A small amount of the western white pine series has been located in T.41S, R. 9W, section 9 along the West Fork of the Illinois River. This is the first identified occurrence of this plant community on the Medford District.

h. Port-Orford Cedar / *Phytophthora lateralis*

There is a small amount of POC present in the watershed. *Phytophthora lateralis* (PL) is also present. Only those areas below the confluence of Whiskey Creek and the West Fork of the Illinois River (T.41S, R.9W, section 9), including the Whiskey Creek fen, and along the West Fork of the Illinois River have been identified has having the root disease present.

H. SPECIES AND HABITATS

1. Botanical

a. Introduction

The responsibilities of the federal agencies include the active management of special status species and their habitats, Survey and Manage species and their habitat, special areas and native plants. The following are special status protection categories used as guidelines for management of special status species and their habitats.

Listed and proposed listed species are formally listed by the U.S. Fish and Wildlife Service (USFWS) as endangered or threatened or officially proposed for listing. The goals are to enhance or maintain critical habitats, increase populations of threatened and endangered plant species on federal lands, and to restore species to historic ranges consistent with approved recovery plans and federal land use plans after consultation with federal and state agencies.

Survey and Manage species were identified by the Northwest Forest Plan (NFP) ROD (Record of Decision) as needing special management attention (USDA; USDI 1994). An amendment to the Survey and Manage guidelines was published in 2001. Categories A & C species must be managed at known sites or high priority sites and are located prior to ground-disturbing activities. Categories B, D & E do not require pre-disturbance surveys, but do require strategic surveys and management of known or high priority sites. Category F species only require strategic surveys and are without any specific management of known sites. Strategic surveys are region wide surveys and are not a focus at the project level scale. Their purpose is to collect information to help in determining the overall or range wide status of these species.

Candidate and Bureau-sensitive species are federal or state candidates and those species that BLM feels might become federal candidates. The broad goal is to manage habitats to conserve and maintain populations of candidate and Bureau-sensitive plant species at a level that will avoid endangering such species that could lead to listing as endangered or threatened by either state or federal governments.

State-listed species are those plants listed under the Oregon Endangered Species Act. Conservation will be designed to assist the state in achieving its management objectives.

Bureau Assessment species are those species considered by the BLM to be important species to monitor and manage, but not to the same extent 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 and **BLM watch species** are not currently special status species, but their locations are tracked during surveys to assess future potential needs for protection.

Only about 41% of the watershed (roughly 2,300 acres) has been surveyed for special status and survey & manage vascular and non-vascular plants. Most of the BLM lands in the watershed have not been surveyed. Informal inventories by amateur and professional botanists have resulted in some species populations reports, mostly in special areas where visitors are drawn. From the BLM surveys and informal inventories, over 200 populations of Special Status or Survey and Manage vascular and non-vascular populations have been found.

Table III-7 lists the 23 special status species that have been found in the West Fork Illinois River Watershed. Nine of these species were already listed in West Fork Illinois Watershed Analysis Version 1.0 (USDA 1997) as species with a large proportion of their range within the watershed. Two more species have since been added to this category.

Table III-7: Plant species found in West Fork Illinois River Watershed

Vascular Species	Protection Status	Habitat	Considerations
Lomatium cookii Cook=s desert parsley	Federal Candidate State Endangered	Valley grassland/oak savannah	Populations greatly threatened by OHVs.
Cypripedium fasciculatum clustered lady slipper	Survey and Manage Bureau Sensitive	Mixed conifer/tanoak forests	Species cannot be treated with fire.
Cypripedium montanum mountain lady slipper	Survey and Manage Bureau Tracking	Mixed conifer forests	Very few occurrences in southern Oregon.
**Erythronium howellii* Howell=s fawn lily	Bureau Sensitive	Forest edges	Narrowly restricted endemic.
**Viola primulifolia ssp. occidentalis* western bog violet	Bureau Sensitive	Pitcher plant fens in serpentine	Very few known sites.
**Epilobium oreganum* Oregon willow-herb	Bureau Sensitive	in or adjacent to pitcher plant fens; wetlands	Very few known sites.
**Gentiana setigera* Waldo gentian	Bureau Sensitive	Pitcher plant fens in serpentine	Larger range than other fen species.
**Hastingsia bracteosa* *& H. bracteosa var. atropurpurea* large & purple flowered rush lily	Bureau Sensitive	Pitcher plant fens in serpentine	Narrowly restricted endemic with very few known sites.
**Calochortus howellii* Howell=s mariposa lily	Bureau Sensitive	Dry serpentine grasslands	Most known sites in the Illinois Valley.
**Senecio hesperius* Siskiyou butterweed	Bureau Sensitive	Dry serpentine grasslands	Numerous populations.
**Microseris howellii* Howell=s microseris	Bureau Sensitive	Dry serpentine grasslands	Numerous populations; grows with above 2 species.
**Streptanthus howellii* Howell=s streptanthus	Bureau Sensitive	Dry serpentine	Narrow endemic.
Limnanthes gracilis var. gracilis slender meadowfoam	Bureau Sensitive	Wet areas in serpentine and non-	Range goes north of Grants Pass.
Fritillaria glauca Siskiyou fritillaria	Bureau Assessment	Dry serpentine openings	Occurs outside of Illinois Valley
Monardella purpurea Siskiyou monardella	Bureau Assessment	Dry serpentine openings	Few known sites in SW Oregon.
Delphinium nudicaule red larkspur	Bureau Assessment	Grasslands, openings	Uncommon in SW Oregon.

Salix delnortensis Del Norte willow	Bureau Assessment	Riparian; creekbeds	Few known sites.
**Carex serpenticola* serpentine sedge	Bureau Tracking	Dry serpentine	Newly recognized species.
Darlingtonia californica California pitcher plant	Bureau Watch	Wetlands, both serpentine and non-	Uncommon throughout range.
Cypripedium californicum California lady slipper	Bureau Watch	Wetlands, riparian, streambanks	Uncommon in SW Oregon.
Non-Vascular Species	**Protection Status**	**Habitat**	**Considerations**
**Pseudoleskeela serpentinense*	Bureau Sensitive	serpentine rock outcrops	Limited to serpentine
Dendriscocaulon intricatulum	Survey & Manage (D)	oaks beneath conifer canopy	Most populations found here and north to Grants Pass only
Bryoria tortuosa	S&M (D)	serpentine shrubs	Numerous populations in IV and outside of IV

* denotes species with a large portion of their range in the West Fork Illinois River Watershed

Besides the 23 species noted above, many other Bureau Watch species also occur in the West Fork Illinois River Watershed. An entire list of known or possible BLM and Forest Service sensitive, tracking and watch species can be found in the East Fork Illinois Watershed Analysis.

Table III-8 lists all Survey and Manage species that could occur in this watershed based on habitat potential. Although two of the vascular plants are repeated from the above table, more habitat information specific to the BLM lands in the watershed is given.

Table III-8: Survey and Manage Vascular Plants, Lichens, Fungi and Bryophytes Suspected to Occur in the analysis area	
Species and Status	**Habitat**
Vascular Plants	
Wayside aster *Eucephalus vialis*	Coniferous forest at elevations from 500 to 3,150'. Occurs on dry upland sites dominated by *Pseudotsuga menziesii*, in canopy gaps and forest edges. East Fork Illinois WS
Clustered lady's slipper *Cypripedium fasciculatum*	Old-growth forest; dry or damp, rocky to loamy sites; 60-100% shade. Elevation 1,300 to 7,300 feet. Blue Creek, Waldo area.
Mountain lady's slipper *Cypripedium montanum*	Old-growth forest; found on moist sites but may occur on dry sites in other parts of its range. Elevation 650 to 7,000 feet. Waldo area/Waldo Hill.
Howell's lousewort *Pedicularis howellii*	Dry ridges, open-red fir forests, at elevations ranging from 4,500 to 6,500 feet. Unknown.
Bryophytes	
Green bug moss *Buxbaumia viridis* Protection Buffer	Occurs on rotten wood and on mineral or organic soil, in cool, shaded locations. Floodplains and stream terraces. Elevation 3,500 to 5,000 feet.
Liverwort *Kurzia makinoana* Survey and Manage	Especially moist low elevation stream terraces. In our forest 60 miles inland. Elevation 300 to 1,200 feet.
Pacific fuzzwort *Ptilidium californicum* Survey and Manage	Grows on conifer bark and logs, requiring cool, moist conditions. Has been found on Brewer spruce and Chinquapin in our forest at elevations ranging from 3,000 to 6,000'.
Moss *Rhizomnium nudum* Protection Buffer	On moist but not wet organic soils, sometimes among rocks or rotten logs, sometimes along streams, mostly in middle to high elevation forests.
Moss *Tetraphis geniculata* Protection Buffer	Occurs on rotten wood, prefers the cut end of old-growth logs, in cool, humid, shaded locations at low to middle elevations. A closed canopy provides the best micro climate.
Fungi	
Aleuria rhenana Protection Buffer	Accumulated duff and humus in low to mid elevation mixed conifer or conifer-hardwood forests.
Noble polypore *Bridgeoporus nobilissimus* S&M and ext. survey	Pacific silver fir zone including *Abies amabilis, A. procera,* and possible *Pseudotsuga menziesii.*
Bondarzewia montana Survey and Manage	Late-successional conifer forests, often associated with stumps or snags.
Otidea leporina Protection Buffer	Conifer duff
Otidea onotica	Conifer duff. Occurring in Josephine county.

Protection Buffer	
Otidea smithii Protection Buffer	Conifer duff.
Sarcosoma mexicana Protection Buffer	Dead conifer litter.

b. Noxious Weeds and Exotic Plants

Complete field surveys have not been conducted in the watershed but past surveys in the district have shown several species of noxious weeds and common exotics present (see Table III-9).

Table III-9: Known or Possible Noxious Weeds or Exotic Plants

Species	Habitat
Bromus tectorum Cheat grass	Disturbed areas.
Centaurea sp. Knapweed	Disturbed areas, meadows, roadsides.
Centaurea solstitialis yellow star-thistle	Disturbed areas, alongside roads, river corridor.
Circium vulgare bull thistle	Every road, landing seems to have at least one plant.
Cystisus scoparious Scotch broom	Old homesteads, mining areas, along roadsides, some campgrounds.
Elytrigia intermedia intermediate wheat grass	Introduced grass for revegetation purposes.
Holcus lanatum velvet grass	Introduced grass for feed and revegetation purposes.
Lathyrus latifolius everlasting peavine	Has invaded seeps, springs, meadows, and streams around culverts.
*Hypericum perforatum*Klamath weed	Along roads, landings, meadows, skid trails and plantations.
Rubus discolor Himalayan blackberry	Patches along roadsides, disturbed areas, homesteads, seeds carried by birds.
Taraxacum officinale dandelion	Meadows, a few scattered plants.
Trifolium repens white clover	Introduced wildlife species to improve habitat.
Verbascum thapsus mullein	Introduced with cattle feed, spread to plantations. Has become an important wildlife food source.

c. Habitats

The following habitats harbor many special status plants on BLM lands. Although habitats have been identified, inventory work to determine the quality of these habitats is lacking.

1) Serpentine Habitats

The watershed has both wet and dry serpentine habitats suitable for several special status species that may or may not be species endemic to this watershed. The species inhabit these ultramafic soils sites because of soil mineral imbalances that prevent dense, more common vegetation from growing. The plants can be found in forest openings, rock outcrops, grasslands or barrens.

The key indicator species for dry serpentine sites on BLM West Fork watershed lands are: Siskiyou fritillary, Howell's fawn-lily, Howell's microseris, Howell's streptanthus, Siskiyou butterweed, Siskiyou monardella and Howell's mariposa lily.

Key indicators for serpentine wetlands are: Oregon willow herb, Waldo gentian, California pitcher plant, Del Norte willow, large-flowered rush lily, serpentine sedge and western bog violet. Ephemerally wet serpentine soils may also harbor such species as slender meadow foam.
Both wet and dry serpentine areas are sometimes incidentally disturbed or destroyed by road building, skid trails, mining, OHVs or other related activities. Some of the low elevation serpentine barrens were intensively disturbed by hydraulic mining in the 1930s. These areas, especially in areas with mine tailings, have yet to recover naturally.

2) Riparian Habitats

Riparian habitats throughout the watershed may be suitable habitat for California pitcher plant, California lady's slipper, large flowered rush lily, Del Norte willow, Oregon willow-herb, slender meadow-foam, Cook=s desert parsley and western bog violet. Perennial riparian habitat is in the form of riverine forests, streambanks, spring-fed seeps, pitcher plant fens and meadows. Riparian habitats have been disturbed through agricultural developments, housing developments, mining, skid trails and OHV use.

3) Forested Habitats

Forested habitats are scattered throughout the watershed on BLM lands. Forests can be dominated by Douglas-fir or tanoak. Many have edges adjacent to serpentine openings; therefore serpentine-influenced soils can exist. These forested habitats carry the legacy of effects from timber harvesting, mining, wildfire and fire suppression. Other impacts are related to recreation and road building. Howell=s fawn lily, clustered lady's slipper and mountain lady's slipper prefer forested habitat.

4) Valley Bottom Grassland / Savannah Habitats

As with the East Fork Illinois BLM lands, nearly pristine valley grasslands still occur under BLM jurisdiction in the West Fork Illinois River Watershed. The best occurrence of this habitat is in the French Flat ACEC where the ponderosa pine-white oak-wedgeleaf savannah still exists. This type of savannah is considered critically imperiled globally. The bunch grass understory supported by this habitat also harbors Cook=s desert parsley which is proposed for federal listing. The tufted hairgrass-oatgrass wet meadow community also occurs in the low elevation lands of the BLM. Both of these habitats are highly threatened by development and OHV impacts.

d. Special Areas

The 10,613 acre Illinois Valley Botanical Emphasis Area covers a large portion of BLM lands in the watershed. This management area was designated through the Medford District Resource Management Planning process because of the prevalence of sensitive plants. The RMP states that actions including timber harvest will be allowed if they do not conflict with the habitat needs of these species. As stated above, the habitat quality of many sensitive species in the watershed is unknown. Although the Botanical Emphasis Area, which encompasses most of the watershed at lower elevations (below 1,500'), allows for the consideration of all special status species when projects are planned, no specific management or protection are required by this designation. Besides this designation, however, three special areas have been designated which allow for more specific management and protection actions to take place.

The Rough and Ready ACEC covers 1,164 acres of alluvial serpentine terrace along Rough and Ready Creek. This area was built upon the original Rough and Ready Wayside managed by the State of Oregon to further protect the numerous rare wildflowers that had become a focal point for visitors. A management plan for the ACEC was completed in 1998. It calls for closing of roads to protect the area from dumping and OHV use. The plan also lays out a prescribed fire program to help maintain serpentine savannahs that have been encroached upon by shrubs or trees due to past fire suppression. This will help promote high quality habitat for numerous special status plants.

The 656 acre French Flat Area of Critical Environmental Concern (ACEC) is located on BLM lands as well. The area encompasses the best remaining examples of the full array of valley bottom plant communities. These communities include tufted hairgrass-California oatgrass wet meadow, ponderosa pine-white oak/wedgeleaf savanna, ponderosa pine-black oak-madrone woodland, Jeffrey pine-manzanita-bunch grass savanna and low elevation mixed conifer forest. The site supports one federally proposed species, Cook's desert parsley, and several Bureau sensitive species including Howell's microseris, Howell's mariposa lily, Siskiyou butterweed, slender meadowfoam, Howell's fawn lily, and opposite leaved lewisia. The main issue facing French Flat ACEC is recreational vehicle / OHV impacts. The BLM officially closed the road into French Flat through the Federal Register in 1992. Gating and fencing has since been installed, yet trespass vehicle entry continues, leaving portions of the ACEC heavily damaged.

The 264 acre Woodcock Bog RNA also occurs in this watershed. The Woodcock Bog is one of the largest fens on BLM land and harbors all five Bureau Sensitive fen species (*Viola primulifolia ssp. occidentalis, Epilobium oreganum, Gentiana setigera, Hastingsia bracteosa,* and *H. bracteosa var. atropurpurea)*. These species are included in a Conservation Agreement (in preparation) between the BLM, the US Forest Service and the US Fish and Wildlife Service which states that the agencies agree to protect these species and their habitats from activities that could lead to their listing. A Conservation Strategy is also being developed that will lay out a strategy of protection, management and long-term monitoring with the Woodcock Bog as one of the critical habitat areas. The RNA does not have public access except by permission of the adjacent landowners. It is still threatened by water diversions and right-of-way requests for logging operations.

A 400 acre potential Research Natural Area has been identified on BLM lands. This area is primarily in the East Fork Illinois watershed in the vicinity of Allen Gulch and extends west towards the Waldo Hill lookout and into the West Fork. This RNA encompasses both unique forested and serpentine habitats. The forested portion consists primarily of the late-successional tanoak-Douglas-fir-canyon live oak-poison oak plant community. It is characterized by large diameter tanoak, although other forms of tanoak are present. Sensitive species such as clustered lady's slipper, mountain lady's slipper, and Howell's fawn lily occur in forested portions. The serpentine portion of this site combines wet and dry serpentine habitats. The wet serpentine area has not yet been described to plant association level. It encompasses a unique combination of shrub and herbaceous species not found in other portions of the watershed. Current issues in this area include mining and potential thinning activities.

A second potential RNA along the West Fork Illinois south of O=Brien has been identified. This area consists of an entire section of serpentine which includes western white pine plant associations. The western white pine plant associations have not been adequately represented in the statewide array of RNAs. The area also harbors several pitcher plant fens with many Bureau Sensitive species and a high diversity of dry serpentine savannah species.

2. Wildlife

a. Special Status Species and Habitats

1) Habitats

Wildlife habitats of southwest Oregon are extremely complex. Terrain, climatic factors and vegetation combine to create the diversity of habitats found from the valley floor to the peaks of the Siskiyou Mountains.

Habitats found throughout the West Fork Illinois River Watershed include meadows, riparian areas, oak stands, Jeffrey pine savannah, serpentine communities (*i.e.*, serpentine barrens) and a variety of other unique areas. The West Fork Illinois River Watershed is characterized by coniferous forest and serpentine associated communities.

The West Fork Illinois River Watershed does not include any designated spotted owl Critical Habitat Units. Designated Late-Successional Reserve does occur in the watershed but is located entirely on Forest Service lands.

Approximately 54% of the watershed has ultramafic soils. These serpentine / peridotite areas are characterized by edaphic endemic plants, complex vegetative patterns, shrub dominated communities and Jeffrey pine forests. The vegetation series occurring on these sites do not have the potential for attaining old growth forest conditions.

Outside of the serpentine influenced sites, there are coniferous forests ranging in age and structure. The forests in the watershed have a significant component of hardwood trees, particularly tanoak, that contribute to structural and vegetative diversity.

The plant communities and habitats occurring in the watershed support an array of native wildlife. During their lifetime, animals require food, water, shelter and space to breed and raise young. Some species have adapted to a particular habitat (specialists) while others 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.

Habitats that are of concern in the West Fork Illinois River Watershed include late-successional forest, meadows, pine stands, oak woodlands, serpentine sites, and riparian habitat. All of these habitats have been impacted by both natural processes and human activity in the watershed.

a) Valley Habitats

The watershed is characterized by numerous drainages flowing toward the mainstem of the West Fork Illinois River. These drainages are typified by a limited area of valley habitat and steep forested hillsides. Development and agricultural use is limited in the watershed. Where flat terrain does exist, it has, for the most part, has been developed. Undisturbed native valley habitats are scarce and occur primarily on federally-managed land.

Fire exclusion may adversely affect the remaining undisturbed valley habitats. Because non-stand replacing 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 three of the five critical habitats by the Oregon/Washington neotropical bird working group. It is assumed that further losses of these habitats would have a negative impact on neotropical migrant birds.

In southwestern Oregon, native valley habitats have shown some of the greatest declines of any plant communities. Due to the changing nature of private land management, the remaining tracts of public land are critical for insuring that this habitat and the biodiversity it supports continues to be represented in the valley. These stands provide 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)* and grey fox *(Urocyon cinereoargenteus)*.

b) Upland Habitats

Most of the federally administered lands in the watershed are found above the valley floor. Here, forests dominate the landscape, with numerous species of conifers, hardwoods, shrubs, and herbaceous plants. 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.

Habitats within the uplands include late-successional forests, meadows, riparian areas, Jeffrey pine savannahs, and oak woodlands that all add diversity to the landscape. Natural disturbances such as fire, wind damage, insects and disease are needed to generate and maintain a number of plant communities and habitats.

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

To facilitate mining activities and timber extraction, numerous roads were constructed throughout the uplands. For species such as black bear, any remaining areas with low road densities offer important refugia from human disturbance.

Areas with high road densities contribute to disturbance and fragmentation of late-successional forest patches. Roads decrease the effectiveness of a number of habitats. Roads also lead to increases in vehicular/human disturbance and provide access for poaching.

c) Aquatic Habitats

Riparian areas are one of the most heavily used habitats found in the watershed, both by humans and by wildlife. Many life cycle requirements of animals are met in these areas. Aquatic and amphibious species are intrinsically tied to these habitats, as are all 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 stands of conifers to bare streambanks. Most of the private riparian is dominated by hardwoods and young conifers. Riparian areas on federal lands are generally in better condition than private, but still have been affected by past practices such as mining and timber harvest.

On National Forest lands in the watershed, Riparian Reserves with perennial streams are dominated by sapling/pole (43%) and small (23%) size trees. The Riparian Reserves of these streams on BLM lands appear similar based on GIS images generated by the Forest Service (USDA; USDI 1997), but BLM data indicate that perennial stream Riparian Reserves on BLM lands are dominated by small trees (51%) and shrubs (18%), and have almost no sapling/pole acreage (2%).

The amount of water allowed to flow from the source to the West Fork Illinois River strongly influences the usefulness of streams to aquatic species. During low flow periods, water withdrawals can determine the absence/presence of many aquatic species.

d) Specialized/Sensitive Habitats

Special and unique habitats include the following: 1) naturally scarce habitats (caves, springs, mineral licks, etc.) 2) rare habitats resulting from human influence on the environment (low elevation old-growth, oak/grasslands, etc.) 3) rare habitats due to the influence of natural cycles (snags, meadow production, bogs, etc.). Often, these habitats receive a greater 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 West Fork Illinois River Watershed contains a number of unique habitats. The continued maintenance of these habitats will determine the presence of many sensitive species. Relevant sensitive habitats are discussed below.

Late successional forests and habitat are characterized by different stand conditions. For example, late successional forests include all forest stands greater than 80 years old. Vegetation class descriptions relate simply to average tree diameter. They do not take into consideration many of the attributes that typify late succession habitats such as downed material, snags and understory structure which are not always present in 80+ year stands.

According to the vegetation condition class summary for the watershed, mature forests comprise approximately 1,020 acres of BLM lands. This represents approximately 1% of the 76,932 acre watershed and 18% of the BLM lands in the watershed. On non-federal lands, mature forests comprise approximately 1,247 acres and represent approximately 2% of the 76,932 acre watershed and 8% of total non-federal lands in the watershed.

In comparison, late-successional habitat is characterized by a multi-storied canopy, high canopy closure (>60%), large trees, snags and large down logs. For the purposes of this analysis, late-successional habitat will be considered to include those areas that have been rated as McKelvey #1 spotted owl habitat. Based on this, there are only 69 acres of BLM and private lands considered late-successional habitat in the watershed.

Over time, mature (>80 years) forested habitats acquire additional characteristics which lead to more complex and older forests. Unique forest attributes may be found at different ages, indicating it may be valuable to identify age classes within the watershed at additional scales, including 80-150 years, 150-200 years, and greater than 200 years.

For example, at 80 years, a forest will not have the complexity or diversity characteristics of an older forest. At approximately 150 years, forests enter a transition stage which more closely typifies an old growth condition, with canopy gaps developing as a result of the death of some large trees, understory trees forming multiple canopy layers, and subsequent accumulation of large woody material (FEMAT 1993). Disturbances such as insects, disease, wind, and fire also contribute to patchy openings.

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 American marten (*Martes americana*) and northern spotted owl (*Strix occidentalis*).

Small, fragmented stands may offer refugia for species with limited home ranges, but do not provide optimal habitat for species with larger home ranges. Large stands (>80 acres) are very important contributors to maintaining the biodiversity of the watershed. Isolated patches of old-growth habitat may also be too small to support the maximum diversity of species. In heavily fragmented environments, larger predators that naturally occur at low densities are lost first (Harris and Gallagher 1989).

On BLM lands in the West Fork Illinois River 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. Additionally, serpentine derived soils occurring throughout the watershed are not capable of producing late-successional habitat suitable for species such as the spotted owl.

Poor distribution reduces the value of forest patches for species associated with late succession/old growth interior forest habitat. This is particularly true for species with low dispersal capabilities such as the red tree vole and the Del Norte salamander.

Irregular shapes and small size patches increase the amount of edge associated habitat within a stand. This has created unsuitable habitat conditions for many late-successional forest-dependent species. Stands with a great deal of edge no longer function as interior forest and do not provide suitable habitat for species sensitive to edge effects. The micro-climatic changes of the "edge effect" can be measured up to three tree lengths in the interior of the stand (Chen 1991).

Compared to species associated with early successional stages, species that depend on late-successional forests are often poor dispersers and are more vulnerable to extinction in fragmented landscapes (Noss 1992). This is particularly true for flightless species such as the fisher (*Martes pennanti*). Fishers are reluctant to travel through areas lacking overhead cover (Maser et al. 1981) and are at risk for genetic isolation. Species that are more mobile, such as the spotted owl, may be capable of dispersing into isolated patches of habitat, but run a high risk of predation when crossing areas of unsuitable habitat.

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 Asource@ for breeding birds, when there is enough suitable habitat to recruit new individuals into the populations faster than individuals are lost.

Meadows within the West Fork Illinois River Watershed are typically associated with the valley floor and serpentine influenced soils. Earlier in the century, many natural meadows were converted to agricultural land by homesteaders. Due to the disruption of the natural fire cycle, the current most significant threat to this habitat is tree encroachment. 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*) and the American black bear (*Ursus americanus*).

Big game winter range in the West Fork Illinois River Watershed is in poor condition due to fire exclusion. 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. Winter range is defined as land found below 2,000 feet in elevation, but may extend higher in elevation on southern exposed slopes. Ideally, these areas offer a mixture of thermal cover, hiding cover and forage. Historically, the valley floor and adjacent slopes served as winter range for deer and elk. Much of the winter range has had an absence of fire for more than 50 years.

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).
Dispersal corridors provide hiding and resting cover. Dispersal and migration are key processes for wildlife within and through the watershed. This process is highly dependent on quality, quantity and spatial distribution of appropriate habitat through time. Species habitat requirements vary greatly and a single dominant vegetative structure will not meet the needs of all species.

Migration can occur at a localized level or at a regional level. Species migrating through the watershed on a regional level include animals as diverse as insects, bats and birds. Localized migration allows for species to take advantage of foraging opportunities and cover during inclement conditions. Localized dispersal of species is critical for ensuring gene flow and repopulation of uncolonized habitat.

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 within the watershed allow for localized dispersal as well as regional dispersal. Dispersal between drainages is also accomplished through low divides.

Because they often provide late-successional habitat, Riparian Reserves serve as important dispersal corridors across the landscape. However, on BLM lands in the West Fork Illinois River Watershed, riparian reserves are characterized by conditions not capable of providing late-successional habitat. On

BLM lands, only 183 acres of Riparian Reserve are considered capable of supporting late-successional habitat and of this only 44 acres are currently represented by stands with an average diameter >21".

At a landscape level, the watershed provides important connectivity between Late-Successional Reserves. The connection from the Cascades to the Coast Range along the Siskiyou crest was assumed to connect to the southern Siskiyou National Forest. This area of the Siskiyou National Forest is largely serpentine soil which is ineffective at producing dense conifer stands or characteristic spotted owl dispersal habitat of 11" average trees and a 40% canopy closure.

A spotted owl meta-population is more likely to persist if genetic interchange occurs between spotted owls within reserved areas and between ecological provinces (Thomas et al. 1990). 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).

Some examples of areas that provide dispersal habitat include the following:

T40S-R8W-Section 9 - This section provides riparian habitat connected to the Illinois River and extending to the northeast.

T41S-R9W-Section 12 and T41S-R9W-Section 13 - These two 40 acres sites include mature forest habitat located on ridges adjacent to Forest Service lands and allow for dispersal to riparian habitat on private lands.

T40S-R8W-Section 21 - The upper 40 acres (OI-001) provides ridge top habitat connected to Logan Cut and BLM lands to the north.

T40S-R8W-Section 20 - The lower 40 acres is (OI-001) part of a more extensive ridge system that provides dispersal opportunities to the north. Although small, the upper 40 acres is connected to riparian habitat associated with the Illinois River.

T41S-R9W-Section 15 - The northwest corner of this section (OI-001 and OI-003) provides riparian habitat associated with Blue Creek.

T41S-R8W-Section 10 - The southeast corner of this section (OI-003) provides riparian habitat associated with Blue Creek.

Within the watershed, many of the key "flow" locations have the potential to support older forest, but currently do not due to past management activities and other disturbance. Other remaining blocks of older forest that contiguously run from the valley floor to the higher mountain ridges allow for "the elevator effect" which permits for seasonal dispersal for late-successional species.

Dispersal and migration can occur at a localized level or at a regional level. On a regional level, species migrating through the watershed include organisms as diverse as insects, bats and birds. Localized migration allows for species to take advantage of foraging opportunities and cover during inclement conditions. Localized dispersal of species is critical for insuring gene flow and repopulation of uncolonized habitat.

Oak woodlands/savannahs are a rich resource providing nesting habitat, mast crop production, big game wintering range and sheltered fawning areas. Due to the exclusion of fire, many of these areas have been encroached by conifers. Federally administered stands of oak/grasslands are scattered throughout the watershed.

Mine adits play a critical role in the life history of many animals, providing shelter from environmental extremes, seclusion and darkness. Mines are the primary habitat for species such as the Townsend's big-eared bat *(Corynorhinus townsendii)*, a ROD buffer species 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 bats and den sites for porcupine *(Erethizon dorsatum)*. A number of mine adits are located on BLM lands within the watershed. Recreational use of mines limits their value for wildlife and displaces easily disturbed species.

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.

2) Wildlife Species

The high diversity of soil types and consequent vegetative communities and habitats in the West Fork Illinois River Watershed potentially provides for a wide variety of animal species. Relatively few formal surveys for wildlife have actually been conducted in the watershed. Distribution, abundance, and presence for the majority of species are unknown.

As many as 11 species of bats, 12 species of amphibians, 18 species of reptiles, hundreds of species of birds, and many thousands of species of insects may occur here. Some species of concern potentially occurring within the watershed include cavity nesters, band-tailed pigeons, and neotropical migrant birds. All but three indigenous mammals (grizzly bear, wolf and wolverine) are thought to have the potential to occur in the watershed.

Of the 46 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).

The NFP has identified additional "Survey and Manage" wildlife species that may occur in the watershed. Federal agencies are responsible for the active management of special status species and their habitats and Survey and Manage species and their habitat. 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.

Survey and Manage species were identified as needing special management attention by the Northwest Forest Plan in Table C-3 (USDA, USDI 1994c; SEIS 2001). (*Note:* updates to this list have occurred since this time.) These species must be managed at known sites and located prior to disturbing activities (Survey Strategy 1 & 2). Some species listed in the NFP need to be inventoried extensively, and, if identified, some of these sites need to be managed (Survey Strategy 3). A regional survey would be conducted on Survey Strategy 4 species.

Candidate and Bureau-Sensitive species are federal or state candidates and those species considered by the BLM to be of concern in 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 or threatened.

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. There are also Bureau-Sensitive species, ROD buffer species, as well as Survey and Manage species that occur in the watershed. (NFP, C-49).

Tables III-10 and III-11 list known and potential special status species found in the watershed, along with status and level of survey as of May 1999. 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 species listed in the ROD as "Buffer" species are also listed. (For more information on this list and habitat needs see appendix section.)

Table III-10: West Fork Illinois River Watershed Special Status Species (Vertebrates)

Common Name	Scientific Name	Presence	Status	Survey Level (5/99)
Gray wolf	*Canis lupus*	absent	FE,SE	none to date
White-footed vole	*Aborimus albipes*	unknown	BT, SU	none to date
Red tree vole	*Aborimus longicaudus*	present	BS	limited surveys
California red tree vole	*Aborimus pomo*	unknown	BS	none to date

Table III-10: West Fork Illinois River Watershed Special Status Species (Vertebrates)				
Common Name	**Scientific Name**	**Presence**	**Status**	**Survey Level** (5/99)
Fisher	*Martes pennanti*	suspected	BS,SC	none to date
California wolverine	*Gulo gulo luteus*	unknown	BS,ST	none to date
American marten	*Martes americana*	unknown	BT,SV	none to date
Ringtail	*Bassacriscus astutus*	present	BT,SU	none to date
Peregrine falcon	*Falco peregrinus*	suspected	BS,SE	none to date
Bald eagle	*Haliaeetus leucocephalus*	seasonally	FT,ST	none to date
Northern spotted owl	*Strix occidentlis*	present	FT,ST	limited surveys
Northern goshawk	*Accipiter gentilis*	suspected	BS,SC	limited surveys
Mountain quail	*Oreortyx pictus*	present	BT,SU	none to date
Pileated woodpecker	*Dryocopus pileatus*	present	BT,SV	none to date
Lewis' woodpecker	*Melanerpes lewis*	unknown	BS,SC	none to date
White-headed woodpecker	*Picoides albolarvatus*	unknown	BS,SC	none to date
Flammulated owl	*Otus flammeolus*	unknown	BS,SC	limited surveys
Purple martin	*Progne subis*	unknown	BS,SC	none to date
Great gray owl	*Strix nebulosa*	unknown	BT,SV	limited surveys
Western bluebird	*Sialia mexicana*	present	BT,SV	none to date
Acorn woodpecker	*Melanerpes formicivorus*	suspected	BT	none to date
Tricolored blackbird	*Agelaius tricolor*	unknown	BA,SP	none to date
Black-backed woodpecker	*Picoides arcticus*	unknown	BS,SC,	none to date
Northern pygmy owl	*Glaucidium gnoma*	present	BS,SC	limited surveys
Grasshopper sparrow	*Ammodramus savannarum*	unknown	BT,SP	none to date
Bank swallow	*Riparia riparia*	migratory	BT,SU	none to date
Townsend's big-eared bat	*Corynorhinus townsendii*	present	BS,SC	none to date
Fringed myotis	*Myotis thysanodes*	suspected	BT,SV	none to date
Yuma myotis	*Myotis yumanensis*	suspected	BT	none to date
Long-eared myotis	*Myotis evotis*	suspected	BT,SU	none to date
Long-winged myotis	*Myotis volans*	suspected	BT,SU	none to date
Silver-haired bat	*Lasionycterus noctivagans*	suspected	BT,SU	none to date
Pacific pallid bat	*Antrozous pallidus*	unknown	BT,SV	none to date
Western pond turtle	*Clemmys marmorata*	present	BS,SC	incidental sightings
Foothills yellow-legged frog	*Rana boylii*	suspected	BT,SV	none to date
Red-legged frog	*Rana aurora*	unknown	BT,SV	none to date
Clouded salamander	*Aneides ferreus*	present	BT,SU	limited surveys
Southern torrent salamander	*Rhyacotriton variegatus*	unknown	BT,SV	limited surveys

Table III-10: West Fork Illinois River Watershed Special Status Species (Vertebrates)				
Common Name	**Scientific Name**	**Presence**	**Status**	**Survey Level** (5/99)
Black salamander	*Aneides flavipunctatus*	suspected	BA,SP	limited surveys
Sharptail snake	*Contia tenuis*	suspected	BT,SV	none to date
California mountain kingsnake	*Lampropeltis zonata*	present	BT,SV	incidental sightings
Common kingsnake	*Lampropeltis getulus*	present	BT,SV	incidental sightings
Northern sagebrush lizard	*Sceloporus graciosus*	unknown	BT	none to date
Tailed frog	*Ascaphus truei*	suspected	BT,SV	none to date

STATUS ABBREVIATIONS: FE--Federal Endangered SC--ODFW Critical SM--Survey and Manage
FT--Federal Threatened SV--ODFW Vulnerable BTBBureau Tracking FP--Federal Proposed
SP--ODFW Peripheral or Naturally Rare BS--Bureau Sensitive FC--Federal Candidate
SU--ODFW Undetermined SE--State Endangered ST--State Threatened

Table III-11: West Fork Illinois River Watershed Special Status Species (Invertebrates)			
Common Name	**Presence**	**Status**	**Survey Level** (as of 5/97)
Burnells' false water penny beetle	unknown	BT	none to date
Denning's agapetus caddisfly	unknown	BT	none to date
Green Springs Mtn. farulan caddisfly	unknown	BT	none to date
Schuh's homoplectran caddisfly	unknown	BT	none to date
Obrien rhyacophilan caddisfly	unknown	BS	none to date
Siskiyou caddisfly	unknown	BT	none to date
Alsea ochrotichian micro caddisfly	unknown	BT	none to date
Franklin's bumblebee	unknown	BS	none to date
Oregon pearly mussel	unknown	BS	none to date

BS = Bureau Sensitive BT=Bureau Tracking

b) Survey and Manage Species

Tables III-12 presents the species that are to be protected through Survey and Manage guidelines as outlined in the NFP. This table also describes the level of protection and the amount of surveys conducted to date. It is suspected that the current late-successional reserve network will not meet the needs of these species, such that further restrictions within matrix lands are necessary to ensure long-term viability of their populations. All known sites will receive some level of immediate protection.

Table III-12: Survey and Manage Species & Buffer Species		
Species	**Presence**	**Protection Level**
White-headed woodpecker* *(Picoides albolarvatus)*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential.
Black-backed woodpecker*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees

Table III-12: Survey and Manage Species & Buffer Species		
Species	**Presence**	**Protection Level**
(Picoides pubescens)		to provide for 100% population potential.
Flammulated owl* *(Otus flammeolus)*	unknown	On matrix land no cutting snags 20" DBH or over. Maintain green trees to provide for 100% population potential.
Great gray owl@ *(Strix nebulosa)*	unknown	1/4 mile protection zone around nest sites, survey prior to activities, 300-foot buffers of meadow and natural openings.
Red tree vole@ *(Aborimus pomo)*	present	Survey prior to activities and manage known sites with 10 acre buffer.

* = Buffer species; @ = Survey and Manage species

c) Threatened or Endangered Species

Northern Spotted Owl (Threatened) - On BLM lands within this watershed, there are no spotted owl cores and no documented spotted owl nests. It is likely that BLM lands within the watershed are used for foraging and dispersal. None of the BLM lands within this watershed have been allocated as Critical Habitat for the northern spotted owl or as Late-successional Reserve by the U.S. Fish and Wild Service (USFWS). Within the watershed, surveys for northern spotted owls have been conducted since the mid-1970s. However, many of these early surveys were opportunistic. After 1985, surveys were required prior to proposed management activities and the level of surveys became more consistent.

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

An effort was made by the BLM to classify the forest type using the McKelvey model. This information was largely gathered through photo interpretation, ground truthing and roadside reconnaissance. This endeavor provides a fairly accurate depiction of the status of BLM lands.

The McKelvey Rating System is based on a model that predicts spotted owl population 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 in consideration. The McKelvey Rating System is as follows:

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

The BLM portion of the West Fork Illinois River Watershed has 5,644 acres (7% of the watershed). There are 751acres of BLM land classified as suitable spotted owl roosting and foraging habitat (McKelvey rating #1 and #2). The largest patches are found in the following locations: R8W,T40S, Section 5, R8W,T40S,Section 9, R9W,T41S, Sections 10 and 15. On private land within the watershed, there are no acres meeting the criteria for a McKelvey 1 rating. There are 810 acres on private land meeting the criteria for a McKelvey 2 rating.

Dispersal habitat for spotted owls is defined as stands that have a canopy closure of 40% or greater, and are open enough for flight and predator avoidances. In the watershed, there are currently 758 acres of BLM land and 4,298 acres of private land functioning as dispersal habitat for the northern spotted owl (McKelvey #5 and #6). Except where sites are heavily influenced by serpentine, this habitat is scattered throughout the watershed.

Table III-13: McKelvey Rating Classes for the West Fork Illinois River Watershed

McKelvey Class	BLM Lands		Non-federal Lands		BLM + Non-federal Lands	
	Acres	Percent in watershed	Acres	Percent in watershed	Acres	Percent in large watershed
1	69	0.1%	0	0	69	0.1%
2	682	1%	810	1%	1492	2%
3	765	1%	4882	6%	5647	7%
4	3369	4%	6465	8%	9834	13%
5	758	1%	4298	6%	5056	7%
6	0	0	0	0	0	0

*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. Although no land within the West Fork Illinois River Watershed was identified as critical habitat, federal agencies are still responsible for determining absence/presence in suitable habitat within 50 miles of the coast. There are no known nest locations within 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 BLM inventory data information and field verification of McKelvey rating, approximately 69 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).

It is unknown if the stands within 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. The BLM has conducted some surveys in proposed project areas and have not detected these birds.

Bald Eagle (Threatened) - At this time, there are no known nest sites documented within the watershed. Bald eagles are likely present in the watershed at least seasonally. The area along the river represents potentially suitable winter habitat. Nesting habitat may occur on mature forests within sight of the river. Preferred nesting habitat consists of older forests, generally near water, with minimal human disturbance.

d) Other Species of Concern

Peregrine falcons nest on ledges located on cliff faces. There are no known historic or current peregrine falcon nests within the West Fork Illinois River Watershed.

Neotropical migratory birds are known to inhabit the West Fork Illinois River Watershed. Neotropical migrants are species of birds that winter south of the Tropic of Cancer and breed in North America.

More then 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, and less so on the west coast.

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 extent that deforestation and forest fragmentation have on temperate breeding bird populations.

The West Fork Illinois River 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 neoptropical migrants, habitats of particular concern include valley brush fields, old-growth, riparian, and oak woodland communities. As a management consideration, it is important to remember that, 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.

Table III-14: Potential Neotropical Birds in West Fork Illinois River Watershed		
COMMON NAME	PRESENCE	TREND*
Green-winged teal	present	insufficient data
Sora	present	insufficient data
Turkey vulture	present	decline
Osprey	present	stable or increasing
Flammulated owl	unknown	insufficient data
Common nighthawk	present	insufficient data
Rufous hummingbird	present	decline
Calliope hummingbird	unknown	insufficient data
Western kingbird	present	insufficient data
Ash-throated flycatcher	present	insufficient data
Western wood-pewee	present	decline
Olive-sided flycatcher	present	decline
Hammond's flycatcher	present	insufficient data
Dusky flycatcher	present	insufficient data
Pacific-slope flycatcher	present	insufficient data
Vaux's swift	present	decline
Tree swallow	present	insufficient data
Northern rough-winged swallow	present	insufficient data
Violet-green swallow	present	decline
Cliff swallow	present	insufficient data
Barn swallow	present	decline
House wren	present	insufficient data
Blue-gray gnatcatcher	present	insufficient data
Swainson's thrush	present	decline
Solitary vireo	present	insufficient data
Warbling vireo	present	insufficient data
Townsend's warbler	present	insufficient data
Hermit warbler	present	insufficient data
Black-throated gray warbler	present	insufficient data
Nashville warbler	present	insufficient data
Macgillivray's warbler	present	insufficient data
Yellow warbler	present	insufficient data
Orange-crowned warbler	present	decline

Table III-14: Potential Neotropical Birds in West Fork Illinois River Watershed		
COMMON NAME	**PRESENCE**	**TREND***
Common yellowthroat	present	stable/increase
Yellow-breasted chat	present	insufficient data
Wilson's warbler	present	decline
Brownheaded cowbird	present	stable/increase
Northern oriole	present	decline
Western tanager	present	decline
Chipping sparrow	suspected	decline
Green-tailed towhee	present	stable/increase
Black-headed grosbeak	present	stable/increase
Lazuli bunting	present	insufficient data

* Based on information from Partners in Flight in Oregon and might not necessarily represent nationwide figures.

Unusual sightings - The rocky terrain and mine shafts found within the West Fork Illinois River Watershed provide suitable habitat for ringtails. These nocturnal animals are frequently seen along river corridors, though there are no confirmed sightings in this watershed.

Game species within the West Fork Illinois River Watershed include: blacktailed deer, black bear, mountain lion, wild turkeys, ruffed grouse, blue grouse, grey squirrels, mountain and valley quail. The watershed is located in the Chetco Game Management Unit. 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. Elk are not known to occur 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. Corresponding with an overall increase in their population, cougar sightings in the watershed have increased

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 within 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 negative affects on deer and elk populations, and lead to increased poaching opportunities. Unroaded areas offer key refugia for deer and other game species.

Band-tail pigeons *(Columba fasciata)* are known to occur in the watershed. Throughout their range, they have shown a precipitous decline in population since monitoring began in the 1950's (Jarvis et al. 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 et al. 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 watershed. 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.

Cavity dependent species such as western bluebirds and northern pygmy owls *(Glaucidium gnoma)* are of special concern. Past silviculture has degraded habitat for these species which use snags and downed logs. In areas previously harvested, silviculture focused on even-aged stands which are typically deficit in 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 (*Dedelphis virginiana*) occupy a similar niche with native stripped skunks (*Mephitis mephitis*) and raccoons (*Procoyon 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.

Table III-15: Federal Habitat Trends for Species of Concern

Common Name	Habitat	Habitat Trends expected within the Watershed
Grey wolf	Generalist, prefers remote areas	Decrease in the watershed
White-footed vole	Riparian alder/small streams	Increase as riparian areas recover from past disturbance
Red tree vole	Mature conifer forest	Decrease in matrix, increase in LSR
California red tree vole	Mature conifer forest	Decrease in matrix, increase in LSR
Fisher	Mature conifer forest	Decrease in matrix, increase in LSR
California wolverine	Remote/high elevation forest	Decrease in matrix, increase in LSR
American marten	Mature conifer forest	Decrease in matrix, increase in LSR
Ringtail	Rocky bluffs, caves and mines	Possible decrease as hard rock mines/quarries collapse or reopen

Table III-15: Federal Habitat Trends for Species of Concern		
Common Name	**Habitat**	**Habitat Trends expected within the Watershed**
Peregrine falcon	Remote rock bluffs	Stable
Bald eagle	Riparian/mature conifer forest	Possible increase as riparian areas recover from past disturbance, decrease on matrix lands
Northern spotted owl	Mature conifer forest	Decrease in matrix, increase in LSR
Marbled murrelet	Mature conifer forest	Decrease in matrix, increase in LSR
Northern goshawk	Mature conifer forest	Decrease in matrix, increase in LSR
Mountain quail	Generalist	Stable
Pileated woodpecker	Mature conifer forest/snags	Decrease in matrix, increase in LSR
Lewis' woodpecker	Oak woodlands	Decrease until management strategy for oak woodlands is implemented
White-headed woodpecker	High elevation mature conifer forest	Decrease in matrix, increase in LSR
Flammulated owl	Mature ponderosa pine/mature Douglas-fir forest	Decrease in matrix, increase in LSR
Purple martin	Forage in open areas near water/cavity nesters	Increase as riparian areas recover and forests mature in the LSR. Possible decrease in matrix.
Great grey owl	Mature forest for nesting / meadows & open ground for foraging	In matrix, increase in foraging habitat and decrease in nesting habitat. In LSR, decrease in foraging habitat and increase in nesting habitat.
Western bluebird	Meadows/open areas	In LSR, decrease as clearcuts recover and meadows become encroached with trees. In matrix, decrease until management strategy for oak woodlands is implemented.
Acorn woodpecker	Oak woodlands	Decrease until management strategy for oak woodlands is implemented.
Tricolored blackbird	Riparian habitat/cattails	Stable/increase as riparian habitat recovers
Black-backed woodpecker	High elevation mature conifer forest	Decrease in matrix, increase in LSR
Northern pygmy owl	Conifer forest/snags	Decrease in matrix, increase in LSR
Grasshopper sparrow	Open savannah	Decrease until management strategy for savannah habitat is implemented.
Bank swallow	Riparian	Increase as riparian habitat recovers
Townsend's big-eared bat	Mine adit/caves	Decrease as mines/quarries collapse or reopen and human disturbance increases
Fringed myotis	Rock crevices/snags	Decrease in matrix, increase in LSR
Silver-haired bat	Conifer forest	Decrease in matrix, increase in LSR
Yuma myotis	Large trees/snags	Decrease in matrix, increase in LSR
Long-eared myotis	Large trees/snags	Decrease in matrix, increase in LSR
Long-legged myotis	Large trees/snags	Decrease in matrix, increase in LSR
Pacific pallid bat	Large trees/snags/rock crevices	Decrease in matrix, increase in LSR

Table III-15: Federal Habitat Trends for Species of Concern		
Common Name	**Habitat**	**Habitat Trends expected within the Watershed**
Western pond turtle	Riparian/uplands	Increase as riparian habitat recovers
Foothills yellow-leg frog	Riparian/permanent flowing streams	Increase as riparian habitat recovers
Red-legged frog	Riparian/slow backwaters	Increase as riparian habitat recovers
Clouded salamander	Mature forest/snags/down logs	Decrease in matrix, increase in LSR
Southern torrent salamander (Variegated salamander)	Riparian/cold permanent seeps/streams	Increase as riparian habitat recovers
Black salamander	Talus/down logs	Decrease in matrix, increase in LSR
Sharptail snake	Valley bottom	Stable
Calif. Mt. Kingsnake	Generalist	Stable
Common kingsnake	Generalist	Stable
Northern sagebrush lizard	Open brush stands	Decrease as meadows are encroached upon and increased shrub canopy closure
Tailed frog	Riparian/mature forest	Increase as riparian habitat recovers

3. Aquatic Habitats and Species

a. General

Within 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 a significant portion of the remnant native wild fish population/habitat within the Rogue River Basin. Thus, the Illinois River Watershed is believed to be the stronghold for wild anadromous fish populations in the Rogue Basin.

The West Fork Illinois River Watershed comprises 20% of the Illinois River Sub-basin. There are approximately 64 miles of perennial streams in the watershed (3^{rd} order and larger). There is an estimated 100 miles of intermittent streams (48 miles of 2^{nd} order plus an unknown number of 1^{st} order streams). Relative to salmonid production, the West Fork Illinois River Watershed is less productive than the East Fork Illinois watershed. The watershed is dominated (54%) by serpentine conditions, which are characterized by a lack of many of the attributes of optimal salmonid habitat (USDA; USDI 1997). There are approximately 800 Riparian Reserve acres on BLM land within the watershed. Approximately 80% of this area is comprised of white oak and Jeffrey pine (serpentine influenced) plant series or unvegetated.

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.

Stream meander is 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 life stages of their life cycle. Adult and juvenile fish production can also be limited by migration barriers such as road culverts. Yearling juvenile fish can move miles within one watershed, especially during summer months when they seek cool waters. 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 overwintering juvenile fish which have been stressed from the lack of sufficient overwinter habitat to allow escape from high water velocities.
Roads located next to streams can disconnect streams from the floodplain, impede stream meander and act as heat sinks. Timber harvesting and the presence of roads accelerate surface water runoff and erosion of sediment into the streams, resulting in decreased macroinvertebrate and fish production. Logging roads produce the most sediment generated among forest management practices. The density and length of logging road distribution can be major factors in determining the level of sediment production.

Off-channel habitat areas in unconfined and lower gradient streams provide refuge areas for coho salmon when they typically migrate downstream during the fall and winter when the habitat is available. Juveniles will then leave winter habitat and migrate to sea at the end of their first year. Properly functioning off-channel habitat areas have frequent active side-channels related to large wood and geomorphology.

When under stress from water temperatures exceeding 70°F, salmonid fish populations may have reduced fitness, greater susceptibility to disease, decreases growth and changes in time of migration or reproduction.

The cumulative effects of management activities have been a substantial alteration of the timing and quantity of erosion and changes in stream channels, both of which have affected fish production. Streams and riparian areas on federal lands are in better condition than streams on non-federal lands. ODFW attributes salmonid population declines within the West Fork Illinois River Watershed to elevated water temperatures, increased sedimentation, water withdrawals, natural lack of flow, passage obstructions, and loss of stream complexity and juvenile rearing areas (USDA, USDI 1997). 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.

b. Stream Habitat Conditions

Table III-16 summarizes stream habitat conditions for those Class I-IV streams where ODFW protocol physical habitat surveys have been completed. The conditions are summarized based on the ODFW habitat benchmark standards (Table III-17).

Table III-16: Class I-IV Stream Habitat Conditions							
Stream	Fish Bearing (Y/N)	LWD levels	Sediment levels within spawning gravels	Canopy Closure	Pool Freq.	Residual Pool Depth	Avg. Gradient (%)
Blue Creek	Y	U	A	D	U	U	7-11
Rough and Ready	Y	U	D	U	U	D	1
Elk Creek	Y	U	U	U	D	U	<3
Logan Cut	Y	U	U	D	U	U	7
Fry Gulch	Y	U	U	U	U	U	2
Whiskey Creek	Y	U	D	U	D	A	5
West Fork Illinois River	Y	U	U	U	D	A	0.5

U = Undesirable, A = Adequate, D = Desirable

Table III-17: Oregon Department of Fish and Wildlife Habitat Benchmarks			
Habitat Type	Undesirable (U)	Adequate (A)	Desirable (D)
LWD pieces / 100 m stream length	< 10	?	> 20
Sediment Levels (% fines in spawning gravels)	> 20	?	< 10
Canopy Closure (%)	< 70	?	> 75
Pool Frequency (Channel Widths Between Pools)	> 20	?	5-8
Residual Pool Depth (m)	< 0.5	?	> 1.0

Rough and Ready Creek is a fish-bearing tributary to West Fork Illinois River. Resident trout, winter steelhead, coho and chinook salmon are present 6.0 miles upstream of the confluence with West Fork. The lower mile of the creek has a wide floodplain where the channel is highly braided and flows are often subsurface. Boulders form pools and pocket water in the channel, and instream woody material is almost completely absent in the lowest reach. Canopy closure downstream of the north and south forks is very low, perhaps naturally, at less than 40%. Pool frequency is undesirable in the lower reaches, although where present, residual pool depth is frequently one meter or more. The description above applies to the mainstem of Rough and Ready Creek which flows through BLM land only in the lower reach. A complete stream survey and summary is presented in Version 1.0 of the West Fork Illinois River Watershed Analysis.

Whiskey Creek is a fish-bearing tributary to West Fork Illinois River. Resident trout are present 2.3 miles upstream of the confluence with West Fork. Winter steelhead are present one mile upstream of the confluence. Boulders form pools and pocket water in the channel, and instream woody material is almost completely absent in the lowest reach. Substantial scouring occurs frequently, and sediment levels in the spawning gravels are adequate. Canopy closure is low, perhaps naturally, at less than 40%.

Pool frequency is desirable in the lower reaches, where the creek is similar to West Fork at its confluence with Whiskey Creek. Average residual pool depth in the lower reaches is adequate (<1.0 meter).

Elk Creek is a fish-bearing stream which is a tributary to West Fork Illinois River. Winter steelhead, resident trout, and coho and chinook salmon are found in the first 3.5 miles upstream of the mouth. Elk Creek produces most of the coho spawned in the West Fork Illinois River Watershed, which in turn accounts for an estimated 10% of the total coho production of the Illinois River Sub-basin (USDA, USDI 1997). The average gradient of Elk Creek is < 3% in the lower reaches and 11% in the upper reach, which lies in California. Within Oregon, Elk Creek flows almost entirely through private land. A small section at the confluence with West Fork Illinois is on BLM land. Instream wood is below benchmark standards. Sediment within the spawning gravels is at undesirable levels, based on turbidity measured at 71 NTU (USDA, USDI 1997) and see Water Quality, Chapter 3 in this analysis). Canopy closure is below benchmark standards. Pool frequency is at ODFW benchmark levels (62%), but average residual depth is most likely below the benchmarks due to lack of instream woody material.

Blue Creek is a fish-bearing stream which flows into Elk Creek, a West Fork Illinois River tributary. Winter steelhead and cutthroat trout are found in the first two miles upstream of the mouth. The tailed frog, a vulnerable species, is present at least in the upper reaches of the creek. The average gradient is 7% in the lower reaches and 11% in the upper reaches. Instream wood is at an undesirably low level based on benchmark standards. Spawning gravel sediment is adequate. Canopy closure is at desirable levels (>75%). Pool frequency and average residual depth are most likely at undesirable levels due to scouring to bedrock and the lack of instream woody material. Ten percent of the streambanks in Blue Creek are actively eroding.

Logan Cut Creek is a fish-bearing tributary to West Fork Illinois River. Logan Cut is an historic mining diversion ditch that was constructed to convey water from the East Fork Illinois River Watershed to the West Fork watershed. Coho are present approximately one mile upstream from the connection to the West Fork, but use by other species is unrecorded. The average stream gradient is 7 %. Instream wood levels are below desirable levels. There is a high amount of sediment present throughout the stream, and 50% of the streambanks are actively eroding. Canopy closure is at desirable levels (75%). Pool frequency is likely to be low and average residual pool depth shallow as a result of the scarcity of instream wood large enough to contribute to pool formation in the remnant trapezoidal channel.

Fry Gulch Creek is a fish-bearing tributary to West Fork Illinois River. Fry Gulch is an historic mining area where a network of diversion ditches and ponds resulting from hydraulic mining are present today. The perennial lower reach is on private land, and the seasonally flowing upper section is on BLM land. Winter steelhead and chinook salmon are present approximately 0.8 miles upstream from the connection to the West Fork, but use by other salmonid species is unrecorded. In the portion of the creek on BLM land, warm water species such as green sunfish (*Lepomis cyanellus*) and smallmouth bass (*Micropterus dolomieui*) are present. The average stream gradient on the fish-bearing section is 2%, but upper sections are as steep as 10%. Instream wood is almost absent at one piece per 100 meters. There is a high amount of sediment (40%) present in the stream, though substrates are not embedded. Only 10 to 20% of the streambanks are actively eroding. Canopy closure is at undesirable levels (<60%). Pool frequency is low and average residual pool depth shallow as a result of the absence of instream elements (woody material, boulders) large enough to contribute to pool formation.

West Fork Illinois River is an important fish-bearing tributary to the Illinois River (see Table III-23 for fish distribution). However, the West Fork has been substantially altered through excessive water withdrawal, channelization, overgrazing, loss of riparian vegetation, gravel removal and mining operations. Six water diversions were found on the mainstem in a stream survey completed by ODFW in 1994.

The average stream gradient of the lower reaches of West Fork Illinois is 0.5%. In the upper reaches which are located on BLM land in Section 9, a gradient of 6% is more typical. There are very low amounts of instream wood, with almost no key pieces. Sedimentation is at undesirable levels with 29% of the riffle substrate composed of fine sediments. The proportion of actively eroding banks is high, ranging from 20 to 55%. Riparian canopy closure is poor, ranging from 16 to 50%. The West Fork is 303(d) listed for summer temperatures, as the seven-day average maximum stream temperature has exceeded the DEQ standard of 64°F. (See Water Quality/Temperature, Chapter 3). Pool frequency is at desired levels, ranging from 3.2 to 6.1 channel widths per pool. Average pool depth is adequate, approximately one meter.

c. Large Woody Material

Streams in the West Fork Illinois River Watershed typically have the same primary factors limiting salmonid production: instream habitat complexity is lacking in large woody material key pieces (greater than or equal to 24 inches in diameter with a length which is equal to or greater than the bankfull width); stream shade less than 60%; and lack of mature trees, especially conifers, >32 inches in diameter within 100 feet of the stream.

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 (USDA-USDI 1995) 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. There is no LSR in the BLM administered portion of the West Fork Illinois River Watershed. The reference above is cited because the LSR standards, along with the ODFW benchmarks for instream conditions, may be applied to Riparian Reserves.

Version 1.0 of the West Fork Illinois River Watershed Analysis (Results Summary) compares the ability of serpentine and non-serpentine areas to provide the riparian and stream attributes listed above.

Streams in serpentine areas are naturally lacking many of the attributes characteristic of salmonid habitat. Many of the streams on BLM land in this analysis are in serpentine areas. They currently have inadequate levels of instream large woody material. However, the natural levels of wood in these systems may be below ODFW standards. The ODFW benchmarks and standards of other agencies as they apply to serpentine areas are currently under review.

d. Macroinvertebrates

Macroinvertebrate surveys were conducted on the West Fork of the Illinois River for BLM in 1998 by Aquatic Biology Associates, Inc. Macroinvertebrate health within the surveyed reaches of the West Fork Illinois River is very low. The upstream survey site was immediately downstream of the confluence with Whiskey Creek. At this site, the macroinvertebrate species present indicate that the habitat and biotic integrity of the reach is low. The absence of long-lived species shows that disturbance to substrate is high and that habitat complexity and mechanisms for the retention of debris are lacking. The habitat is limiting for macroinvertebrate production due to warm summer water temperatures, flashy flows and increased scour, high sun exposure, and very low recruitment of deciduous detritus. The absence of cold water macroinvertebrates indicates that the summer water temperatures are lethal to these invertebrate species and non-supportive for salmonids.

The macroinvertebrate community present at the downstream site (Mendenhall Creek confluence) is similar to the upstream site. The absence of long-lived and cold water species indicates that summer water temperatures are non-supportive for salmonids. The abundance of negative indicator species, those tolerant of degraded conditions, points to the same factors which make the upstream site limiting for the production of macroinvertebrates. The downstream site had moderate embeddedness of substrates and moderate presence of silt. This site is downstream of both Wood and Elk Creeks, which are major sources of sediment to the West Fork. In contrast, the upstream sampling reach is relatively free of silt and substrate embeddedness and has less turbid flows.

There are many factors which have contributed to the low macroinvertebrate condition in these reaches. 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. Naturally flashy hydrology in serpentine areas probably has been magnified by the impacts of historic mining, riparian alteration, and flooding on the West Fork.

Table III-18: Macroinvertebrate Condition on West Fork Illinois River

Stream	Erosional Habitat	Margin Habitat	Detritus Habitat
West Fork at Whiskey Creek	Very Low (37.1%)	Very Low (33.7%)	Very Low (32.3%)

Table III-18: Macroinvertebrate Condition on West Fork Illinois River			
West Fork at Mendenhall Creek	Very Low (29.8%)	Very Low (36.7%)	Very Low (29.2%)
Source: BLM surveys; 1998. For meaning of bioassessment scores see Table III-19.			

Table III-19: Macroinvertebrate Bioassessment Scores (Percent)

Bioassessment Score	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 1998

e. Special Status Species

The coho salmon (*Oncorhynchus kisutch*) is the only federally listed (threatened) fish within the West Fork Illinois River Watershed. There are several other special status species present within the watershed whose habitat requirements are the same as those of coho salmon.

Table III-20: 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 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 suitable for fry colonization, predators, temperature[1], nutrient loading[1]	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 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 NMFS 1997)

Table III-21 lists special status and federally-threatened aquatic species in the West Fork Illinois River Watershed.

Table III-21: Special Status and Federally-Listed Aquatic Species	
Species	**Status**
Steelhead	$ Ruled not warranted for federal listing (4/01) $ Oregon Natural Heritage Program* (ONHP) Status List 1 $ State of Oregon Avulnerable@
Chinook salmon	$ Ruled not warranted for federal listing (9/99) $ Oregon Natural Heritage Program (ONHP) Status List 3 $ State of Oregon Acritical@
Cutthroat Trout	$ Ruled not warranted for federal listing (4/99) $ Oregon Natural Heritage Program (ONHP) Status List 3 $ State of Oregon Avulnerable@
Reticulate Sculpin	$ Bureau Tracking in Washington
Coho salmon	$ Federally Threatened All Stocks South of Cape Blanco $ Critical Habitat Designated $ Oregon Natural Heritage Program (ONHP) Status List 1 $ State of Oregon Acritical@

Table III-21: Special Status and Federally-Listed Aquatic Species	
Species	**Status**
Pacific lamprey	$ Federal category 2

* Oregon Natural Heritage Program (ONHP) 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 fom 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.

f. Salmonid Distribution

Stream surveys have been conducted by ODFW and the USFS on many streams in the watershed (USDA, USDI 1997). These surveys verify salmonid distribution. The results are presented in Table III-22.

Table III-22: Salmonid Distribution Within the West Fork Illinois River Watershed (in miles)

Stream Name	Resident Trout	Steelhead	Coho Salmon	Chinook Salmon
Rough and Ready Creek	6.0	6.0	6.0	6.0
West Fork Illinois River	17.0	17.0	17.0	14.3
Broken Kettle Creek	ND	0.0	1.5	0.0
Dwight Creek	1.0	0.5	0.0	0.5
Blue Creek	2.0	2.0	ND	ND
Wood Creek	4.0	3.8	2.3	2.3
Parker Creek	0.0	0.5	0.0	0.5
Mendenhall Creek	0.0	1.3	1.3	1.3
Woodcock Creek	2.3	0.5	0.0	0.0
Whiskey Creek	2.3	1.0	0.0	0.0
Elk Creek	3.5	3.5	3.5	3.5
Fry Gulch	ND	0.8	ND	0.8
Logan Cut	ND	0.0	1.0	0.0
Trapper Gulch	2.4	2.4	0.3	0.0

Source: ODFW Fish Distribution Database

Anadromous salmonids present within the watershed are: fall chinook (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and winter steelhead (*O. mykiss*). These anadromous species represent important fish populations within the ESUs (Evolutionarily Significant Unit) of the province.

Resident salmonids within the watershed include rainbow trout (*O. mykiss*) and cutthroat trout (*O. clarki*). Other native fish species present within the watershed include Pacific lamprey (*Lampetra tridentata*), Klamath smallscale sucker (*Catostomus rimiculus*), and sculpin (*Cottidae sp.)*. Non-native fish species found within the watershed include the redside shiner (*Richardsonius balteatus*), green sunfish, and smallmouth bass.

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 within the Illinois River basin. As a result of declining population levels, ODFW presently prohibits trout fishing within the entire Illinois River basin.

Coho salmon within West Fork Illinois River Watershed are part of the Southern Oregon / Northern California 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). Current summer water temperatures in the valley limit coho production from reaching historical levels (USDA, USDI 1997). An estimated 10% of the coho in the Illinois River Sub-basin are produced in the West Fork Illinois River Watershed. Elk Creek produces most of these coho.

Habitat designated by the National Marine Fisheries Service (NMFS) as critical to the recovery of Southern Oregon/Northern California 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 that provide: shade; sediment, nutrient or chemical regulations; stream bank stability; and large wood or organic matter. It is important to note that habitat quality is intrinsically related to the quality of riparian and upland areas and of inaccessible headwater or intermittent streams that 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.

Chinook salmon within the West Fork Illinois River are fall-run and belong to the Southern Oregon and Northern California coastal chinook ESU, which was proposed for listing on March 9, 1998. In September 1999, NMFS identified this ESU as not warranted for listing under the Endangered Species Act. USFS Regional Forester Robert Williams, however, designated chinook salmon and other salmonids within the Pacific Northwest Region as sensitive for Forest Service management purposes (FC 2670-1920; August 20, 1997).

Steelhead trout within the East Fork Illinois River belong to the Klamath Mountains Province ESU, which was ruled not warranted for listing in April, 2001. Activities such as logging and road building have impacted critical 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. Sports harvest declined from 2,500 fish in the 1970s to less than 200 fish in 1992. Irrigation withdrawals have been a major impact to steelhead production in the Illinois River basin. This was particularly severe during the recent drought.

Resident cutthroat and rainbow trout are distributed throughout many of the reaches of all tributaries above and below anadromous fish barriers. The Southern Oregon / California Coasts ESU of cutthroat trout was ruled not warranted for listing in April, 1999. The resident rainbow population within Illinois River is sympatric with winter steelhead. The Illinois River trout population appears to be much smaller than that observed in the 1950s.

Pacific lamprey (*Lampetra tridentatus*) are anadromous and use West Fork Illinois River tributaries for spawning. The juveniles rear in the tributaries until they are ready to migrate to the ocean. Little is known about lampreys in the Rogue basin, although it is assumed their distribution overlaps that of steelhead.

Reticulate sculpin (*Cottus perplexus*) are found throughout the West Fork Illinois River Watershed. Their range overlaps that of resident trout.

The **speckled dace** (*Rhinichthys osculus*) is a native fish found within the West Fork Illinois River Watershed. Its range overlaps that of resident trout.

The **Klamath small-scale sucker** (*Catostomus rimiculus*) is the only species of sucker found within the Rogue basin. They inhabit the Illinois River and spawn in tributaries in the spring. Little is known about their distribution within the watershed.

Non-native fish - The redside shiner (*Richardsonius balteatus*) is an exotic species that flourishes in the mainstem West Fork Illinois and in tributaries and irrigation ditches 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. These fish compete directly with juvenile salmonids and are able to reduce trout production up to 54% in warm water (66.2° to 71.6°F) (Reeves 1987).

Non-native species such as sunfish and bass are found throughout the watershed in the mainstem of West Fork Illinois and in lakes and ponds which provide relatively warm and slow-moving water. The presence of these species in the watershed has been recorded by ODFW, and their distribution throughout the watershed provides opportunities for recreational fishing.

g. Fish Passage Barriers

Fish barriers can be defined as any physical/chemical/biological factor that prohibits upstream or downstream migration of juvenile or adult fish. Examples are dams, culverts, low water flow, temperature, waterfalls, and predation.

On Rough and Ready Creek, five diversions are known, but only two of them currently act as a barrier to fish passage. The two barriers, Seats Dam and Wing-Ferren Ditch, are described in the first iteration of this watershed analysis (USDA; USDI 1997).

On Logan Cut, a culvert under BLM road #40-8-4(B) may be a partial barrier to anadromous fish. No other passage barriers are known. However, a thorough blockage inventory has not been conducted on BLM land in the watershed since the 1980s.

I. 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 as a significant and important part of shaping plant communities in southwestern Oregon (Atzet and Wheeler 1982). Overall, the West Fork Illinois River Watershed 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
- 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 classification 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, that exceptions abound, and that 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 within the West Fork Illinois River Watershed fit into three of these classes and one sub-classification. 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).

II. **0-35 years, stand-replacing, non-forest**
Includes true grasslands (Columbia basin, Palouse, etc.) and savannahs with typical return intervals of less than 10 years and mountain shrub communities (bitterbrush, snowberry, ninebark, ceanothus, Oregon chaparral, etc.) with typical return intervals of 10-25 years. Fire severity is generally high to moderate. Grasslands and mountain shrub communities are not completely killed, but usually only top-killed and resprout.

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 Areset@ large areas (10,000-100,000 acres) but subsequent mixed intensity fires are important for creating the landscape heterogeneity. Within 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 many times be correlated to the fire regime itself. Thus, a fire regime characterized by long return interval crown fires and severe surface fires would be impacted less by fire exclusion then a regime of frequent, light surface fires with a one to 25 year return interval. This is due to fire visiting the frequent, low intensity regime on more of a regular basis versus that of the long interval regime. With an aggressive program of fire suppression occurring for approximately 100 years, a regime that would be visited by fire every 100 to 300 years may not be impacted by fire and its effect to the degree of the short interval regime. Detrimental effects in the longer return-interval fire regimes will take longer to appear. 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).

Historically, wildland fire swept frequently across most of the Illinois Valley landscape. In recent decades, however, the nature of fire on these lands has changed. The unintended consequence of this continued fuel accumulation is 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 catastrophic 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. Such can further impact how prescribed fire is applied to the landscape.

1. Fire Condition Class

A series of Fire 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-23 summarizes the three fire condition classes, attributes of each class, and general management options.

Table III-23: Fire Condition Class		
Fire Condition Class	**Attributes**	**Example of Management Options**
Condition Class 1	- Fire regimes are within 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 within an historical range.	Where appropriate, these areas can be maintained within 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 with approximately one quarter of the area approaching a Fire Condition Class of 3. Within southwestern Oregon, a broad scale breakdown of fire condition classes by acres and percent of total acres follows.

Table III-24: Fire Condition Classes of Southwest Oregon		
Class	**Acres**	**Percent**
1	13,000	4.4
2	25,000	8.5
3	255,000	87.0
Total	293,000	100.0

Where prescribed fire has been used as a management tool in the past within this watershed, it has been done primarily to achieve stand-by-stand management objectives. This fragmentation approach has not counteracted the ten decades of fire exclusion (Mutch 1994) and has not allowed fire to interact on a landscape scale level. Economically, small unit level prescribed fires have a much greater planning and implementation cost versus those done on a larger scale.

A further cause of this unit level burning is due to land ownership and the relatively small size of BLM land holdings compiled in a non-contiguous pattern. With some effort, fire on a landscape level can be mimicked within this area. In other cases due to the fire condition class, small size of BLM land holdings, wildland/urban interface concerns, and access issues, various mechanical treatments can be utilized to mimic fire or at least bring the fire regime closer to its natural state. These mechanical treatments include slashing through the use of chain saws, slashbuster work, and hand piles followed with burning.

2. Wildland-Urban Interface

The wildland-urban interface exists where people and their developments meet or intermix with wildland fuels. Illinois Valley and a majority of the West Fork Illinois River Watershed are within the wildland/urban interface. Furthermore, the Illinois Valley has 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 within 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. The vicinity of federal lands is defined as within the range in which fires can travel. High-risk exists where there is land condition that is characterized by high-risk fire regimes. For example Fire Condition Classes 2 and 3 are considered high-risk fire regimes.

Concern exists for ignitions starting on BLM lands and going onto private lands along with ignitions starting on private lands and going onto BLM lands. Such risk of ignitions will be discussed in greater detail later. Steps need to be considered that ensure appropriate defensible space is provided in these areas of wildland/urban interface. In general, the areas of interface are at elevations below most BLM lands and in areas of transition from forested to shrub ecosystems.

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

Fuel 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.

The data collected for the West Fork Illinois River Watershed for hazard, ignition risk, and values at risk for loss from wildfire are summarized in Tables III-25 through III-29. Ratings are displayed on Maps 12-16. 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 catastrophic 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. Such can further impact the means in which prescribed fire is applied to the landscape.

Hazard is based on the fire=s ability spread and 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. These elements include in weighted order, ladder fuel presence, fuel model, slope, position on slope, and aspect.

Ladder fuel presence determines the ability of a fire to go from a surface fire into the crown canopy, thus impacting 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 U.S. Forest Service=s 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-25 summarizes the acres in each hazard class.

Table III-25: Hazard Classification

Ownership	Acres	High Hazard		Moderate Hazard		Low Hazard	
		Acres	% of Ownership	Acres	% of Ownership	Acres	% of Ownership
BLM	5,644	2,135	38%	2,972	53%	536	9%
Non-BLM	16,455	10,127	62%	5,048	31%	1,279	8%
All ownerships	22,099	12,262	55%	8,020	36%	1,815	8%

Based upon the previous mentioned criteria, only 8% of the watershed is at a low hazard condition with over half being in a high hazard condition. The primary factor is exclusion of the natural fire process. Forest management practices that did not treat activity fuels or created younger stands have also contributed to the current condition. Currently, 64% of the watershed is in mid-seral to mature vegetative conditions.

Based upon the elements of fire hazard, the potential for a large fire to occur is high to extremely high for this watershed. This is due to the buildup of fuels, both live and dead, overstocking of conifers and hardwoods, and the presence of less fire resistant species. This invasion of less fire resistant species has resulted from reduced fire frequency. The increase in higher fire hazard is also due in part to past management practices that created, but did not treat, slash.

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 watershed. The watershed as a whole has a high risk of human-caused ignition. Human uses which create ignition risk include residential, industrial (light manufacturing, timber harvest, mining/quarry operations), recreational, tourist, and travel activities. Human use within the watershed is high. The human-caused fire occurrence pattern for the watershed would generally be a fire starting at low elevations or along roads and burning up to the uppermost ridgetops.

Lightning occurrence in the watershed has been moderate to high. The watershed typically experiences at least one lightning storm event every two to three summers. Multiple fire starts often result from these storms.

Historical fire occurrence on BLM, U.S. Forest Service, and private lands within the watershed was reviewed based on available data of fires where management action was taken and a fire report was completed between 1970 and 1998. While data is available prior to 1970, it is incomplete for analysis purposes. During the 28 year time period, 324 fires occurred within the identified lands within the West Fork Illinois River Watershed with an average of 11.6 fires per year, 763 total acres burned, and an average of 27.3 acres burned per year as highlighted in Table III-26. The largest lightning caused fire, Mendenhall Creek Fire, covered 120 acres in 1994 with the largest human caused fire, Rough Read Fire, at 290 acres in 1986 within the watershed.

Table III-26: Historic Fire Occurrence 1970-1998

Cause	Total Number of Fires	Yearly Average Number of Fires	Total Acres	Average Fire Size (acres)	Yearly Average Fire Size (acres)
Human	270	9.6	501.4	1.9	17.9
Lightning	54	1.9	261.6	4.8	9.3
Total	324	11.6	763	2.4	27.3

Fifty-three percent of the watershed is a high risk category with only 11% in a low risk category. Human presence and use within the watershed produces high risk for wildfire occurrence. Table III-27 summarizes the acres in each risk class.

Table III-27: Risk Classification							
Ownership	Acres	High Risk		Moderate Risk		Low Risk	
		Acres	Ownership Total	Acres	Ownership Total	Acres	Ownership Total
BLM	5,644	1,302	23%	3,473	62%	868	15%
Non-BLM	16,455	10,419	63%	4,490	27%	1,545	9%
All Ownerships	22,099	11,721	53%	7,963	36%	2,413	11%

c. Values at Risk

Values at risk are the resource and human values for 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 watershed has 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, ACEC, potential RNA designation, and other forest resource values within the watershed. Table III-28 summarizes the values at risk classification in the watershed.

Table III-28: 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	5,644	1,422	25%	2,855	51%	1,367	24%
Non-BLM	16,455	5,618	34%	9,589	58%	1,247	8%
All Ownerships	22,099	7,040	32%	12,444	56%	2,614	12%

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 particular management concern. The West Fork Illinois River Watershed has 13% 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. The large amount of land with high values at risk and the high level of risk of wildfire occurrence demonstrated the urgent need for management actions and activities that will decrease the potential for large stand-destroying wildland fire and loss of important features in the watershed. Table III-29 summarizes the land base where high hazard, risk, and values converge.

Table III-29: 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	5,644	173	3%
Non-BLM	16,455	2,630	16%
All Ownerships	22,099	2,803	13%

J. 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 within 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.

Grants Pass and Medford are the closest designated areas (non-attainment) to the West Fork Illinois where air quality standards are typically not met. Other population centers around the Upper Illinois valley of interest in minimizing smoke impacts include Cave Junction, Takilma, Kirby, and Selma. Class I areas within the region include the Kalmiopsis Wilderness on the Siskiyou National Forest, Mountain Lakes Wilderness, on the Rogue National Forest, and Crater Lake National Park.

Oregon Department of Environmental Quality (in cooperation with the U.S. Forest Service) 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}) date 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 within 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 within 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 within 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. Whereas, prescribed fire will produce smoke, through appropriate smoke management measures, the quantities, duration, and timing of the burn can be adjusted to manage such production.

Prescribed burning is constrained July 4 through Labor Day by the Oregon Visibility Protection Plan. The Medford District 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 an extended 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. Historic occurrence of long lasting, large wildland fires that produce larger volumes of smoke during the months of August and September have been common within this region.

The Clean Air Act, as amended, directs the State of Oregon to meet or exceed national ambient air quality standards by 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 within western Oregon. Particulate matter with a size of 10 microns or less (PM10) is the specific pollutant addressed in the SIP. Particular 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 such as small particles, NO_x, CO and 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, 90% of smoke particles from wildland and prescribed fires are PM10, and 70% are PM25 (EPA 1998).

Historically, EPA's National Ambient Air Quality Standards (NAAQS) for particulate mater (PM) tended to focus emission control efforts on Acoarse@ particles (those larger than PM25). Before 1987, EPA's PM standards focused on ATotal 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.

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.

K. HUMAN USE

1. Socioeconomic Overview

The Illinois Valley is located in the southern portion of Josephine County, which has a population of 65,500. The following data is taken from Reid (1996) and represents federal and state data taken between 1987 and 1995. For Josephine County, the percent of the population age 65 and older is 20%, exceeding the state average of 13.7%, and transfer payments are among the highest in the state. 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 the highest for poverty, particularly for children (27.5% of the population). College educated individuals comprise 12% of the population, compared to 20% for the state. The high school dropout rate is among the highest for the state (Reid 1989; USDI 1998).

Cave Junction is the largest town in the watershed, with a population of 1,256. A considerable population also lives outside of the city limits on rural residential lands. The county ranks highly for owner occupied housing units. Josephine County has the smallest percentage of the land base in farms and only 24% of the land in the county is in private ownership. 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, no date). The historical dependence of 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.

Highway 199 is the primary transportation route through the watershed, running north to south. Scattered residences and small businesses (Cave Junction) are located in the northern tip of the watershed. The town of O=Brien is located in the watershed, south of Cave Junction along highway 199, and includes a store, realty office, post office, restaurant and scattered residences. Rough and Ready Lumber mill is south of Cave Junction along highway 199. The West Fork of the Illinois River runs generally southwest to northeast within the watershed.

2. Recreation

a. Dispersed Recreation

Dispersed recreation includes off-highway vehicle (OHV) use, hunting, mountain biking, hiking, horseback riding and driving for pleasure. OHV use is popular on many BLM lands. Areas that are frequently used by OHVs include French Flat ACEC, Rough and Ready ACEC, and Logan Cut. There are also non-designated horse/hiking/mountain biking trails in the watershed, especially in the Logan Cut area and in the French Flat and Rough and Ready ACECs.

b. Developed Recreation

The Rough and Ready Botanical Wayside is located along highway 199 in the Rough and Ready ACEC. The wayside is on land that was patented to the State of Oregon through the Recreation and Public Purposes Act (R&PP). This land is set aside for recreation and must be managed for recreation for the state to retain their patent. There is a parking area, gated road and a proposed trail along the existing road heading west into the ACEC. The trail will be accessible to all non-motorized uses and travels approximately 0.5 miles to an overlook along Rough and Ready Creek. There is a kiosk and interpretive panel at the trail head and another interpretive panel will be placed at the overlook.

There is an R&PP Lease on BLM land in the northwestern part of the watershed. Illinois River Forks State Park is an 80 acre parcel leased by Oregon State Parks. This area is currently being used for picnicking; however, the state has proposed an undeveloped area as a campground.

3. Roads

Most roads in this watershed have been constructed as a result of the public's need for access. Many of these roads are on private lands, are natural surfaced and lack appropriate drainage structures. The mid-slope and low-elevation natural surface roads are a source of erosion and sedimentation of streams.

Road construction and improvement across BLM lands stemmed primarily from timber management objectives and mandates. Many natural-surfaced roads remained open for administrative access after timber sales were completed. These roads are known to be a source of sediment erosion into streams. BLM roads are managed and inventoried for potential decommissioning or improvements to help reduce sedimentation of neighboring streams.

Prior to 1992, road drainage culverts on BLM land in the West Fork Illinois River Watershed were designed for 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. 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. Today=s 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. During road inventories, existing culverts are evaluated for future replacement to meet the 100-year flood event.

Road density and type vary in the watershed. Table III-30 summarizes road mileage based on different surface types. According to current BLM GIS data, the average road density for the West Fork Illinois River Watershed is 2.6 mi./mile^2. For non-BLM land in the watershed, the density is 2.7 mi./mile^2. The average road density on BLM land is 1.16 mi./mile^2. The BLM continues to analyze and inventory BLM-controlled roads in an attempt to improve the roads and reduce road density to a level appropriate for land management and the environment.

There are a total of 10.94 miles of BLM roads in the watershed.

Table III-30: Summary of Road Mileage by Surface Type			
Road Ownership	**Surface Type**	**Miles**	**Total**
BLM	Natural (NAT)	7.46	2%
BLM	Pit Run Rock (PRR)	0.14	0%
BLM	Grid Rolled Rock (GRR)	1.23	0%
BLM	Aggregate Base Coarse (ABC)	0	0%
BLM	Aggregate Surface Coarse (ASC)	2.11	1%
BLM	Bituminous Surface Treatment (BST)	0	0%
Private & Other Agencies	Unknown / Various Types (UNK)	306.50	97%
Total Road Miles		**317.44**	

4. Minerals and Mining

a. Minerals

An inventory utilizing the mining claim information found in BLM records known as LR 2000 (computerized lands and minerals data base) revealed that there are approximately sixty current mining claims in the watershed with a fairly even mix of lode claims and placer claims. The rights of mining claimants for activities on unpatented claims are outlined in Appendix B.

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 usually involve no mechanized earthmoving equipment or explosives, and do not include residential occupancy. No administrative review of these types of operations is required. The number of casual users is not known.

Mining activity above casual use but primarily exploratory in nature requires the filing of a mining notice pursuant to the BLM Surface Management Regulations (43 CFR 3809). The mining notice informs the BLM of the level of operations that will occur, the type of existing 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. There have been no mining notices submitted for operations proposed to occur on the BLM-administered lands within the watershed.

A plan of operations is generally required for mining operations above casual use, for activities above the exploratory level (bulk sampling of greater than 1000 tons of ore), and in areas described as follows:

1 In areas where activities above casual use in specially designated areas such as areas of critical environmental concern (ACEC), lands within an area designated as a Wild or Scenic River, and areas closed to off-highway-vehicle use

2 Any lands or waters known to contain federally proposed or listed threatened or endangered species or their proposed or designated critical habitat, unless BLM allows for other action under a formal land-use plan and/or threatened or endangered species recovery plan

3 National Monuments and National Conservation Areas administered by BLM.

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. One plan of operations has been submitted for proposed activities within the watershed. This plan of operations was submitted by Walter Freeman representing Nicore Mining.

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

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 instream activities where the removal or displacement of material is anticipated and where the movement of a stream channel is planned. DSL also permits dredging within 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 within anadromous fish bearing streams. ODFW also approves variances for operations outside the preferred work periods where applicable. Dredging within the Illinois River and tributaries is allowed between June 15 and September 15 annually.

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).

b. Surface Uses of a Mining Claim

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. There are no instances within the watershed where the claimants have surface rights. These rights are outlined in Appendix B.

c. Mineral Potential

Lode: The mineral potential for nickel and chromite is moderate southeast of O=Brien. A moderate potential for copper and cobalt exists in the vicinity of Waldo Hill and trends north-northeast along the ridge system towards French Flat.

Placer: High bench gravels surrounding the old town site of Waldo were mined near the turn of the century and revealed variable concentrations of gold and platinum. The potential for placer deposits within the present day West Fork Illinois River and it=s tributaries also exists where older deposits have been incised and redistributed.

d. Physical Condition Resulting from Past Mining Activities

The existing physical conditions of areas that have been mined are variable. Those areas mined along the West Fork of the Illinois River appear to be in satisfactory condition; however, short-term visual impacts may occur where dredging undermines the shoreline. Evidence of past mining activities can be found throughout the watershed. There are several abandoned mining ditches and rock piles that have become overgrown with forest.

e. Mineral Patent Application

A mineral patent application was submitted to the BLM by Walter Freeman in 1992. The patent was submitted after a moratorium was initiated by Congress freezing the processing of mineral patents received prior to the date of the moratorium. The moratorium is still in effect.

5. Cultural Resources

Approximately 3,700 acres were surveyed for cultural resources in the 2000 Esterly Cultural Survey. This survey included lands in the East and West fork Illinois River Watersheds. Twenty eight sites were recorded in the West Fork Illinois River Watershed. Twenty-three of those sites are historic and five sites are prehistoric. Historic sites represent a full range of local mining history. The mining site chronology extends from the discovery of gold in Sailor's Gulch in the early 1850s to more recent prospecting in the 1930s and 1940s and includes sites representing all the important technological developments associated with hydraulic mining. Of the 23 historic sites, seven are recommended as eligible for National Register status (Budy 1999).

The Waldo Mushroom Camp has historically been used by commercial mushroom pickers periodically over the last 10 years. It is located at the old Waldo town site and near the Waldo cemetery. Several historic sites were identified in the cultural survey adjacent to the mushroom camp. Dumping and discharging of firearms have been a problem in the area.

Early routes between Crescent City and southern Oregon traversed the West Fork watershed from Oregon Mountain via the McGrew Trail, built in 1858, to Waldo and on to the Applegate Valley. (USFS, 1997)

The Wimer Road was constructed in 1882 by P.T. Wimer, an enterprising postmaster from Waldo, as a shorter, less difficult route than the McGrew Trail. This route became the primary route until the construction of Highway 199. The Wimer Road crosses a corner of BLM land in section 3 and traverses the west half of section 9 (T41S, R9W) (Historical Survey of Early Roads and Trails in Southwestern Oregon. Siskiyou National Forest, 1972).

6. Lands/Realty

The land pattern of BLM ownership within 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 within the watershed have the status of Oregon and California Revested Railroad lands (O&C lands). The lands owned by the United States and administered by the BLM are somewhat scattered and sometimes inaccessible.

The 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.

A major right of way corridor exists adjacent to Highway 199. Power transmission and telephone facilities are located within the corridor.

Josephine County has applied to the Federal Aviation Administration for patent (title) to BLM lands immediately west of the existing Illinois Valley Airport for airport expansion. BLM has asked FAA to table their request to BLM for the consideration of the patent application pending the eventual review of a mineral patent application submitted by mining claimant Walt Freeman prior to the FAA patent application.

A Recreation and Public Purposes Act (R&PP) lease has been issued to the State of Oregon for the

Illinois Valley Forks State Park. The lease currently allows the state to operate and manage the park for day use purposes. The lease expires in 2007 and allows for renewal of the lease. Currently, the state is considering amending the lease to allow future development with overnight facilities.

There are several land withdrawals within the watershed. The majority are for water power site withdrawals and classifications. The Medford District RMP lists those withdrawals.

7. Illegal Dumping

Illegal dumping occurs throughout the watershed. High impact dumping areas are at the Rough and Ready and French Flat ACECs, the Waldo Cemetery area, and near Logan Cut. Several dump contracts have been awarded to clean up these areas over the past several years. In addition, the BLM and interested neighbors have joined together to perform cleanup activities in the watershed annually around Earth Day.

IV. REFERENCE CONDITION

A. PURPOSE

The purposes of this section are 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).

This long period of drier and warmer conditions in southwestern Oregon began to change at some point in the mid Holocene. The onset of wetter, cooler conditions gradually changed vegetation patterns, as well as the quantity and distribution of game animals and migrating fish (Atwood and Grey 1996).

C. EROSION PROCESSES

Prior to Euro-American settlement there were more mature forests with openings caused by Native American burning practices and natural lightning events. Vegetation, coarse woody material, and organic matter on the forest floor protected the soil from erosion.

The historic erosion processes were generally the same as those described under the Current Conditions section. 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. Native burning practices generally involved burning nearly level to gently sloping areas in valley bottoms, foot slopes, 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. 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), the Native Americans recognized the value of riparian areas for humans and animals and therefore did not burn within them. Furthermore, the riparian areas of Class I, II, III and sometimes IV streams are very moist due to the stream influence and do not burn as easily as the uplands.

Mass movement or slides may have occurred in ultramafic areas with greater than 40 inch deep, extremely stony fine-textured soils and slopes greater than 20%. 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 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 AThe Beast@ was used in Josephine County to haul lumber over roads; it damaged bridges and culverts (Booth 1984) and compacted soils considerably.

D. HYDROLOGY

1. Floods

Periodic flooding within 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 the upper Illinois. 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. Warm rain on snow events have historically been a large factor in flooding in the West Fork Illinois River Watershed.

Major floods of record in the 1900s occurred in 1927, 1955, 1964, and 1974 (Atwood and Grey 1996). Another major flood occurred in 1997, during which the Rogue River was swept clear of every bridge between Grants Pass and the Pacific Ocean (Rogue River Courier, March 4, 1927).

2. Droughts

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. The controversy over who should have primary access to the limited water supply (farmers or miners) was described in an 1861 editorial (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

Within the East Fork Illinois River Watershed, placer mining for gold was initiated in Sailor, Allen, and Scotch Gulches. At about the same time, Fry Gulch, in the West Fork was also placer mined. These areas were intensively mined and 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 probably occurred to some degree.

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. Logan Cut is a ditch that was later developed as an outlet from one of the Esterly Lakes that was used for holding used hydraulic mining water. Logan Cut starts in the East Fork Illinois River Watershed and runs over the boundary to flow into the West Fork Illinois River.

E. STREAM CHANNELS

Prior to Euro-American settlement, the steeper, headwater streams in the West Fork Illinois River

Watershed had varying amounts of large woody material (LWM). Generally, the forested, non-serpentine streams had sufficient amounts to create pools and meanders. Forests, in these areas, along the streams provided shade and an abundant source of LWM resulting from tree mortality. The coarse wood provided both structure and nutrients for the stream. Areas that were strongly influenced by ultramafic/serpentine, such as Rough and Ready Creek sub-watershed, had very few trees and, therefore, very little instream LWD, much like today. The streams were longer, more complex and provided more aquatic habitat. Beaver eradication, mining, and agricultural development 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 true for the West Illinois River 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 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. 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 a reduced riparian vegetation which allowed more solar radiation to reach streams. Increased water temperatures resulted from this activity. Irrigation withdrawals lowered stream flows and increased the surface area of the water receiving solar radiation. This also increased stream temperatures.

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, 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 a 1936 Forest Type Map for the southwest quarter of the state of Oregon (Andrews 1936).

Enough information is present in the1936 type map to develop approximate major plant series and seral stage maps 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. The 1936 type map information for the all Forest Service lands and all lands in California are data gaps.

1. Forest Stand Types

The information below covers BLM lands and non-federal lands within the West Fork Illinois River Watershed outside of California. The definitions are as follows:

Table IV-1: Forest Stand Types

Forest Stand Type	Definitions
Douglas-fir - Small Second Growth	Young forests containing over 60% Douglas-fir, in which most of the volume is in trees 6 to 20 inches in diameter.
Douglas-fir - Old Growth	Forest containing over 60% old growth Douglas-fir, regardless of size.
Non-Forest Land -	Includes barrens, cities, natural grass areas, brush, desert, sand dunes, tidal flats, and agricultural areas with less than 10% of the area in woods.
Ponderosa Pine - Seedling and Sapling	Forests or old burns or heavily cut land where the majority of the trees under 12 inches in diameter are ponderosa and the stand of large ponderosa pine, if any, amounts to less than 1,000 board feet of saw timber per acre.
Ponderosa Pine - Small	Forest containing at least 50% by volume of either ponderosa pine, sugar pine, or Jeffrey pine, or all of them in combination, where the majority of the volume is immature trees ordinarily between 12 and 22 inches in diameter and amounts to more than 1,000 board feet per acre; such stands may consist either of (a)selectively cut stands of any age, or (b) uncut immature stands (so called Abull pine@ stands under 150 or 200 years old).
Ponderosa Pine - Large	Forests containing at least 50% by volume of ponderosa pine, sugar pine, or Jeffrey pine, or all of them in combination, where the predomination trees are over about 22 inches in diameter (over about 150 to 200 years old), and where no material amount of the stand has ever been cut.
Sub-alpine and Certain Non-Commercial Forests -	Includes areas at the upper limits of tree growth, usually unmerchantable because of poor form and small size, and areas within the range of commercial timber types and below the limits of sub-alpine types, which are too rocky, steep, sterile, or swampy to produce a stand of commercial size density, or quality.

Table IV-2 summarizes the extent of each of the vegetation types in the watershed.

Table IV-2: Reference Major Plant Series and Size Class Within the West Fork Illinois River Watershed (1936)

Major Plant Series	Acres	Watershed
Douglas-fir Small Second Growth	4,569	20.1%
Douglas-fir Old Growth	9,130	40.2%
Non-Forest	882	3.9%
Ponderosa Pine Seedling and Sapling	25	0.1%
Ponderosa Pine Small	2,416	10.6%
Ponderosa Pine Large	3,618	15.9%
Subalpine and Certain Non-Commercial Forests	2,075	9.1%
Total	**22,715**	**100%**

2. Landscape Patterns

Douglas-fir Old Growth - Over 9,000 acres was Douglas-fir old growth in 1936. Most of the old growth was found in T40S, R8W, sections 29, 30, 31, 32, and in T41S, R9W, sections 1,2,11-14.

Non-Commercial Forest Lands - Over 2,000 acres of non-commercial forest lands were identified in 1936. These areas were along the eastern boundary of the watershed, west of the Waldo Lookout road and in the vicinity of the current Rough and Ready Area of Critical Environmental Concern.

Pine species (Jeffrey, ponderosa, and sugar) were the most common species or species group on an additional 6,059 acres or 26.6% of the watershed.

Wildfires - There is no mention of any burned areas on the 1936 map.

Tanoak Series - There is no mention of the tanoak series in 1936.

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. It can be postulated from Hickman=s work, that the habitat for late-successional Survey and Manage plant species (*Cypripedium spp.)* in the West Fork Illinois River Watershed could have been more extensive, at least on north-facing slopes based on past disturbance. The south-facing aspects in the watershed were probably always limited in the extent of moister, late-successional habitat. Frequent, low-intensity fires helped to maintain a competitive edge for these species in the herbaceous layer. Due to the complex life history of these plants, they were probably never a dominant species in the herbaceous layer, but they could have occurred more frequently in the watershed and with higher numbers of plants per population area if moister, shaded microsite conditions occurred more frequently. The microhabitat required was most likely more abundant and contiguous before mining activities and their associated timber harvest became common practice since major clearance of timber over stories occurred.

Since serpentine habitats occur because of unusual soils, their area was probably similar to and contained the same type of plants as today but at higher levels of diversity and extent of population size. Primarily, the intensity of mining affected much of the serpentine. Most areas were flushed of their top soil. Some areas were subject to coverage by tailings or obliterated for tailings ponds. Forests were completely cut away in some areas. Also, the low-intensity, more frequent fires of the past probably helped to promote this higher species diversity. These areas were probably more extensive in size because the fires prevented encroachment of trees and shrubs. This would also be true for the serpentine wetlands in the area.

Oak woodlands and grasslands above the valley floor may also have been healthier due to frequent, low intensity fires. Therefore, better habitat may have been available for the native grasses and lichens that have been found.

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

Noxious weeds were nonexistent before the advent of European settlers. Native vegetation and habitats would have been more intact in the Illinois Valley as a whole.

b. Wildlife

Prior to European settlement, Native Americans managed the landscape using fire to burn off undesirable vegetation and to promote growth of desired products. Wildlife was extensively used by these people to meet their everyday needs. Human use of these wildlife resources occurred at a sustainable level.

Many habitat types were created and maintained by disturbance events, specifically fire. Consequently, fire suppression has changed vegetation patterns and historic habitat distribution. Fire adapted habitats and associated wildlife species have been adversely affected by fire suppression. This is particularly true for meadows, oak/savannahs and pine stands.

White oak stands provide nesting habitat for various species, acorn crops for wildlife forage, and big game winter range. The open condition and the grass understory are highly beneficial to a number of game animals and ground nesting birds. A variety of bird species such as the acorn woodpecker *(Melanerpes formicivorus)*, western blue bird *(Sialia mexicana*) and Lewis' woodpecker *(Melanerpes lewis)* are intricately tied to the riparian areas within these stands. Species such as the sharptailed snake *(Contia tenuis)*, common kingsnake *(Lampropeltis getulus)*, and mountain kingsnake *(Lampropeltis zonata)* use the grassland-riparian interface area as their primary habitat.

Historically, the amount and distribution of old-growth forest in the watershed was in a state of constant fluctuation. Early seral stands were created by disturbances such as wind throw, fire, disease and human activity such as commercial timber harvest, agriculture, and mining.

According to 1936 records, approximately 40% of the watershed contained old growth Douglas-fir. This wide distribution of old growth forest allowed for connectivity and dispersal of species associated with this habitat.

Ripple (1994) estimated that 89% of the forest in the large tree size class was in one large patch that extended throughout most of western Oregon. Landscape patterns within the watershed suggest that a similar distribution of Douglas-fir old growth occurred historically. Due to the connectivity of the older forests, animal dispersal, recolonization of former habitats, and pioneering into unoccupied territories was accomplished more effectively than it is today.

However, not all mature/old growth forests occurred in contiguous patches. Throughout the watershed, large areas of serpentine influenced soils were characterized by vegetation not capable of attaining old growth characteristics. Meadows were interspersed throughout the landscape and created habitat for early successional and edge associated species. Serpentine areas and meadows created natural barriers to dispersal for some species associated with old growth forests.

Old growth/mature forest associated species such as the northern spotted owl (*Strix occidentalis*), pileated woodpecker *(Dryocopus pileatus)*, northern flying squirrel *(Glaucomys sabrinus)* and red tree vole *(Phenacomys longicaudus)* were found in greater numbers than they are now. Due to the historic connectivity of mature habitat, species that benefited from edge environments, like striped skunks *(Mephitis mephitis),* may have been less common than they are today.

Riparian corridors provide habitat for a myriad of wildlife species. Beavers *(Castor canadensis*) acted as a keystone species (species whose impact on the habitat is greater than their numbers would normally indicate and which provide critical habitat support), creating backwater sloughs behind their dams, and adding fine woody material to the stream which served as fish cover. Waterfowl such as ducks and geese also benefited from the nesting habitat created as a result of beaver ponds.

Within a riparian area, the diversity of wildlife species is not restricted to the water surface. A profusion of aquatic insects supported an assortment of vertebrate species including anadromous fish. As the adult fish returned to their native streams, spawned and died, their carcasses produced a rich source of food that supported minks *(Mustela vision)*, American black bears *(Ursus americanus)*, grizzly bears, bald eagles *(Haliaeetus leucocephalus)* and a number of other scavenger species.

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.

More than any other human activity, mining has altered many aquatic systems in the watershed. Mining diverted water flows, altered stream channels and resulted in timber harvesting, road building and the movement of large quantities of soil and rock. 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.

Mortality associated with natural attrition and pulse events such as fire, windthrow and insect infestations created snags that provided habitat for a wide range of 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. Timber harvest and fire exclusion have reduced the influence of pulse events on the recruitment and availability of snags and down wood.

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.

Predators benefited many other species by preying on small mammals such as raccoons *(Procyon lotor)* that fed on the young birds in ground nests. Predators also made carcasses available in the winter that benefited species as diverse as the striped skunk *(Mephitis mephitis*) and the black-capped chickadee *(Parus atricapillus*).

Historically, the landscape was open 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/savannahs, and spent warmer seasons in the uplands.

In the early spring, black bears sought green grass to activate their digestive system. Winter kills that remained were utilized by the bears at this time. During early summer, California ground-cone *(Boschniakia spp.)* became an important part of their diet, until berries were available. As fall approached, the salmon returned to the river, spawned and died. This abundant food source was available to a host of consumers and scavengers.

Historically, exotic species such as bullfrogs, starlings, house sparrows, opossum and largemouth bass were not found within 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. Prior to the introduction of widespread mining activities, water quality was high. Seeps, springs, snow and riparian vegetation all 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.

Stream courses with higher gradients were primarily lined by conifers with a narrow band of deciduous trees and were well defined by entrenched channels. On BLM lands, most streams were characterized by plant series such as Ponderosa pine and Jeffrey pine which were not capable of providing Douglas-fir late-successional forest habitat.

As the streams dropped to the valley floor, wide floodplains were developed and the streams began to meander, taking on a variety of courses from year to year. These highly sinuous stream systems consisted of undercut banks, oxbows, and woody material that created a diverse aquatic system and associated habitats. Here, the riparian zone would have widened, with deciduous trees playing a more important role than they did in the uplands. Because conifers near the streams had a longer fire return interval, they were more likely to progress to mature stand conditions. This provided a source of large wood in the streams.

Many wildlife species contributed to riparian corridor diversity. Beavers *(Castor canadensis*), as a keystone species, created backwater sloughs behind their dams and added fine woody material to the stream, providing fish cover as well as nesting habitat for species such as ducks and geese.
The diversity of wildlife species was not restricted to the surface, as a profusion of aquatic insects took

advantage of the variety of available niches. These insects in turn supported an assortment of vertebrate species including anadromous fish. As the adult fish returned to their native streams, their carcasses produced a rich source of food that, in turn, supported minks *(Mustela vision)*, American black bears *(Ursus americanus)*, grizzly bears *(Ursus horribilis)*, bald eagles *(Haliaeetus leucocephalus)* and a number of other scavenger species.

2. Aquatic

a. Fisheries

Pre-Euro-American Settlement: A pre-Euro-American view of the West Fork Illinois River Watershed would have included sustained populations of beaver and salmon, particularly in the lower gradient reaches of Elk Creek and West Fork Illinois. In addition, there would have been a mixture of mature conifers and hardwoods and riparian zones would have had dense canopies, most notably on the valley bottoms where alluvium is derived from ultramafics but serpentine conditions do not dominate. Summer water temperatures in these valley bottom reaches were probably cool and not a limiting factor in salmonid production. In the upper reaches of the West Fork, 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. In the Jeffrey Pine plant series, the pine understory was sparse due to frequent fire and probably consisted of a grass layer. Stream temperatures in these areas may have been higher than current water quality standards (see Water Quality/Temperature, Chapter 3). In the valley bottoms and less so in the serpentine areas, there would have been large woody material dispersed throughout the streams providing complex habitats for resident trout, juvenile steelhead and salmon, as supported by the 1936 type map. There probably would have been an abundance of fish in many valley bottom reaches of most streams. Native Americans relied heavily on salmon, steelhead, lamprey and suckers for subsistence and ceremonial purposes.

Prior to Euro-American settlement, streams in the valley alluvium meandered with unconstrained channels. Multiple stream 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, although production of coho in the West Fork Illinois River Watershed was historically moderate compared to East Fork Illinois. 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, as was the stage road connection to California along upper West Fork and Whiskey Creek. Sedimentation of streams increased as well. Placer mining caused extensive erosion of the streambanks, notably in Fry Gulch, Elk Creek, and West Fork mainstem. 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.

There was extensive agricultural activity within the West Fork Illinois River Watershed. Fields were plowed right up to the streambanks. 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 were a relatively new phenomenon and consequently, large numbers of salmon and trout ended up in farmer=s fields.

Timber harvest had one of the biggest impacts on juvenile coho salmon, steelhead, and cutthroat trout habitat, especially in non-serpentine areas. Streamside trees were harvested due to their size and value. 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 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 are found in lower gradient stream reaches than resident trout and steelhead, and are not distributed as far upstream. As a result, when the lowland habitat was altered, there were limited refugia for the coho salmon.

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.

Insufficient restrictions on commercial salmon harvest and a rapid decrease in freshwater habitat led to rapid decline in the coho populations.

I. FIRE

The majority of lands within the West Fork Illinois River Watershed have a historical fire regime of low severity. The low severity fire regime is characterized by frequent (0-35 year) fires of low intensity (Agee 1990). The remaining brushfields and open areas of grass are considered a stand-replacing, non-forest fire regime, again with a fire frequency of 0-35 years. Some limited areas are mixed severity fire regimes with fire frequencies of 35-100 years.

Fires in these 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 overstory mortality occurs. The majority of the dominant overstory trees are adapted to resist low intensity fires because thick bark developed at an early age. Structural effects of these fires are on the smaller understory 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 understory 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 understory 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 understory with little fuel accumulation or understory vegetative growth. This would have occurred across the watershed with only isolated areas of dense undergrowth and fuel accumulation. These areas would have changed over time. Location would have largely been dependent on the lightning occurrence pattern, with the exception of areas used by Native Americas. 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 understory. 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

Broadly speaking, the native people of the region were hunter-gatherer-fishers who made their living from a wide variety of natural resources found in the narrow canyons and small interior valleys they occupied. People wintered in semi-permanent villages located along major rivers and dispersed during the spring-summer-fall season to exploit upland resources. The archaeological record reflects this subsistence-settlement system.

Ethnographically, Penutian and Athapaskan speakers occupied the region. Tribes included the lowland Takelma of the upper Illinois River; Athapaskans occupied the Applegate Valley (Kendall 1990). Gray (1987) however, concludes that the whole Illinois River drainage was Athapaskan. At the time of Euro-American contact, native cultures could be characterized as simple, stratified, village-based societies, with ceremonial systems much like those found among the Hupa, Karuk, and Wiyot of northwestern California (Aikens 1993; Kendal 1990). Gray (1987) provides an excellent synthesis of the Takelma and their Athapaskan neighbors.

Aikens (1993) recently summarized the prehistory of southwest Oregon. The oldest recorded site in our immediate area is located at Marial on the Rogue River. This site has been dated to around 8,000 years before present (Schriendorfer 1985). However, little is known of the archaeology of the upper Illinois River Watershed, especially in this watershed. 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). Four prehistoric sites are recorded for the watershed (three USFS and one BLM).

Traditional Native American cultures were effectively destroyed in the Illinois Valley area by the intrusion of miners in the early 1850s and the subsequent Rogue Indian Wars. After the 1853 treaty, most of the Takelma were on the Table Rock Reservation. In 1856, after the cessation of hostilities, they were moved to the Grand Ronde and Siletz Reservations.

2. 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).
There are numerous parallels between modern vegetation management and Indian burning. Each seeks to maintain an array of early to mid-seral plant communities across the landscape. Communities provided small and big game habitat, natural fuel breaks, and for native populations, 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). Fire also recycles nutrients, provides vistas, and often destroys forest pathogens. See Williams (1993) for a recent bibliography of the use of fire by Native Americans.

Until recently, specific ethnographic information for the use of fire in southwest Oregon was limited (Lewis 1989). However, research specific to the Applegate and Illinois Valleys has been published (McKinley and Frank 1995; Pullen 1995). In addition, detailed information is available for the Willamette Valley (Boyd 1986), and it is possible to extrapolate techniques to native populations in this watershed based on similarities of plant communities. Similar plant communities also occur in northern California, such as chaparral, and ethnographic data is available for burning by those tribes. Native people=s burning practices in southwest Oregon must have functioned similarly to those described for such tribes as the Miwok, Hupa, Tolowa, and Wintun in California (Lewis 1989, 1993). Also see Blackburn and Anderson (1993).

The following review is based on Lewis (1989) and Pullen (1995). In addition, Pullen (1995) 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 1995). Open ponderosa pine stands was 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 (1995) 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.

3. Native American Management of the Anadromous Fish Resource

The importance of anadromous fish resources to aboriginal societies is well documented in the ethnographic literature for northwestern California and southwestern Oregon (Hewes 1942, 1947; Kroeber 1925; Kroeber and Barrett 1960; Suttles 1990). Estimated total yearly consumption of salmon in native California, which includes northwestern California watersheds, is estimated at over 15 million pounds (Hewes 1947). 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 aboriginal settlements and the spiritual life of native peoples.

Harvesting and storage of anadromous fish in the Pacific Northwest has been part of a yearly subsistence routine dating back to prehistoric times (Aikens 1993). Charred salmon bone was recovered at the Marial site located on the Rogue River. This site dates back to at least 8000 before present (Schreindorfer 1985). Exploitation of river resources occurred at the Umpqua-Eden site located on the Umpqua River estuary. Artifacts associated with fish procurement and salmon-coho bones were recovered; this site dates to 1010 BC (Ross 1990). The excavation of the Gallaher site on the lower Illinois River yielded artifacts associated with fishing technology.

Fishing techniques used throughout the region include hook-line, netting from canoes, dip nets from falls, harpoons, night fishing with torches, clubs, salmon fences (weirs), and basketry traps (Gray 1986; Kroeber 1925). Salmon was cooked and then pulverized for storage for winter use. Fish drying was a common method of preservation and extremely important as a winter food source. Salmon eggs were smoked. In hard times towards the beginning of spring, the tails and heads of salmon might be eaten with some acorn mush. Spring runs of salmon were especially important at a time when stored winter reserves were dwindling or exhausted.

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 McCalebs Ranch located within walking distance falls on the Illinois River.

Native peoples were familiar with all major fish species: trout, salmon trout, 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.

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. Priests or formulists controlled the timing of rituals in northwestern California (Kroeber 1925). 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. 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).

4. Gold Mining

The discovery of gold at the mouth of Josephine Creek in the summer of 1850 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. 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. Reviews of regional environmental and mining history are found in McKinley and Frank (1996), Ramp and Peterson (1979), and Francis (1988).

Althouse Creek, just east of the West Fork Illinois Watershed, saw a tremendous amount of gold mining activity, supporting over a thousand miners along ten miles of its length for perhaps ten years (McKinley and Frank 1996). By 1853, Browntown was a thriving mining center on Althouse Creek, serving miners in the area. In 1852 a trail was opened up from Crescent City, California, which led to an increase in miners coming into the valley.

Within both East and West Fork Illinois River Watersheds, placer gold was first discovered in Sailor, Allen, Fry and Scotch Gulches. These areas were intensively mined and lasted only a few years (Ramp and Peterson 1979). Beginning around 1860, a system of ditches was developed to bring water to the hydraulic mine operations developing in the area; the Osgood Ditch, located above the East Fork of the Illinois River, dates from this era. It is estimated that thirty miles of ditches and flumes at four levels were constructed (McKinley and Frank 1996). Active mines included the High Gravel No. 416, the Deep Gravel No. 393 and Esterly mines (Llano de Oro), No. 396. These areas contained several thousand acres of gold and platinum gravels and were hydraulically mined from about 1870 to 1940. Their combined estimated production was about 55,000 oz. (Ramp and Peterson 1979). Bedrock at the Deep Gravel and Esterly Mine was well below the elevation of the Illinois River and huge hydraulic elevators were used to hoist the gravel to the sluices. The Esterly Mine closed in 1942. The Esterly Lakes are a remnant of those early hydraulic mine operations.

As miners came into the area whole towns sprang up over night. Towns appeared in Allen Gulch and at Waldo. By 1856, 500 people were living in Waldo and by 1858, the town had four hotels (one for

Chinese only), a stable, blacksmith shops, saloons, and a bowling alley. Francis (1988) estimates that over 3,000 people used the services and materials the town had to offer. When Josephine County was formed on January 22, 1856, Waldo, the largest town in the area, was chosen as its territorial seat. Waldo declined in population until the late 1920s. In the mid-1930s, the hydraulic giants of the Esterly Mine mined what was left of Waldo. Between 1852 and 1979 Josephine County produced 567,989 oz. of gold valued at $12,797,434 (Ramp and Peterson 1979). For a detailed discussion of individual mines, see the Oregon Metal Mines Handbook (1942).

In addition to gold, copper was produced primarily before 1920 from the Queen of Bronze Mine No. 421 and the Cowboy Mine No. 446, both in the Waldo-Takilma area. Ore was processed at a local smelter but some ore was shipped by horse drawn freight wagons to the railroad terminal at Waters Creek. Over 25,000 tons of ore were produced (Ramp and Peterson 1979). Copper has been the second most important metal in terms of production in Josephine County.

Mines and later copper processing facilities produced a demand for forest products, and almost certainly impacted forests heavily at the local level. Flumes, chutes and towns needed building materials. Two whipsaws in the Waldo area in the 1850s were producing up to 20,000 board feet per week for mining operations, and Chinese miners ran a mill for the Sailor Diggings. Large pines were the preferred species. By 1886, J.W. Bennet opened a water run lumber mill in Butcher Gulch near Waldo. Other mills opened in the 1890s but lumbering really didn't take off in the region until the 1950s (McKinley and Frank 1995).

5. 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.

6. 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 are 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, agriculture and forest management that has occurred since the end of the nineteenth century.

Forest management on both private and public land has included fire suppression, road construction, and logging with yarders on steep slopes and tractors on gentle to moderate slopes. Fire suppression has resulted in accumulation of fuels. When these burn in a wildfire situation, they can burn extensively and with high intensity. A high-intensity fire consumes the duff, litter and most of the coarse woody material. The top layer of mineral soil impacted by a high-intensity fire commonly shows color changes due to consumption of organic matter and the effects of heat on the mineral components. This leaves bare soil conditions that are highly susceptible to erosion.

A review of the fire hazard (Map 12) and high priority hazard treatment (Map 16) as compared to soil depth and parent material (USDA, USDI 1997) shows a correlation between non-ultramafic parent materials and high fire hazard. This is likely due to vegetation patterns under fire suppression that typically become dense and overstocked in most soils in this area of high precipitation except in areas of ultramafic derived soils that produced scattered vegetation due to soil chemistry that limits plant species and rate of growth. Areas of high fire hazard are of concern, if left untreated, because of the potential for extensive erosion after catastrophic fire.

Any surface disturbing (including burning) treatment on slopes of ultramafic soil is of concern because of the 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 have high erosion hazard due to the severity 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 West Fork Illinois River 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. Stream surveys of Class 3 and 4 streams need to be completed.

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 road 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 bottoms where stream were located. Added investments for improvements and tributary roads over time would make many these roads nearly permanent in spite of their poor location from a hydrologic and erosion perspective.

Logan Cut is an old mining ditch located in sections 9, 10, and 15. It takes water out of the East Fork of the Illinois Watershed and shunts it to the West Fork. It is acting as a perennial interrupted (pools remain in the dry period) fish stream. Logan Cut augments flow to West Fork of the Illinois River.

Hydrologic cumulative effects analyses have not been completed for subwatersheds within the watershed. However, estimates based on GIS mapping indicate that generally the higher road density areas are on non-BLM land. The areas with high to very high road densities, where data is available, include West Fork Illinois, Lower; West Fork Illinois, Middle; and Elk Creek. 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 mid-range peak flows in small streams (Jones 1996). 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 levels 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 except where soils are derived from serpentine/ultramafic material. 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 West Fork Illinois River 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. Increased instream gradients and sediment transport are consequences of the larger width-depth ratios (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 continue to supply sediment to streams as long as the roads exist. Road maintenance, renovation and decommissioning may, in some instances, 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).

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 the potential for short-term recruitment. Large wood can perform an important function of reducing stream velocities during peak flows and trapping and slowing 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). Stream surveys are needed for the Class 3 and 4 streams to quantify where large wood is needed.

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 increase in fire exclusion in relatively recent times has driven forest structure towards a higher level of complexity in the current forest stands. 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.

Consideration of the watershed=s vegetation, reference and current condition and successional patterns indicates four distinct areas for consideration.

1. Plant Series

The Douglas-fir series was the dominant plant community in the watershed and remains so today. In 1936, 60% of the acres inventoried were in the Douglas-fir series. Today, the Douglas-fir series has been inventoried on 36% of the acres, a drop of approximately 24%. In 1936, there was no mention of the tanoak series in the watershed. Today, that plant community covers 21% of the watershed acres inventoried.

It is difficult to assess the changes in the Jeffrey pine series as the 1936 type maps combined areas with all pine species. However, if the areas deemed non-commercial in 1936 are lumped with all pine areas, the total is 36%. Today, the ponderosa and Jeffrey pine series account for 25% of the acres inventoried. This is a decrease of about 11%. Ponderosa pine itself has declined from 11% of the acres inventoried in 1936 to 0.6% of the acres inventoried today.

Last, there has been an increase in the non-forested areas from 4% in 1936 to 17% in 2000, a 12% increase. This may reflect the rural development in the watershed.

This change in series composition shows a 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, if fire disturbance had been allowed to occur. Pine series are being encroached by Douglas-fir. These correlations are rough but demonstrate changes in plant communities over time.

2. Late-Successional Forest

In 1936, 40% of the inventoried acres were classified as Douglas-fir old growth. Today, about 10% of the land has trees with an average diameter greater than 21" or is considered late-successional forest. Most of the reference condition old growth was present on what is now private land. Mining, logging, and development have removed most of the late-successional forest from this watershed. The remaining late-successional forest is split between the BLM and non-Federal lands.

3. Fire Events

There is no mention of deforested burn areas in the 1936 inventory. Since that time, there have been several fires in the watershed. The Longwood fire burned about 2,300 acres in 1987 and the Mendenhall fire burned 450 acres in 1994. Five other wildfires have been recorded in the watershed between 1944 and 1960 (USDA, USDI 1997). A rough estimate is that less than 4,600 acres (6%) in the watershed have burned since 1936. This means that fuels have been accumulating on 94% of the watershed for 65 years without a fire event occurring.

4. Size Class Distribution

A high percentage of the watershed (60%) 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 Whiskey Creek and in the West Fork Illinois River, downstream from the confluence of Whiskey Creek and West Fork Illinois River.

G. SPECIES AND HABITATS

1. Terrestrial Species and Habitats

a. Special Status and Survey and Manage Plants

In the West Fork Illinois River Watershed, habitat for special status and Survey and Manage plants differs between current and reference conditions. Changes have occurred primarily from fragmentation of habitat due to agricultural use, rural residential development, mining, and timber harvest. There have also been changes in species composition due to fire suppression.

Changes in habitat are especially evident where intensive mining took place. Without detailed information of population size or the extent of individual species pre-mining era, it is difficult to determine at what natural levels these species may have existed. Some areas appear be recovering over time, but other areas where extensive mine tailings were left above any topsoil may not recover without extensive restoration efforts.

The reduction of late-successional habitat for Survey and Manage plant species lends uncertainty to the long-term health of these species. If this habitat continues to shrink, those populations in existence will become more isolated with little chance of expansion. This will also make them more susceptible to extirpation by chance events (such as a hot-burning wildfire, especially on the south facing aspects of the watershed) that could cause major perturbations in numbers of individuals per population and numbers of populations in the region (*i.e.*, southwestern Oregon). If the numbers of populations or individuals per population decrease, the chance of extirpation of this species from this region could increase.

The reason these species were originally determined to be Survey and Manage was because their future viability was uncertain due to their dependence on late-successional habitat. Late-successional reserves designated by the Northwest Forest Plan do not provide refuge for the majority of populations of these species in this region of Oregon. The majority exist on the lower elevation Matrix lands. The Management Recommendations prepared as part of the NFP not only discuss the need to protect known sites of these species, but also recommend retaining canopy closures of 60% or greater and protecting mychorrhizal associations by limiting disturbance to the duff layer. This could also improve the chances for protection of rare nonvascular plant species which also require late-successional, structurally-diverse habitat. An ecosystem management approach could ensure that a natural range of ecosystem variability is retained which would include crucial habitat for a variety of species.

Besides reduced late-successional forest habitat, the biggest impact affecting species diversity is the reduction in number and size of natural openings as well as edge habitat between the forest and openings. These openings are filling in with shrubs and trees due to lack of fire. This reduces the likelihood of survival of healthy populations of such species as *Erythronium howellii*. Managing these habitats is as important as managing for late-successional habitats.

Similarly, managing for serpentine habitat is important as it harbors the highest concentrations of special status plants in southwestern Oregon. Both dry serpentine and serpentine fens require habitat restoration activities such as prescribed fire to improve habitat for special status plants. Improved habitat will consist of reduced thatch and reduction in shrub encroachment. For serpentine fens in particular, this is important since four of the rarest special status species (plus one species variety) occur only in these fens.

While maintaining such habitats, nonvascular Survey and Manage species should be protected from treatments that could decrease population viability. This is especially true in oak woodlands where *Dendriscocaulon intricatulum* and *Bryoria tortuosa* have been found.

The Medford District Resource Management Plan (RMP) includes the objective of "studying, maintaining or restoring community structure, species composition and ecological processes of special status plants." The RMP includes management actions and directions that require the maintenance or enhancement of habitats such as these.

b. Wildlife

When compared to reference conditions, there is less late-successional forest and less connectivity today. Past management activities such as timber harvesting and mining have reduced the current 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 loss of late succession forests.

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 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, poaching and decreased habitat effectiveness.

The reduced small and isolated mature/late succession forest patches within 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 succession forest patches are larger and better distributed.

When compared to reference conditions, late-succession forest patches are more fragmented. This has reduced dispersal opportunities at both a local and landscape level. The purpose of providing connectivity is to facilitate movement 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).

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 larger, stand-replacing fires. Due to fire exclusion, the accumulation of ladder fuels currently poses a greater threat than was historically present. For example, research by Atzet and Martin (1991) found that fire exclusion in Douglas-fir forests has contributed to reducing fire disturbance by more than twice the historical average. This has created significantly greater risks of stand-replacement fires.

Fire suppression has also resulted in 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 replaced by more shade tolerant species such as tanoak and Douglas-fir.
Fire exclusion has resulted in encroachment of meadows by species such as incense cedar and Douglas-fir. Additionally, fire exclusion has contributed to decadent brush fields and the loss of forbs and grasses typically associated with lower brush canopy closure.

In general, management of habitat for target species such as the spotted owl or red tree vole will depend upon the ability to maintain existing late-successional forests while at the same time managing young stands so they will achieve desired stand conditions as quickly as possible. Continued losses of late-successional forest would further reduce dispersal opportunities and viability of species associated with this habitat.

Utilizing fire in meadows is essential to restore these sites. Otherwise 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.

2. Aquatic Species and Habitats

a. Stream and Riparian Trends

The degradation of aquatic habitat on federal and non-federal land in the West Fork Illinois River Watershed from the reference to the current condition has resulted from changes in these major watershed attributes: (1) successional 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. In addition, on non-federal lands, agriculture and development in the floodplain have been major factors in changing aquatic habitat in the watershed.

b. Riparian Reserves and Large Woody Material

The majority (57%) of the Riparian Reserves on BLM lands are serpentine areas with a Jeffrey pine plant series. These pine stands have changed from mature trees with a grass understory to being dominated by mid-seral trees with a shrub understory (see Current Condition, Wildlife, Riparian). Wildfire exclusion has allowed the encroachment of shrubs into Jeffrey pine stands, excluding new pine seedlings. 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 more likely to be found because the material is not being consumed by frequent fires. The mature size class probably has become less available with time, however, as recruitment is increasingly from the mid-seral stage.

Within the BLM Riparian Reserves, only 17% of the land is described as the Douglas-fir plant series. These are the only lands plus a small amount of tanoak series (2%) within the Riparian Reserves capable of producing late-successional habitat. 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, both through removing mature trees and by post-harvest burning. Approximately 15% of the BLM Riparian Reserve acreage is non-vegetated and has never been capable of producing late-successional habitat.

The trend on National Forest and private lands has been similar to that on BLM. Riparian vegetation has changed from forest stands dominated by mature trees to stands of poles and small trees. On private land, hardwoods and young conifers have become the dominant vegetation due to logging and fire exclusion. National Forest lands are predominately serpentine areas such as Rough and Ready Creek, and are mostly incapable of producing late-successional habitat. On private land, logging and the development of valley bottoms have degraded riparian habitats which were capable of having late-successional habitat. Wildfire exclusion in particular has favored tanoak, resulting in degraded riparian habitat due to decreased species and structural diversity, and lowered recruitment of high quality conifer down wood.

c. Instream Large Woody Material

The difference between the reference and current conditions regarding instream large woody material is a drastic degradation 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 has been cleared out of stream channels when it appeared to pose a risk to structures or a blockage to fish passage.

The quality of instream large wood has been reduced as mature trees have been removed and streamside forests become dominated by smaller trees. Smaller material 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. For example, tanoak produces lower quality large woody material in areas where it now dominates such as Blue Creek, Elk Creek, and the middle section of West Fork.

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 leaves the system sooner. When the wood cannot function to shape the channel, fewer meanders and side channels develop to provide needed rearing habitat. The effect of the degradation of this channel process is evident on the West Fork from the confluence of Whiskey Creek to the confluence with the East Fork Illinois River.

Another significant change from the reference condition is the presence of Port-Orford cedar root disease. An infestation has been identified adjacent to the Whiskey Creek confluence at West Fork Illinois. The reach of West Fork upstream of the Whiskey Creek confluence in Section 9 has a functioning log jam composed of whole trees with root wads. This jam resulted from a landslide on an adjacent slope or the undercutting of a forested streambank slope. The jam caused a bench of spawning gravel to form and forced the flow laterally into a meander. The log jam demonstrates the function of woody material in the West Fork system and the importance of a source of mature trees. The loss of Port-Orford cedar from the riparian corridor will remove a significant source of large wood from the West Fork Illinois system.

d. Sedimentation

Stream sedimentation is a critical issue in Elk Creek, Logan Cut, Fry Gulch, and the lower reaches of the West Fork Illinois River. Elk Creek drains land that is primarily in private ownership and has erosive non-serpentine soils. Logan Cut and Fry Gulch have both had increased flows and scour associated with their use as hydraulic mining outwash drainages. Logan Cut continues to have over 50% of its banks erode due to the steepness of the slopes. The West Fork mainstem has undesirable sedimentation levels downstream of its confluences with Elk and Wood Creeks. Both of these creeks are major sources of sediment to the West Fork. Wood Creek, like Elk Creek, drains lands that are almost entirely in private ownership and have erosive non-serpentine soils. Past mining and logging practices account for the changes in the sedimentation of the watershed from the reference condition to the current condition. 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 is expected to decrease on federal lands with the continued implementation of the ACS. This assumes that new activities 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 to irrigation withdrawal, increased width-depth ratio, and decreased riparian canopy cover. 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 poor land management and continue to cause declines in native fish populations. Past land use practices which increased peak flows and incised channels have had the effect of destabilizing banks and widening channels. These changes in the channels in turn have resulted in decreased low flows.

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, low flows are expected to continue to be a limiting factor for salmonid survival due to the effect on rearing habitat. Projected growth and development on the valley floor will continue to put a demand on water allocation and result in higher road densities.

f. Stream Temperature

Stream temperatures have increased from 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 clearing are the three forms of human disturbance that are most evident in this watershed. Some streams in natural (undisturbed) condition may have temperatures that exceed DEQ 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 within the Riparian Reserves, summer temperatures will continue to exceed DEQ standards within the tributaries and the mainstem West Fork Illinois River. Some stream temperatures in serpentine areas may continue to exceed current standards even when they return to a natural range of variation. Summer stream temperatures in areas with predominately federal land holdings should decrease with continued implementation of the ACS. Within the low-gradient reaches of the valley floor where private land ownership dominates, summer stream temperatures are not likely to improve as riparian vegetation is removed during logging and conversion to residential development and the demand on water allocation increases.

g. Aquatic Species

Factors outside the West Fork Illinois River Watershed which have already 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, which provides protection from over-harvest and slows the rate of habitat loss in the watershed. Implementation of the Aquatic Conservation Strategy on federal land will improve watershed health. The likelihood of recovery of anadromous fish habitat is moderately low, however, because the majority of the watershed is privately owned. Changes in summer temperatures and the loss of stream complexity in the lower West Fork have severely 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. In the coho and steelhead recovery effort, refugia on federal land will be extremely important. The prioritization of restoration in Key Watersheds will allow remnant stocks of coho to survive while drainages that have been 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, especially in non-serpentine areas. In the West Fork mainstem, increased woody material will retain detritus and encourage communities of macro invertebrates intolerant of scouring and degraded conditions.

Current resource management practices and water diversions on private lands, which are beyond the scope of the Aquatic Conservation Strategy, will continue to limit potential for recovery of salmon and steelhead habitat and populations. The philosophy of the Aquatic Conservation Strategy must be applied equally across all ownerships to achieve the potential for recovery of at-risk fish stocks. The removal of fish passage barriers and the improvement of water withdrawal methods (*e.g.*, gravel push-up dam removal) can be accomplished on private land by spending federal funds through the Wyden Amendment. 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 irrigation and fish passage improvement.

Private forest lands will no doubt continue to be managed intensively for wood production. The cumulative effects of management activities have substantially 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 in better condition than streams on private lands. The trend will likely continue.

H. FIRE MANAGEMENT

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

Fire exclusion has created vegetative and fuel conditions with high potential for large, destructive, and difficult-to-suppress wildfire occurrence. The watershed 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 within 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 within the watershed.

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 class II and III. The watershed 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 degrees of mortality, and replaces vegetation rather then maintains it. This has resulted from nearly a century of fire suppression and exclusion. The change in vegetative conditions, fuel profile, and amount of fuel present is now such that a large wildfire will have severe effects on vegetation, erosion, habitat, and water quality. Stand replacement as a result of wildfire was a low percentage in the reference condition. Existing conditions would produce 50% to 75% stand destruction type fire. The current trend is for increasing fuel hazard buildup and increasing risk for fire ignition due to population growth and human use within the watershed and adjacent region.

The change is great in magnitude and is widespread throughout the watershed. Only eight percent of the watershed is currently in a low hazard condition. High hazard conditions occur throughout the watershed, covering 55% of its 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 will define and limit the ability to achieve most management objectives for the watershed. The capability of achieving and meeting management objectives in the watershed is low in the long term (20 years or more).

Risk of ignition has increased within the watershed. This is a result of the higher population residing within 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 that have occurred in the watershed include timber harvesting, road building and development. Cave Junction and the surrounding areas are 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 and more private 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 Waldo in the eastern part of the watershed (over 100 years ago) to the west. Settlement is centered along highway 199, especially in Cave Junction and O=Brien. 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, bisects the watershed. Cave Junction is the second largest community in Josephine County. As of 1997, approximately 15,000 people lived in the Illinois Valley, scattered in the backwoods and small hamlets such as Takilma, Selma, O=Brien, and Holland (Cosby 1997).

Human use has led to increased overall erosion. Erosion and sedimentation is due to additions of increased runoff from roads, parking lots, roofs and other surfaces where there is no or little 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.

The anticipated result of these social or demographic changes/trends that could have ecosystem management implications include an increase in population which increases the demand for use (or abuse) of public lands, a continuation of the illegal use of the watershed due to lack of law enforcement patrol, and landfill fee increases.

As previously noted, a major change regarding fire in the landscape has been occurring since the interruption of Native American periodic burning of specific plant communities, especially those communities 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 (Dick Boothe, personal communication). This would roughly correspond to the period of time after the Rogue Indian Wars and the removal of Native Americans.

Miners, by contrast, 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.

Burning by miners, fire suppression, and the natural fire frequency of the area can lead to questioning the degree and intensity of Native American burning to manage habitats. Is it possible to separate out the effects of Native American habitat management from naturally occurring fire? If we allow for a long time frame in which native people used fire, possibly thousands of years in specific habitats, we can posit that a number of plant communities (*e.g.,* pine-oak savannahs and meadows) were primarily anthropogenic in nature and owed their continued existence to the periodic and systematic use of fire by Native Americans. In this context, prescribed fire will play a critical role in maintaining the vitality of the watershed over time and restoring specific pre-settlement plant communities where that is a goal.

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, specifically from the East Fork Illinois River, may have had an impact on water temperature which in turn affected fisheries. Areas within 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, 1995). The French Flat area just north of Waldo was heavily modified by early day mining activities.

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

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 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-5 list recommended management actions for the West Fork Illinois River Watershed within each of the land allocations. Actions that are required by the RMP, NFP, 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. The recommendations may conflict or contradict one another. 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 the National Environmental Policy Act (NEPA). It is within 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 Allocation	Issue / Concern	Related Core Topic	Location	Recommendation
All	Ponds	Human Uses (Fire), Species and Habitat (Wildlife)	Watershed Wide	Where possible, maintain and improve ponds to enhance their value to wildlife and for fire suppression.
All	Deer Winter Range	Species and Habitat (Wildlife)	Below 2,000 Feet	Seasonally close roads in important deer winter range areas. Minimize permanent road construction and restrict management activities between November 15 and April 1.
All	Mines	Species and Habitat (Wildlife)	Watershed wide	Prevent or minimize disturbance to mines through the use of closures, buffers and seasonal restrictions.

Table VI-1: Recommendations - All Land Allocations				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
All	Watershed with Mixed Ownership	All	Non-BLM lands	Work with land owners through watershed councils, partnerships, etc. on projects, planning, and activities to promote a watershed wide perspective and consideration. Projects could include working with Special Status / Survey and Manage plants 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.
All	Meadows, Oregon White Oak, Ponderosa Pine Sites	Species and Habitat (Botany, Wildlife), Vegetation	Watershed Wide	Restore meadow, 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.
All	Noxious Weeds	Species and Habitat (Botany), Vegetation	Watershed Wide	Develop an active noxious weed control program in the watershed.
All	Road Closures	Fire, Vegetation (Port-Orford cedar)	Watershed Wide	Collaborate with State Forestry for gate closures and signing during periods of very high to extreme fire danger.
All	Road Closures	Vegetation (Port Orford cedar)	Watershed Wide	Reduce vehicle access to uninfected Port-Orford cedar locations.
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 throughout the watershed. These sites would be located on ridgetops or other natural or human made features which can function as barrier to wildland fire spread: along property boundaries, within or around areas of high values at risk of loss from wildfire. They would create opportunities to compartmentalize wildland fires into small drainages and prevent large-scale wildfire occurrence. Additionally, they reduce the risk of a high intensity fire occurrence and return to a condition that would exhibit a low intensity fire regime
All	Helispots/ Pump Chances	Fire	Watershed Wide	Maintain existing helispots and pump chances.
All	Fire Hazard	Fire, Human Uses	Watershed Wide	Pursue both mechanical and prescribed fire treatments on BLM lands to reduce fire hazard. Focus on high priority and wildland/urban interface areas. Encourage a coordinated approach with all landowners and ODF.
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.

Table VI-1: Recommendations - All Land Allocations				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
All	Illegal Dumping, firewood cutting	Human Uses	Watershed wide	Work to minimize illegal dumping in the Waldo area, Rough and Ready ACEC, Logan Cut and firewood cutting by enforcing rules and regulations, limiting access, increasing visible presence in the area and educational efforts about protection of resources. Publish Federal Register notice for closures in Rough and Ready ACEC, implementing Management Plan.
All	Management of Waldo Cemetery	Human Uses, Species and Habitat	Waldo Cemetery	Work with private landowner to limit motorized access into Waldo Cemetery by installing a gate to deter vandalism. Consider decommissioning road and developing interpretive trail to site.
All	OHV designations	Human Uses, Species and Habitat, Vegetation	Watershed Wide, Section 9 (T41S, R9W)	Review the existing OHV allocations as designated in the 1995 RMP ROD for consistency with management objectives for area. Obtain map of wetland locations in watershed to better delineate OHV- limited areas. Consider plan amendment to close section 9 to OHVs, due to *Phytophthora* and rare plants. Do not allow OHV use in areas with healthy Port-Orford cedar.
All	National Register Nomination/ Cultural Resource Mgmt. Plan	Human Uses, Species and Habitat	Waldo, French Flat area	Finalize specific management objectives for identified cultural sites. Nomination and management plan have been completed.
All	Botanical restoration	Species and Habitat (Botany)	Watershed Wide	Maintain / improve habitats using such techniques as prescribed fire while balancing the risks to other Survey and Manage or special status species. Prescribed burns in the vicinity of special status plants would use experimental methodologies to study the effects of burning on these species or the burns will avoid populations known to be intolerant to burning.
All	Plant species composition	Vegetation, Species and Habitat (Wildlife, Botany)	Watershed Wide	Conduct density management (thinning) in both natural and planted stands. Objectives should include reduction of stem numbers, species selection to provide a species mix that more closely resembles that thought to occur prior to fire exclusion and logging. Utilize prescribed fire to reduce the activity fuels (slash) created by density management. Conduct forest management activities in a manner that mimics natural disturbance, maintains special status species and structural diversity.
All	Special Status species habitat	Species and Habitat (Botany)	Watershed Wide	Develop a Conservation Strategy tiered to a Conservation Agreement with the USFWS for four special status serpentine fen species.
All	Port-Orford cedar	Vegetation, Water Quality, Species and Habitat (Aquatic)	Watershed Wide	Prevent export of POC root disease to uninfested sites. On infested sites, implement management objectives consistent with management of other resources.

Table VI-1: Recommendations - All Land Allocations				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
All	Watershed Restoration	Water Quality, Vegetation	Watershed wide	Maintain partnerships consistent with Governor=s Restoration Plan through watershed councils and other agencies.
All	Species composition	Vegetation, Fuels, Botany, Fisheries, Wildlife, Hydrology	Watershed wide	Tanoak - Reduce the amount of tanoak and other encroaching vegetation that has developed in the absence of fire disturbance.
All	Transient Snow Zone (TSZ) / Peak Stream Flows	Erosion Processes, Water Quality, Vegetation	Transient Snow Zone	Work with others to implement measures that would minimize rapid runoff from rain on snow events. This condition exists on approximately 1% of the BLM lands in the watershed. TSZ is also located on non-BLM lands.
All	Access	Fire, Vegetation, Species and Habitat (Fisheries)	Section 10 and 15, T41S, R9W	Acquire access in section 16 (possible improvement, replacement of existing flat car bridge) for management in sections 10 and 15.
All	Extensive Serpentine Areas/Erosion	Erosion Processes, Water Quality, Vegetation	Watershed Wide	- In serpentine areas, treatment prescriptions and actions will be series-based and will include considerations of conservation of duff and litter. - Restore Jeffrey pine sites. Institute low intensity prescribed fire to reduce herbaceous layer accumulation and shrub / tree encroachment. Minimize ground disturbance activities such as OHV use.
All	Mature Stands / Connectivity	Vegetation / Species and Habitat (Wildlife, Botany)	Watershed Wide	Design vegetation management treatments for continued and potential development of connectivity corridors. Where feasible, prioritize these corridors in and adjacent to the Riparian Reserves. While these areas may not be sustainable over time due to the high risk of fire, these stands should be maintained or preserved as long as they provide effective connectivity.
All	Botanical Emphasis Area	Vegetation, Fuels, Botany, Fisheries	Botanical Emphasis Area	Develop site specific management strategies for all special status and Survey and Manage plant species in the botanical emphasis area.
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 when available.
All	Western White Pine Series -	Vegetation	Watershed Wide	Map the western white pine series on BLM lands.
All	Species Composition	Vegetation, Botany	Watershed Wide	Fire tolerant species - increase the amount of and percent cover of fire tolerant, shade intolerant tree form hardwood species and pine, particularly on non-serpentine soils.

Table VI-2: Recommendations - Special Areas				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
Special Areas	High Ecological Value	Fire	Woodcock Bog, French Flat, Section 9 (T41S, R9W), Rough and Ready	Reduce fuel hazard within or adjacent to high ecological values. Objective would be to protect these areas from catastrophic wildland fire and allow fire to play a more natural role. Develop fire management plan for special areas.
Special Areas	Manage-ment plans	Human Uses, Species and Habitat	French Flat ACEC, Woodcock Bog RNA	Prepare management plans for French Flat ACEC and Woodcock Bog RNA.
Special areas	OHV use	Human Uses, Species and Habitat	French Flat, Rough and Ready ACEC	Permanently close non-OHV areas through gates, barricades, signs; publish closed areas in Federal Register. Monitor and enforce closures. Establish additional law enforcement for Illinois Valley. Develop "leave no trace" education programs.
Special Areas	Unique habitat	Vegetation, Species and Habitat (Plants)	T41S,R9W, Sec 9; T39S-8W,Sec 33/34	Nominate Section 9 and the Waldo Hill-Allen Gulch area for Research Natural Area status, due to the preponderance of rare plants and habitats.

Table VI-3: Recommendations - Riparian Reserves				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
Riparian Reserves	Riparian Reserve Mgmt., Reserve widths	Species and Habitat	Watershed Wide	Retain interim Riparian Reserve widths outlined in the NFP 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 thinnings, prescribed fire or mechanical treatments to reduce fuels.
Riparian Reserves	Late-successional forest (non-serpentine) is below Reference conditions	Species and habitats	Blue Creek, Elk Creek, Logan Cut, West Fork Illinois River	Use existing natural late-successional forest habitat as a template of desired conditions. Priority stands for treatment are those on the perimeter of quality late-successional forest habitat that currently do not provide this habitat. Treat natural stands and plantations. Stands that have the potential to provide late-successional habitat should be treated.
Riparian Reserve/ Matrix	Mushroom camp	Human Uses, Species and Habitat	Waldo Mushroom camp	Close and rehabilitate mushroom camp on BLM lands to reduce impacts to riparian and upland habitats and on cultural features.
Riparian Reserves	Large Woody Material (instream and	Species and Habitat (Aquatic),	West Fork Illinois River, Elk Creek,	Where appropriate based on local site conditions of the riparian plant community, improve instream complexity by adding key pieces of wood.

Table VI-3: Recommendations - Riparian Reserves				
Land Allocation	**Issue / Concern**	**Related Core Topic**	**Location**	**Recommendation**
	riparian)	Erosion Processes, Water Quality, Water Quantity	Logan Cut	
Riparian Reserves	Fish passage / Culverts / Barriers	Species and Habitat (Aquatic), Human Uses	Watershed wide	Update inventory of culverts/barriers on fish bearing streams. Improve or replace culverts and remove barriers at stream crossings that impede juvenile and adult fish passage. Stream crossings should be built with natural streambed. (15 identified sites on private lands, Rogue Basin Fish Advisory Team, 2000).
Riparian Reserves	Water Temps	Water Quality, Species and Habitat (Aquatic)	All series (except pine and white oak) watershed wide	Wherever early to mid seral stages occur along creeks, treat vegetation to expedite larger tree growth to improve stream shading conditions and stream temperature for summer rearing for fish and other aquatic organisms. This may be incorporated in a Water Quality Management Plan .
Riparian Reserves	Sediment management / roads	Human Uses, Erosion Processes, Water Quality	Watershed wide	Conduct sediment evaluations. Corrective measures may include road surface design and reduction of drainage ditch flow into natural tributaries.
Riparian Reserves	Sedimen-tation	Aquatic Species and Habitat, Erosion Processes, Water Quality	Blue Creek, Fry Creek, Logan Cut, West Fork Illinois River, Elk Creek	Strive towards restoring 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 Reserves	Instream flows	Species and Habitats	Watershed Wide	Work with watershed council, agencies and private landowners to improve water utilization, maintain instream flows and minimize aquatic resource impacts.
Riparian Reserves	ACS / Cultural resources	Species and Habitat, Water Quality, Human uses	Logan Cut	Evaluate the watershed to facilitate managing cultural resources and minimizing impacts to aquatic resources. Improve critical coho habitat in Logan Cut.

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.

Table VI-4: Data Gaps	
Core Topic	**Data Gaps**
	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 within 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 <u>not</u> 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. - Current plant series acres for the all Forest Service lands and all lands in California are a data gap. - The 1936 type map information covers 84% of the watershed. The data gaps are the western most portion of Forest Service lands and all lands in California.
Fire	- A list of smoke-sensitive area residents (for prescribed burning) does not exist for use in burn notification. - A full understanding of fire effects in serpentine ecosystems is not complete.
Botany	- A comprehensive watershed wide survey of special status and Survey and Manage plants (both vascular and nonvascular) has not been completed. - *Vascular and non-vascular plants*: Only approximately 41% of the watershed has been surveyed, need to survey the remainder. - *Noxious weeds*: Few surveys have been conducted - There is a lack of survey information available on the potential RNA along the West Fork Illinois. Due to funding constraints only 25 acres of the entire section (which is all BLM) has been surveyed. Also, noxious weed locations have not been adequately mapped within the watershed. - Need to complete comprehensive plant species surveys to identify those that inhabit the Riparian Reserves.
Fisheries	-- Comprehensive stream and riparian surveys have not been completed (see hydrologic / riparian data gap). Physical habitat surveys have not been completed in most streams. Comprehensive surveys to monitor relative abundance, and distribution of fish species, classify all streams, conduct benthic macroinvertebrate surveys would fill many data gaps. Repeating such surveys at 5-10 year intervals would provide better baseline information and trend identification.
Hydrologic / Riparian / Stream inventory	- Stream surveys and inventory of various hydrologic parameters have not been completed on all BLM lands. (*e.g.*, proper functioning condition, coarse wood, stream class, riparian vegetation, reaches subject to instability). This is baseline information useful in making management recommendations to enhance and improve stream and bank stability. Inventory and classification of Class 3 and 4 streams would be highest priority. Local site-specific, vegetation type specific standards for down wood densities do not exist. - Comprehensive information regarding headwater conditions for streams relative to sediment production, water contribution and riparian potential does not exist. - There is no known quantitative information about stream flows for the West Fork of the Illinois River or its tributaries within its watershed - No hydrologic cumulative effects analysis (extent of equivalent clear cut area, compacted area, TSZ, and road density by subwatershed) has been performed for the West Fork Illinois River - Most streams on BLM land in the watershed have not been surveyed for physical habitat. - Rough and Ready Creek Subwatershed comprises close to one-third of the West Fork Illinois River Watershed, yet little is known about the character of its anadromous fishery and few data are available. - Anadromous fish passage inventory has not been conducted on BLM land in the watershed since the 1980s. - It appears that many of the streams in this watershed were not included in the original 303d inventory. Specifically, Wood Creek has been recognized as a degraded stream system and probably deserves 303d listing, but no data have been collected. - No known research has been conducted to determine cause of unusual clarity of streams associated with serpentine watersheds.

Table VI-4: Data Gaps	
Core Topic	**Data Gaps**
	- No hydrologic cumulative effects analysis (extent of equivalent clear cut area, compacted area, TSZ, and road density by subwatershed) has been performed for the West Fork Illinois River Watershed.
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 of the 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 corridors are for the most part unknown. -- The location of all mining shafts / adits is needed to assess the extent and value of them as habitat. -- Comprehensive animal species surveys to identify those that inhabit the Riparian Reserves have not been completed.
Human Use	- *Roads:* BLM noncapitalized roads and skid trails have not been inventoried. - *Recreation:* There has been no comprehensive inventory of the amount or type of recreational use of the area. There also has been no Recreation Opportunity Spectrum inventory of the existing opportunities that are available in the watershed. This information is important in managing for recreational values. 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.

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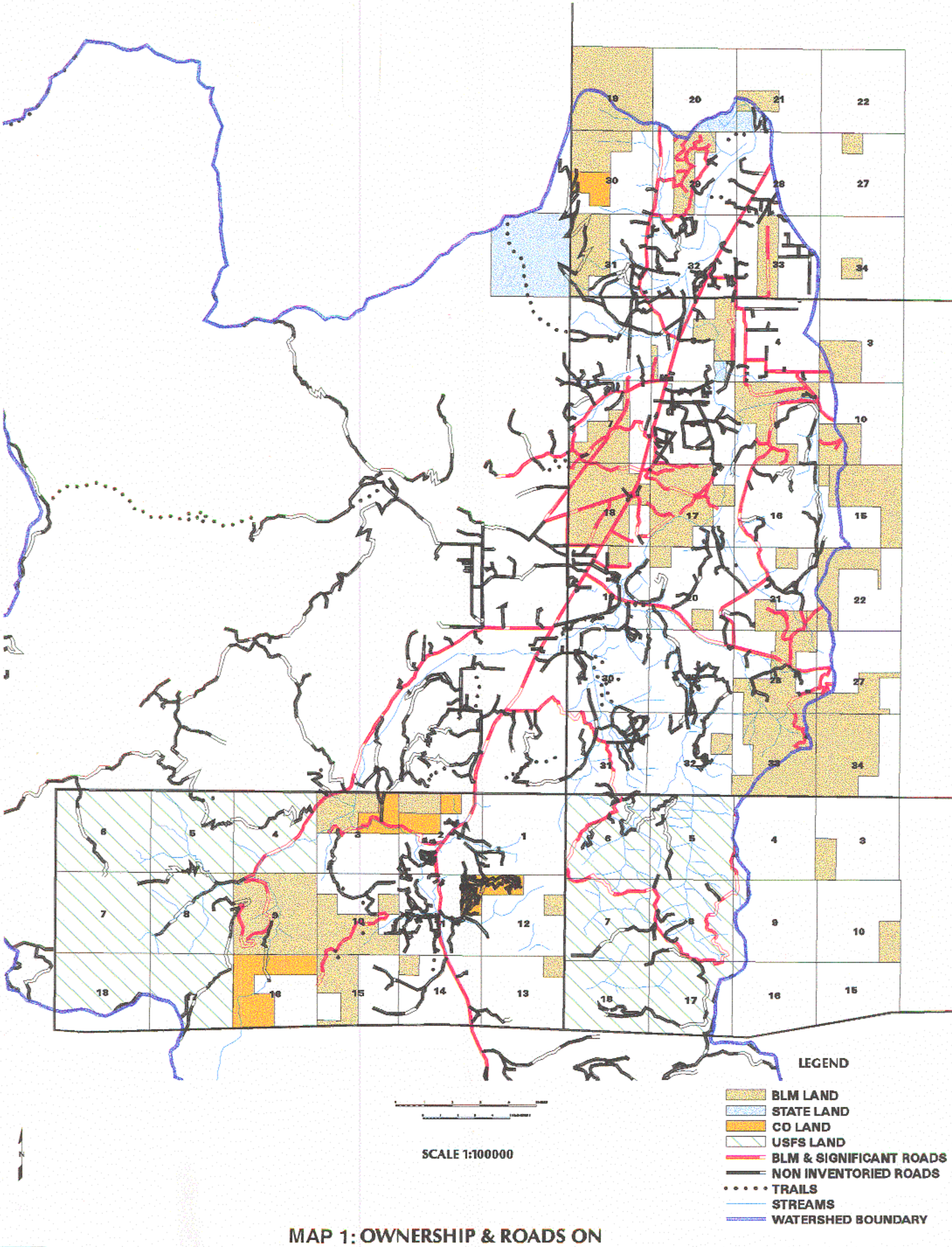
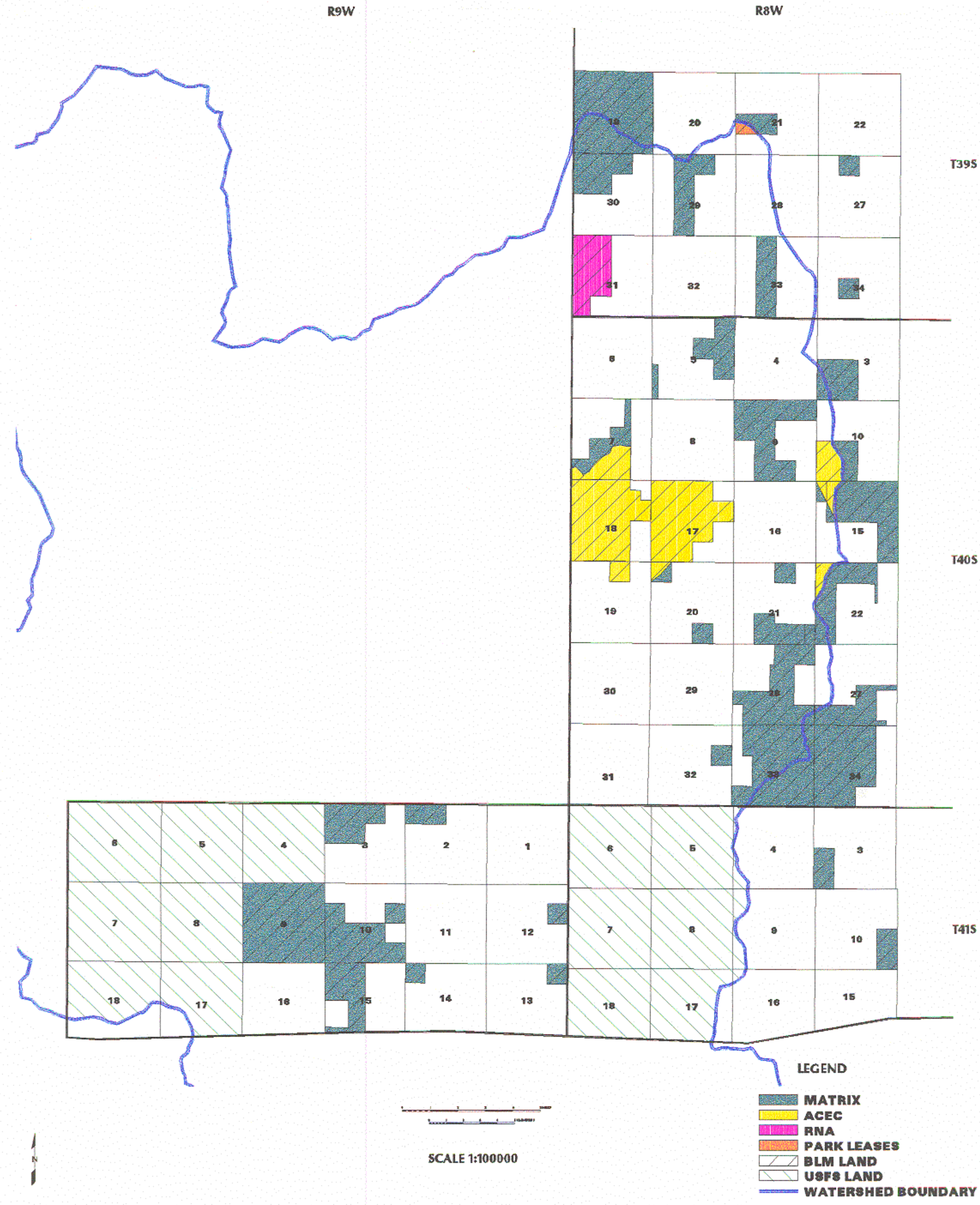
Appendix A: Maps



MAP 1: OWNERSHIP & ROADS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/28/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 2: LAND USE ALLOCATIONS ON MEDFORD DISTRICT BLM LANDS IN THE THE WEST ILLINOIS WATERSHED

03/30/00
Dennis Glover

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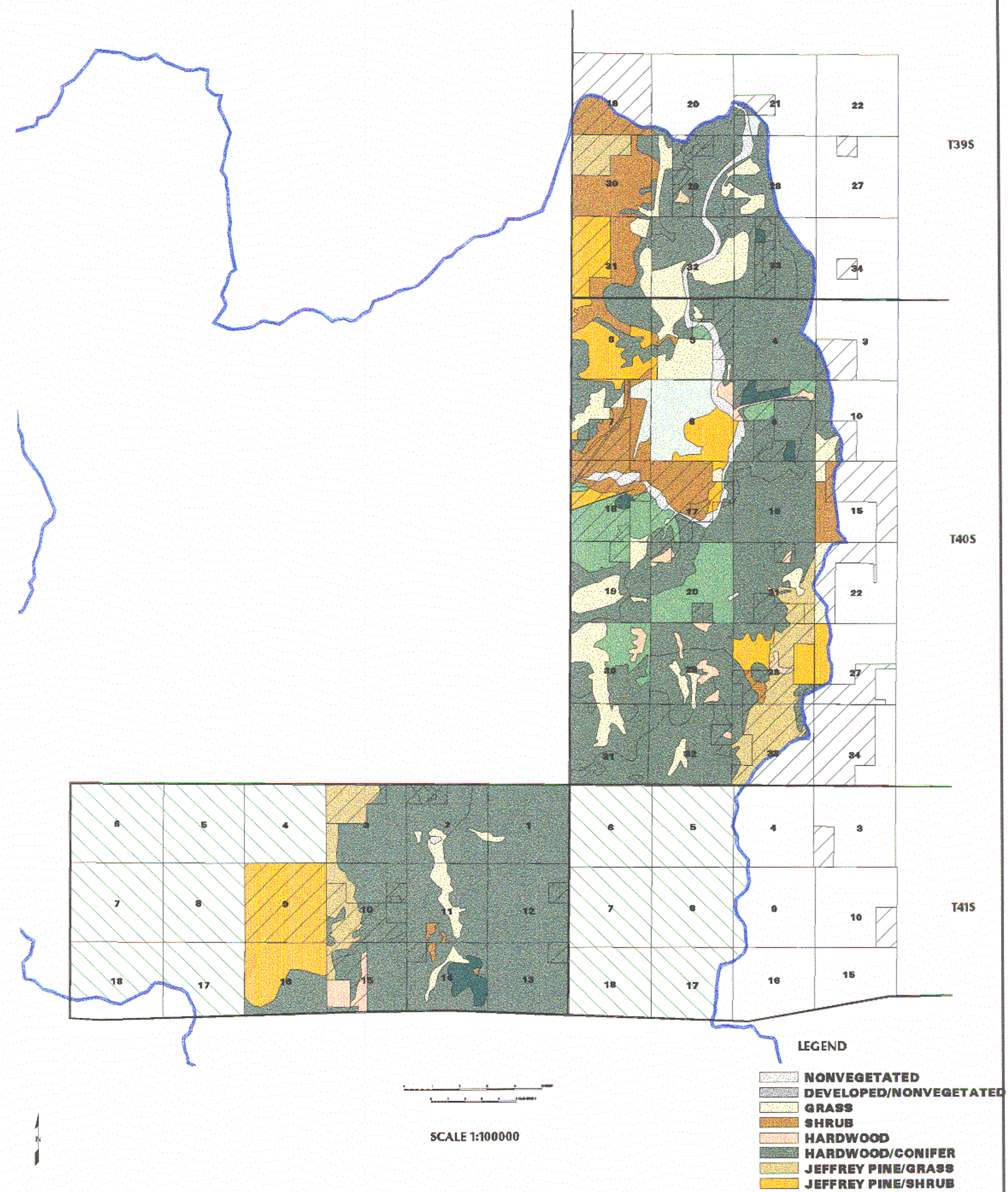
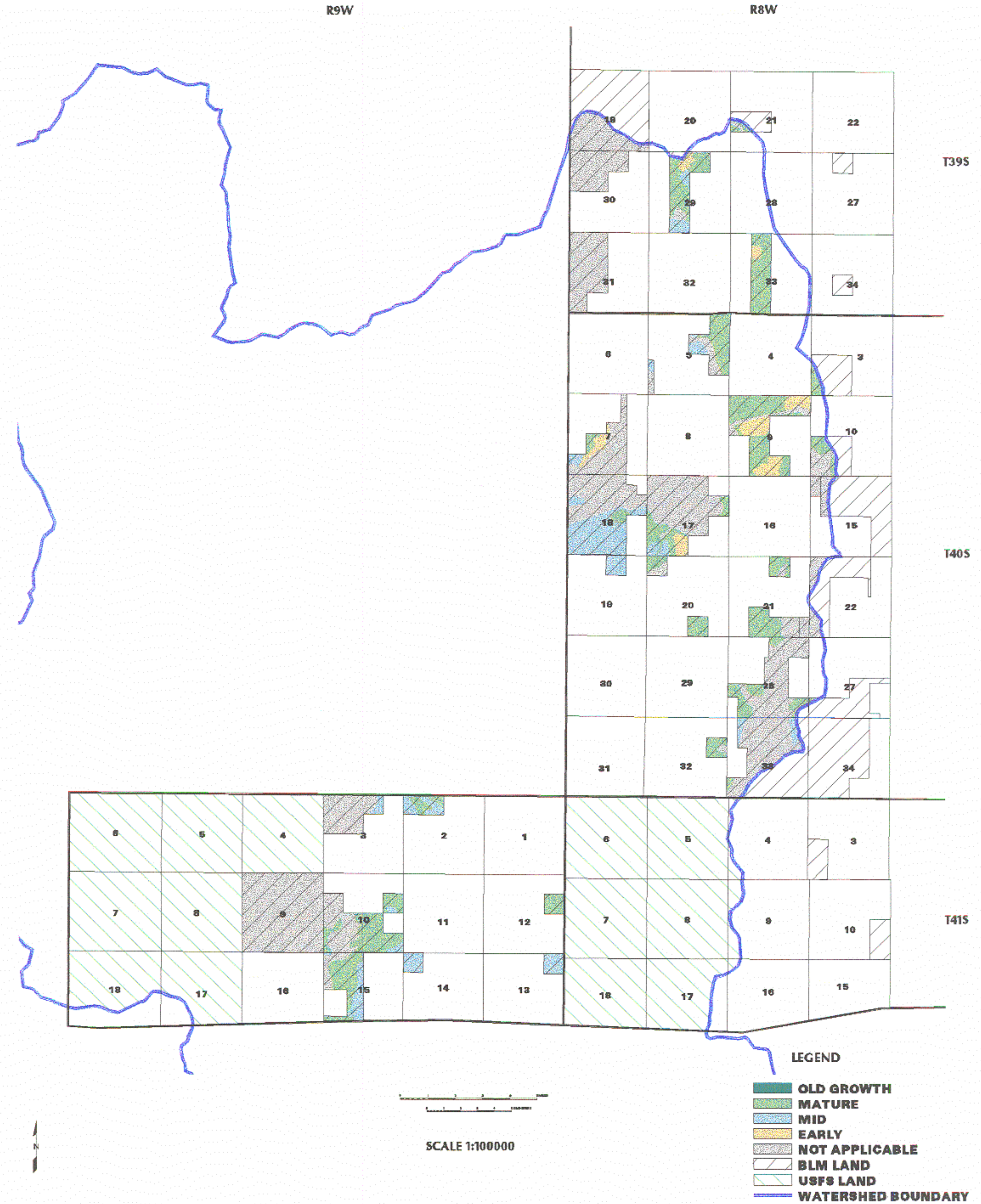


MAP 3: DOMINANT VEGETATION ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/22/00
Dennis Glover

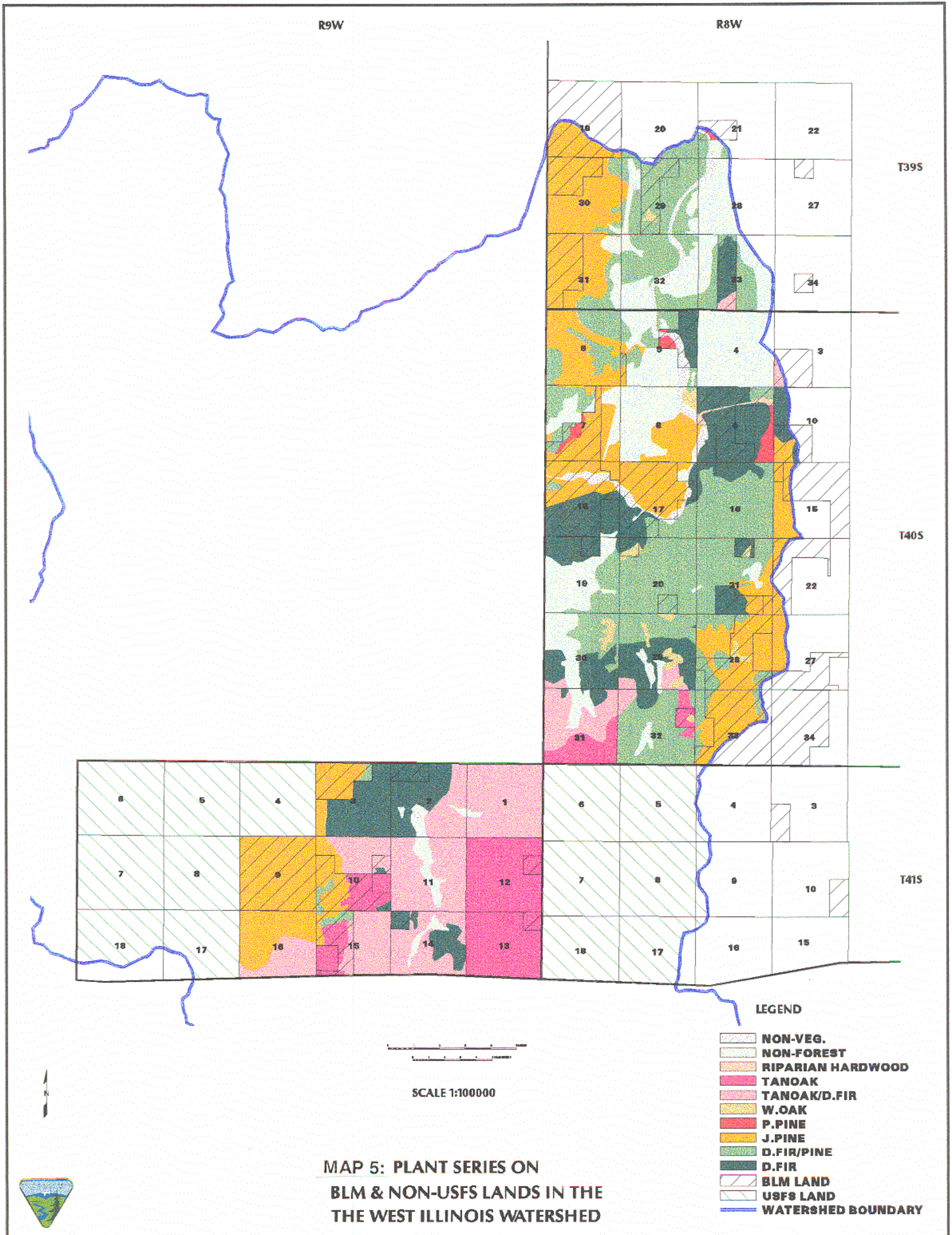
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 4: SERAL STAGES ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 5: PLANT SERIES ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

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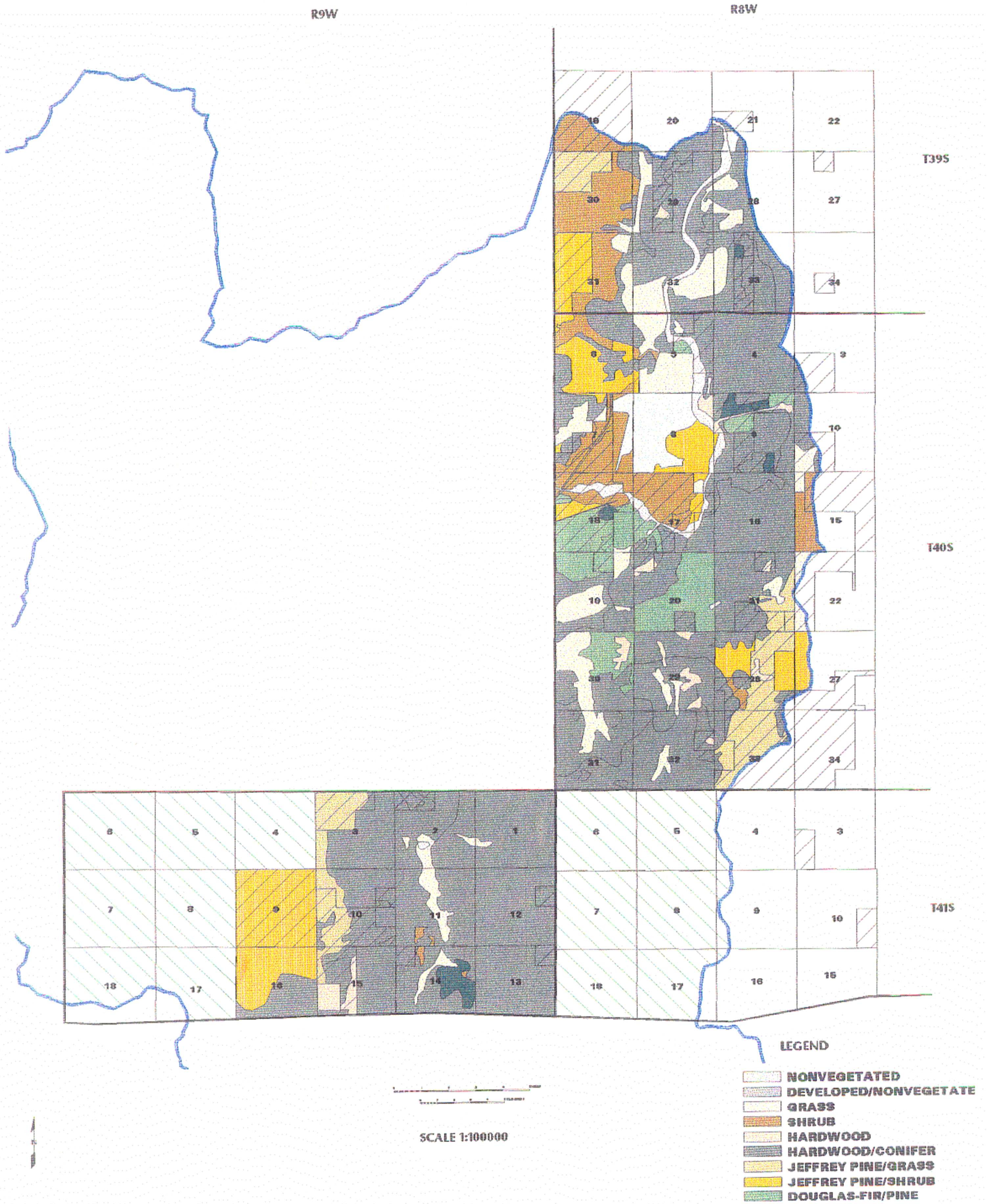

MAP 6: DOMINANT VEGETATION ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability or completeness of these data for individual use or aggregate use with other data

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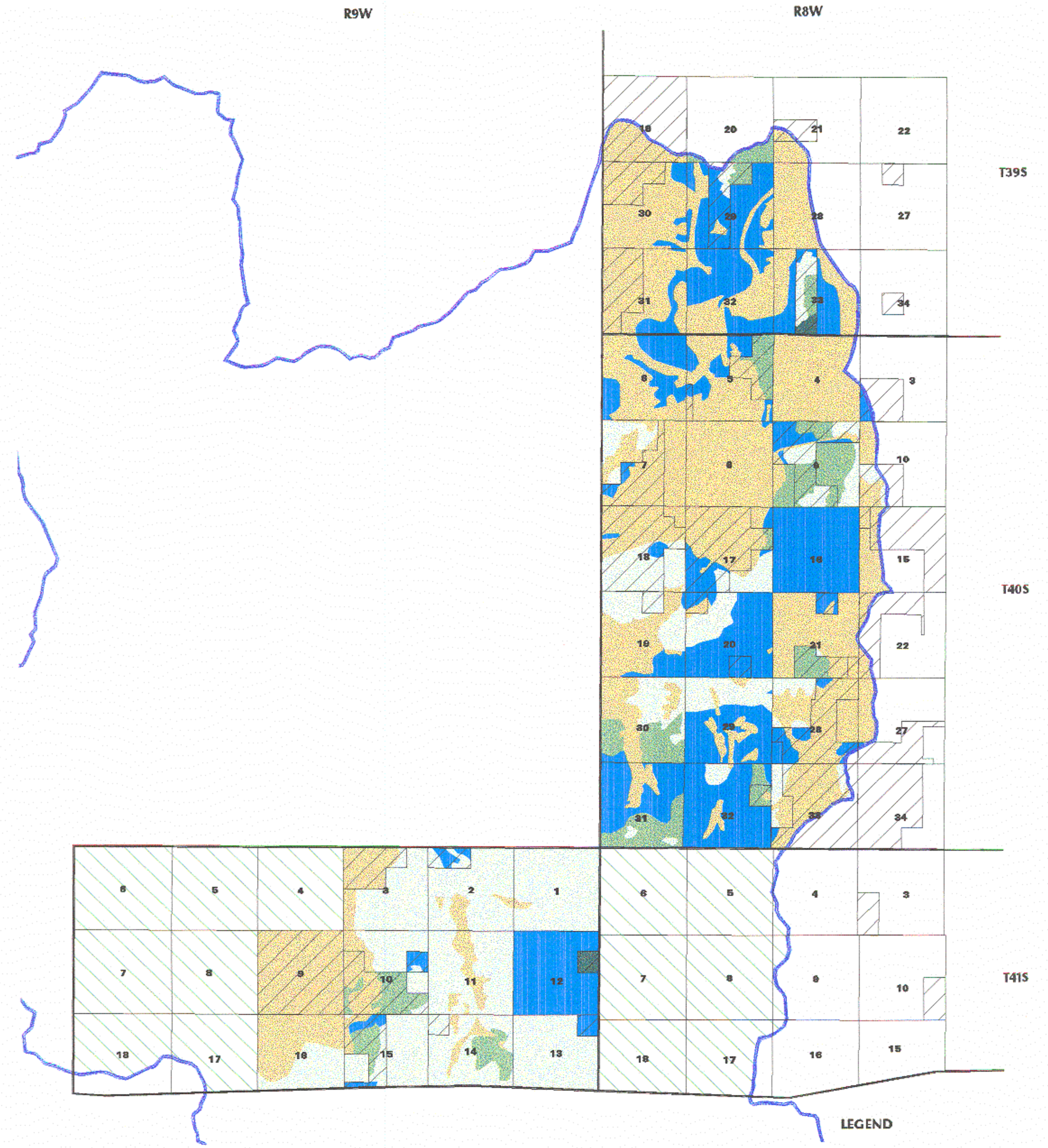
Dennis Glover



MAP 7: McKELVEY RATINGS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

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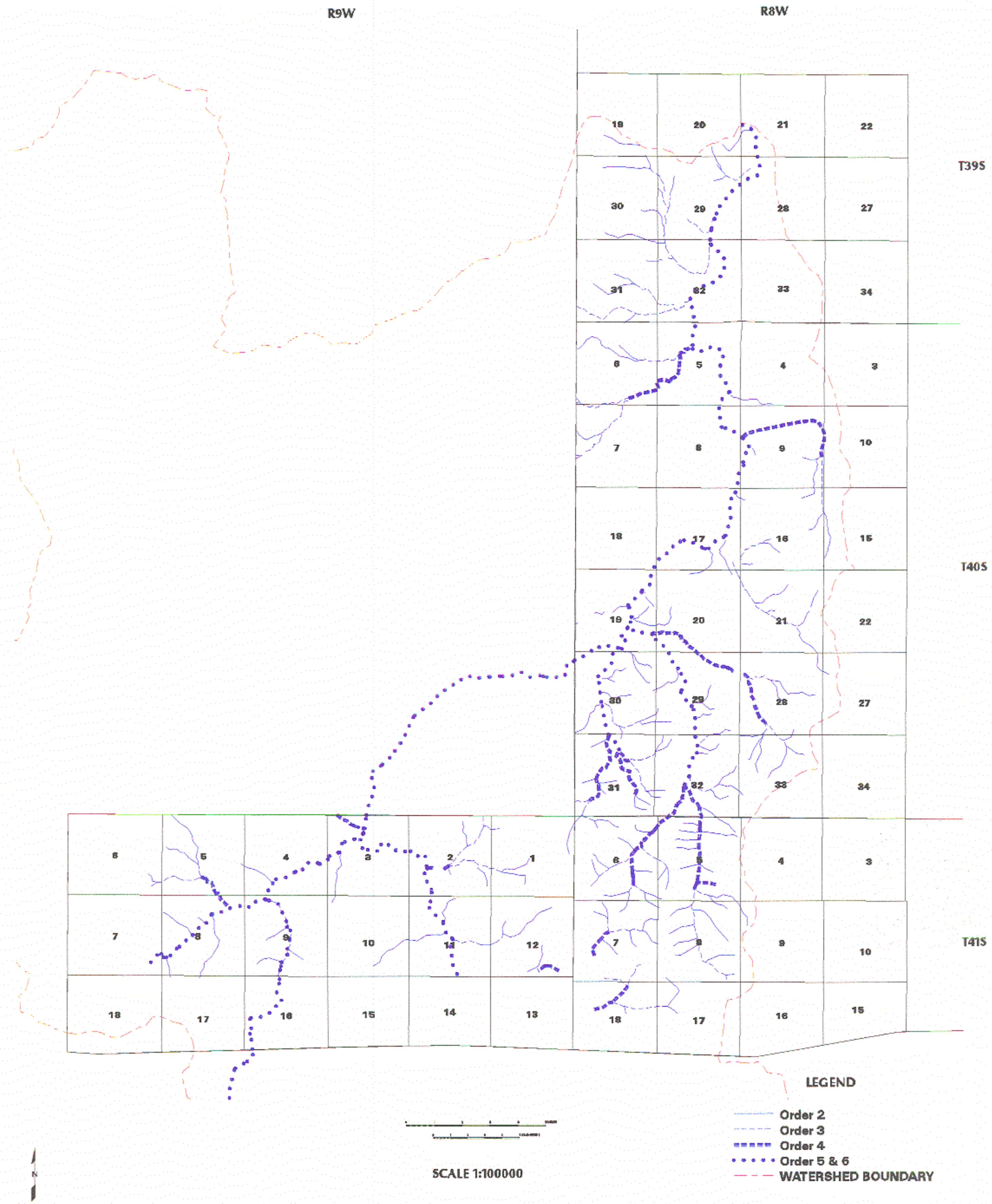
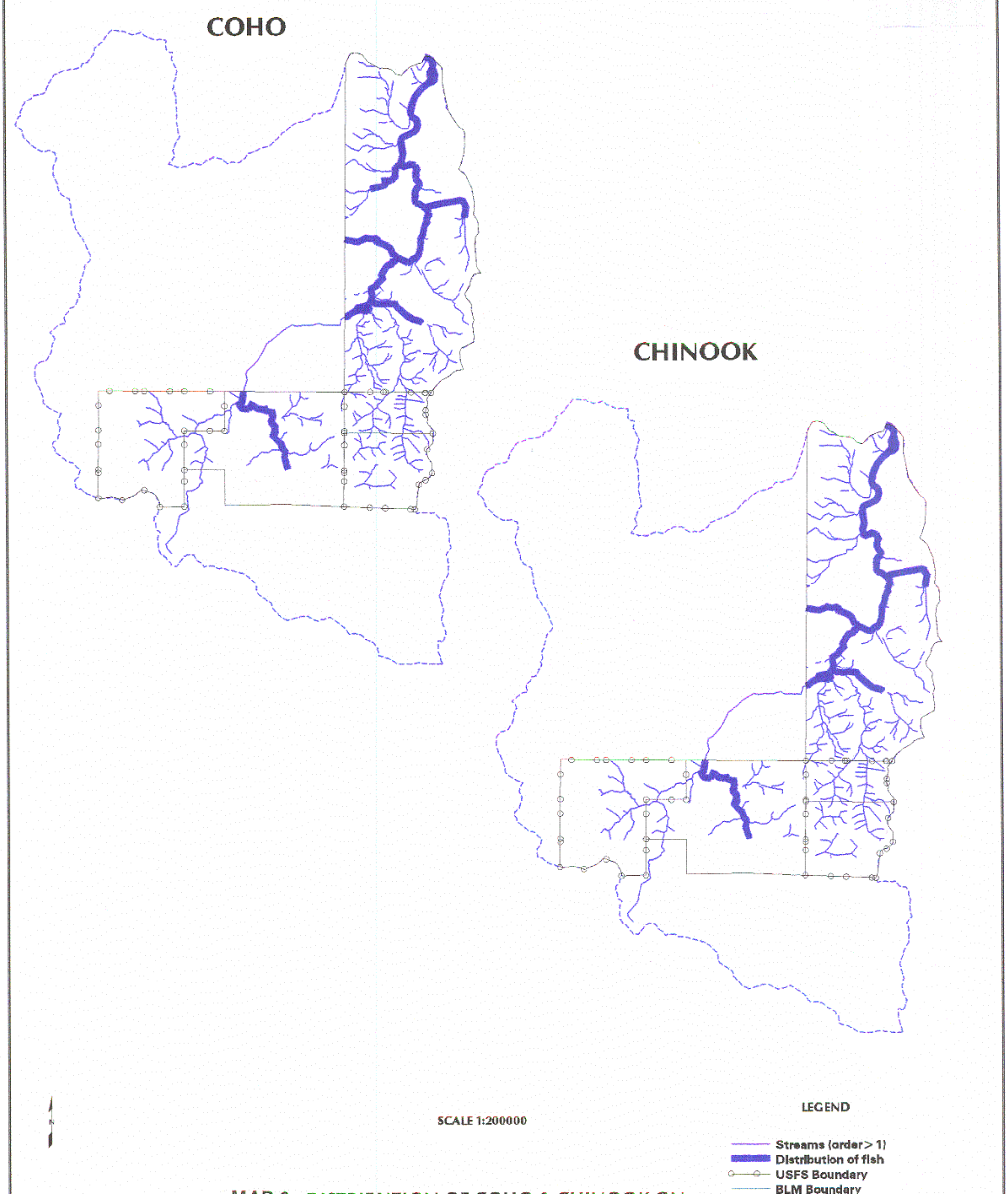
Dennis Glover



MAP 8: **STREAM ORDERS (> 2) ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED**

03/29/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 9: DISTRIBUTION OF COHO & CHINOOK ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/28/00
Dennis Glover

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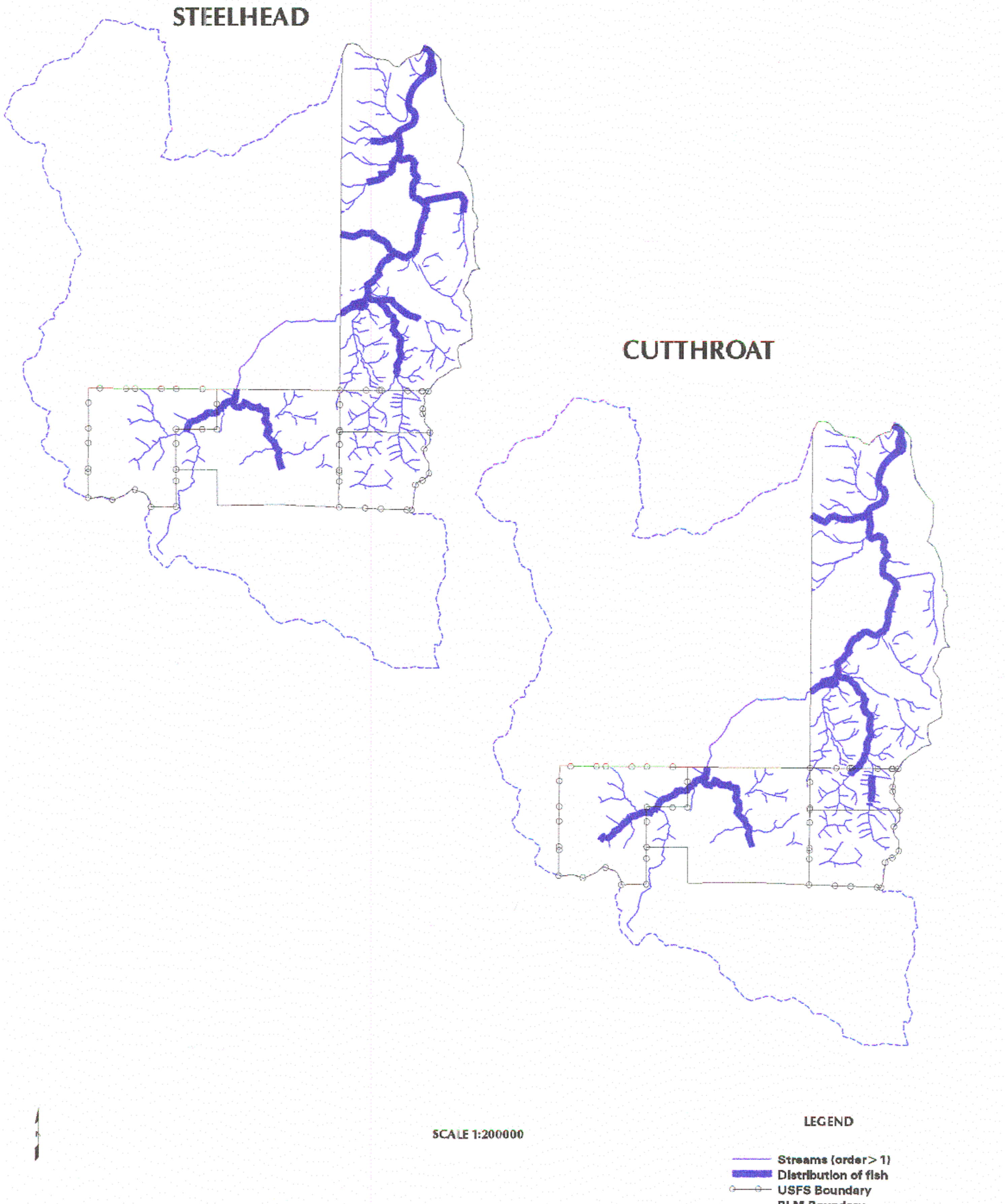
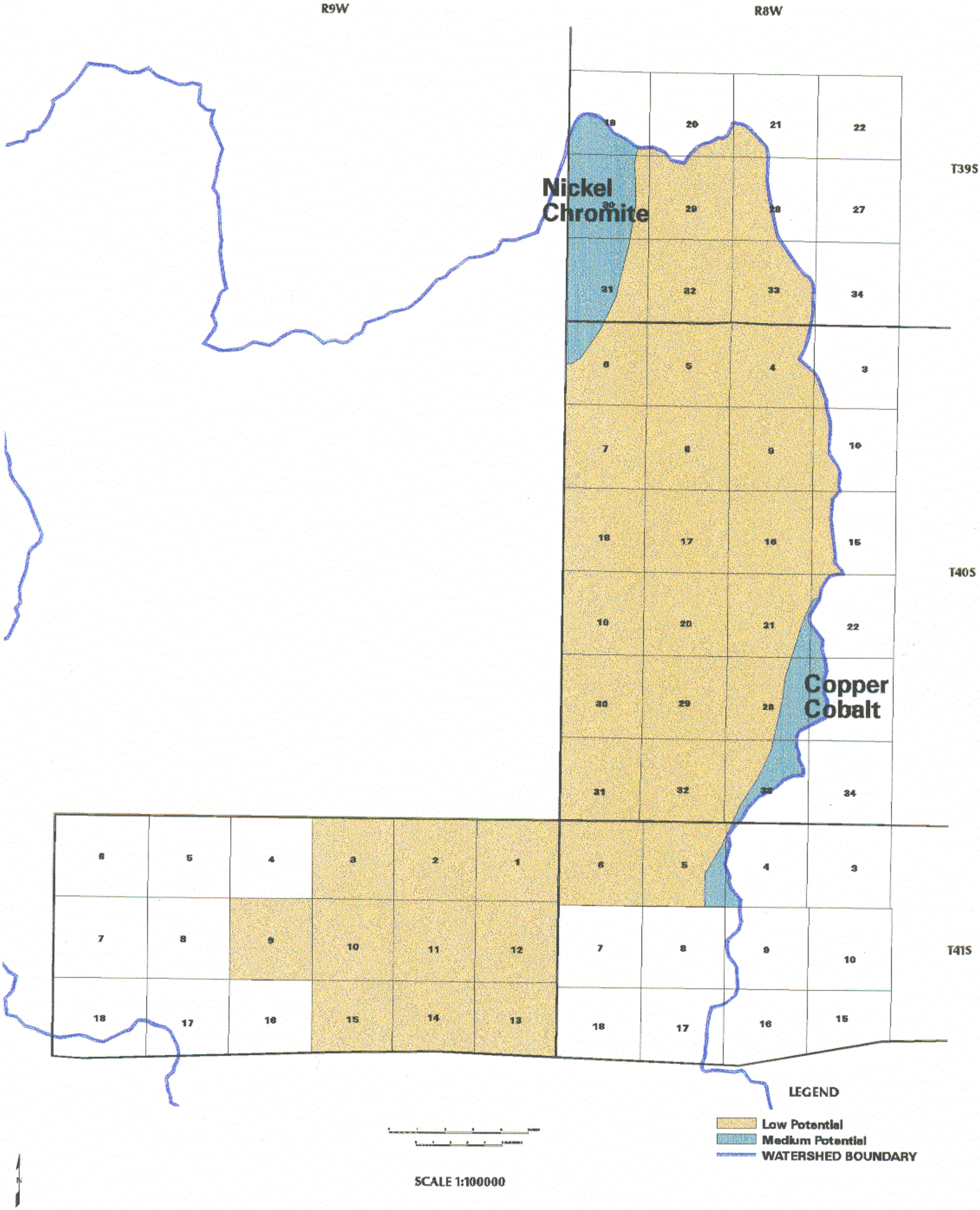


MAP 10: DISTRIBUTION OF STEELHEAD & CUTTHROAT
ON BLM & NON-USFS LANDS IN THE
THE WEST ILLINOIS WATERSHED

03/28/00
Dennis Glover

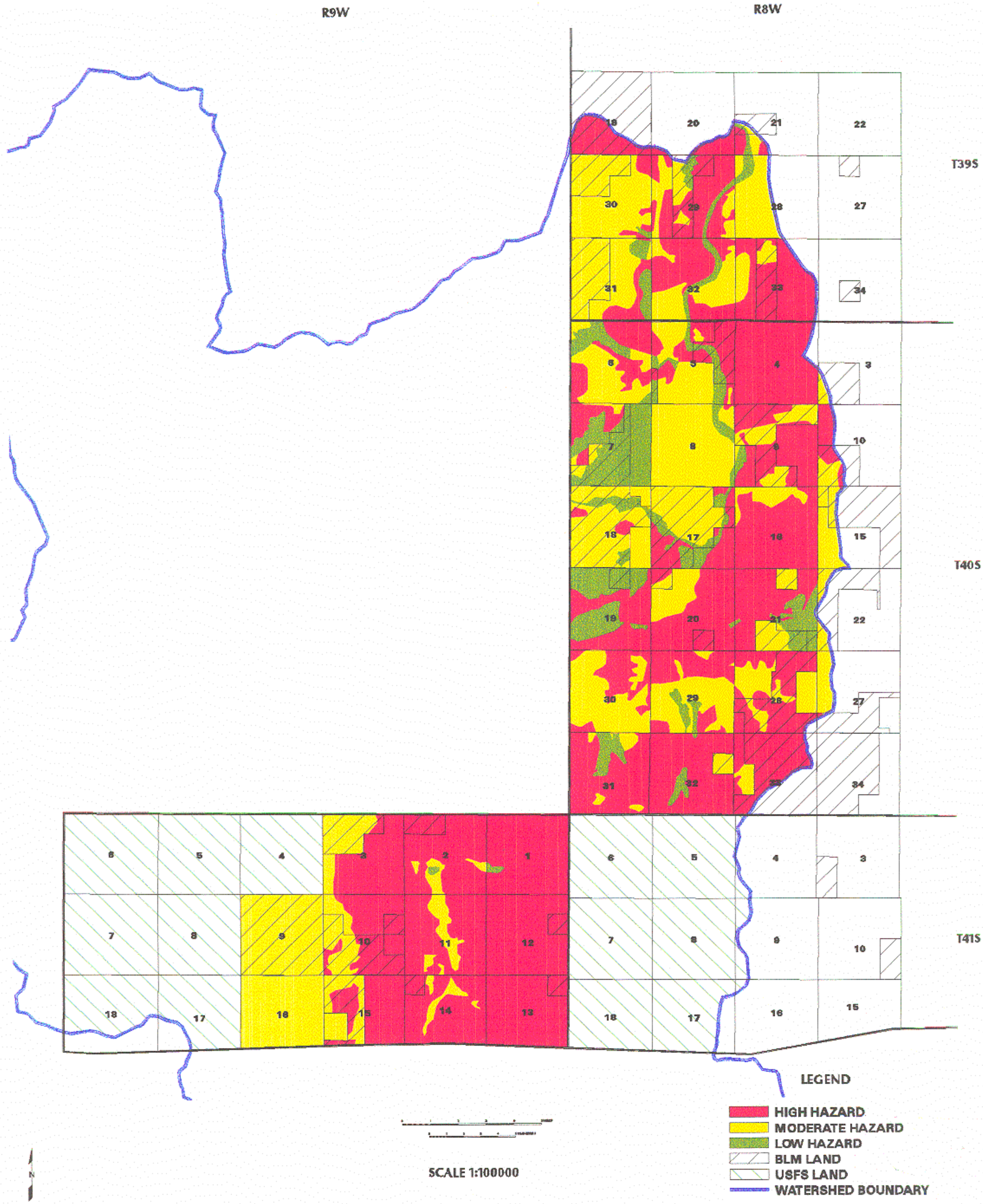
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 11: MINERAL POTENTIAL ON
BLM & NON-USFS LANDS IN THE
THE WEST ILLINOIS WATERSHED

03/29/00
Dennis Glover

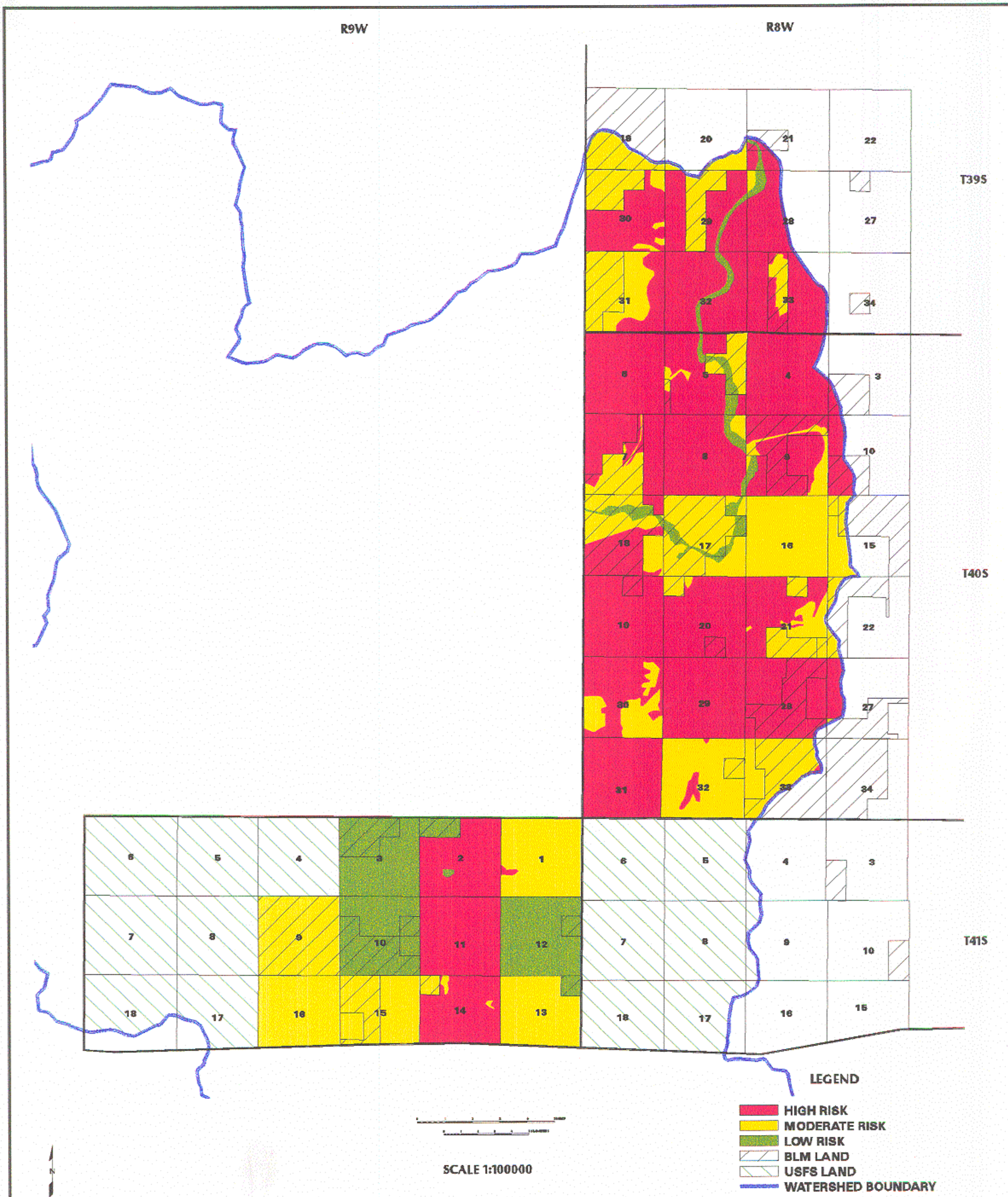
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 12: FIRE HAZARD RATINGS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 13: FIRE RISK RATINGS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

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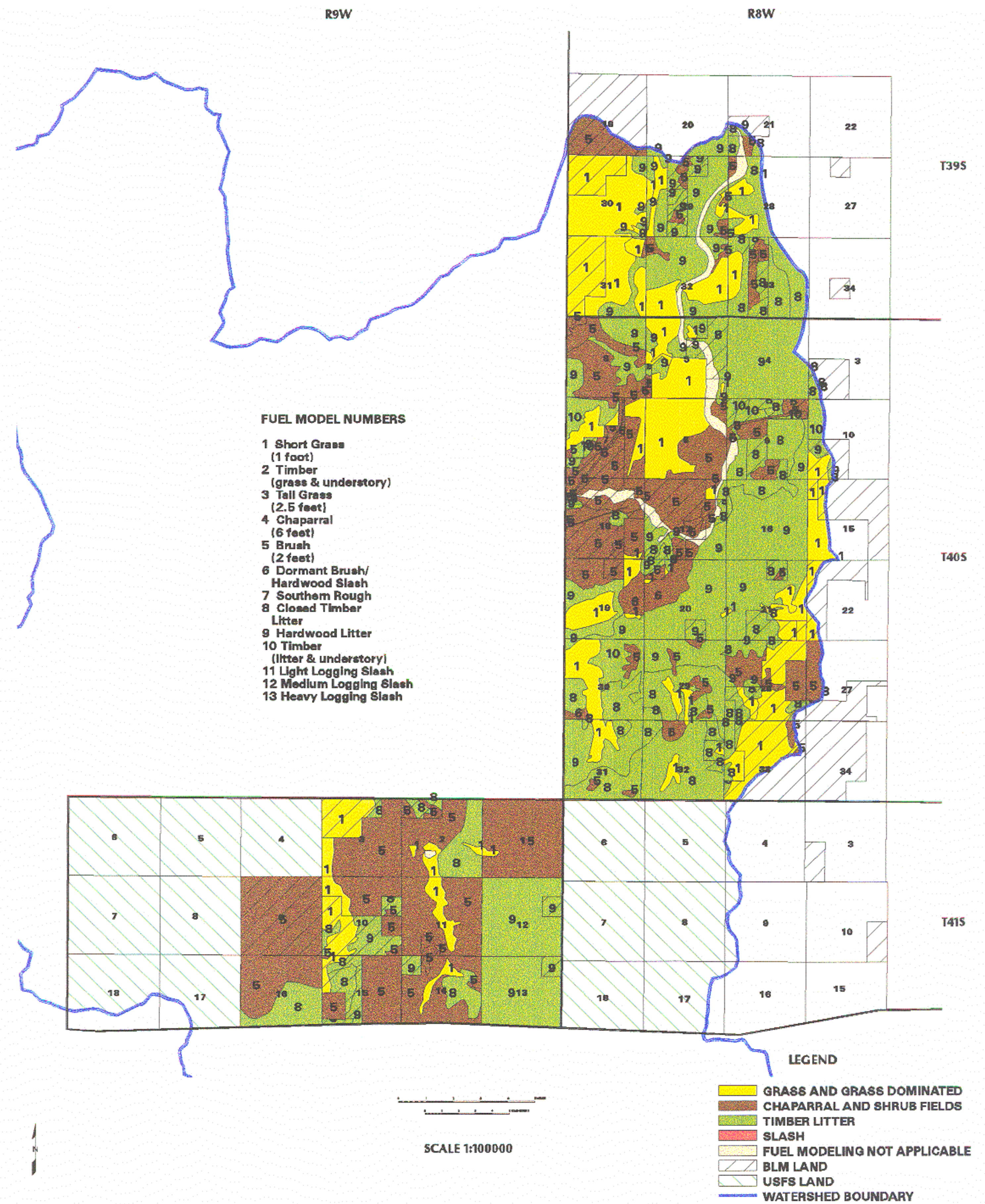

MAP 14: FIRE FUEL MODELS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

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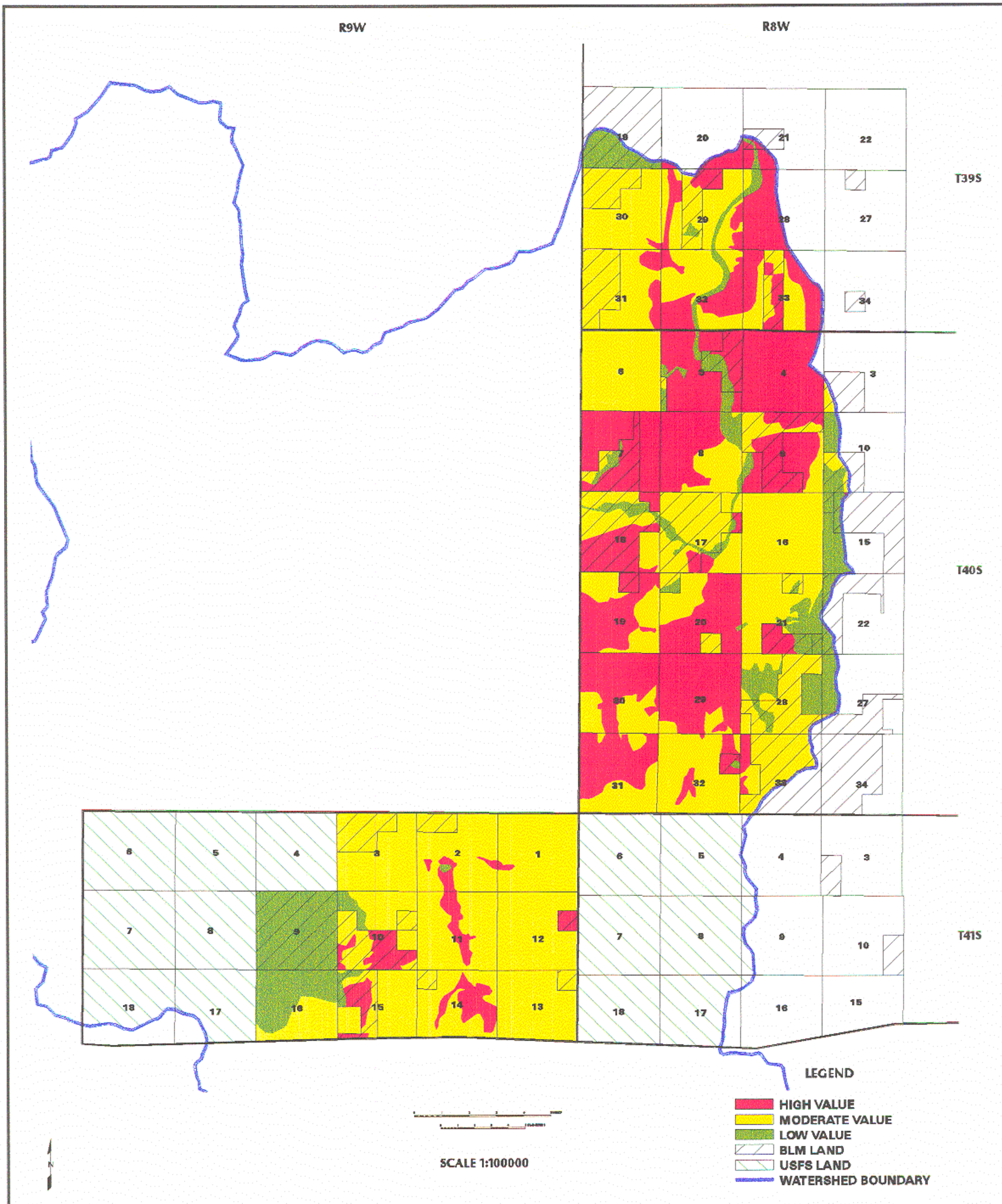
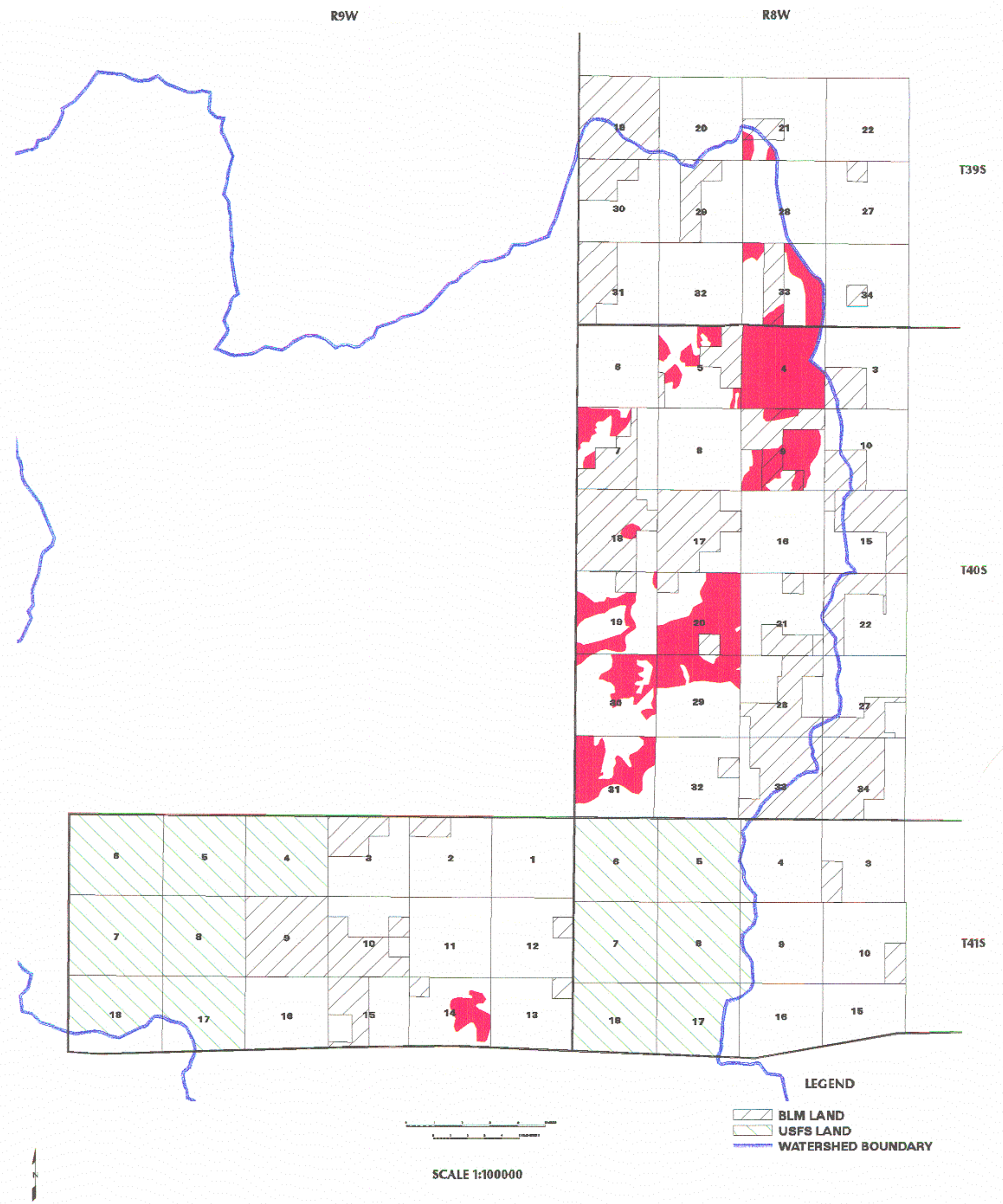


MAP 15: FIRE VALUE RATINGS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

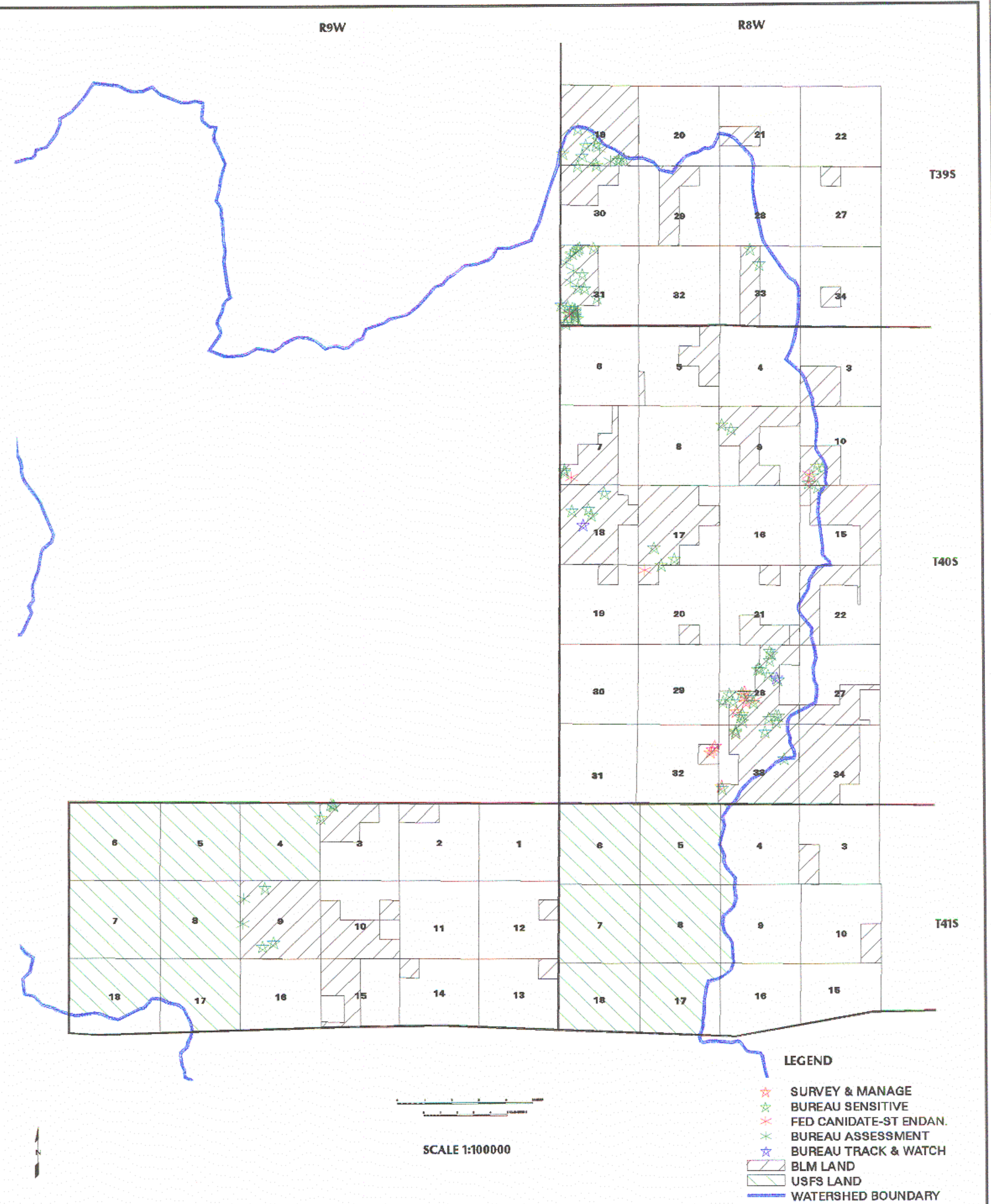
Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 16: POTENTIAL HIGH PRIORITY HAZARD REDUCTION TREATMENT AREAS ON BLM & NON-USFS LANDS IN THE THE WEST ILLINOIS WATERSHED

03/27/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.



MAP 17: TEP LOCATIONS ON MEDFORD DISTRICT BLM LANDS IN THE THE WEST ILLINOIS WATERSHED

04/04/00
Dennis Glover

Note: No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

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. Acceptable activities that normally occur on mining claims include the development of the mineral resources by extracting the gold-bearing gravels, or ore, from the claim, manufacturing of the mineral materials utilizing a trommel and sluice box system, or a mill site of some sort. After the gold is extracted the tailings (waste material) are stockpiled to either be utilized in the reclamation of the site or removed to an appropriate location. Timber on site may be used in some situations if outlined in a mining notice or plan of operations.

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 incidental. 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 cases where the surface of the claims are administered by the BLM or Forest Service, 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 within 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

T = Township, R = Range, Sec = Section, Seg = Road Segment
These columns describe the road number, location of the beginning point of the road, and the road segment. Example of a road number: 35-7-24 A.

Name = Name of the road.
Total Miles = Total length of the road in miles.
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 road: includes installing a berm/log barricade and allowing the road surface to naturally revegetate.
Surface Type = Road surface type.
NAT = Natural, PRR = Pit Run, GRR = Grid Rolled, ABC = Aggregate Base Course, ASC = Aggregate Surface Course, BST = Bituminous Surface Treatment
Road Width = Subgrade width of the road in feet.
Surface Depth = Road surfacing depth in inches.
Who Controls = Who controls the road.
BLM = Bureau of Land Management, PVT = Private, OTA = Other agency.
Access Rights = Who has access rights on the road.
BA = BLM administrative use only, BP = BLM and public use, PVT = Private but access allowed to BLM, 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 within 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 (more than 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 West Fork Illinois River Watershed - May 2001 -

Road Number	Road Name	TMO	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 08 W 29.00	COMBO MAINLINE	OIMP	1.28	0.00	0.21	1.49	NAT	14'		BLM	BP	2	BLM	LOC
39 S 08 W 29.01	COMBO A SP	UCG	0.13	0.00	0.00	0.13	NAT	14'		BLM	BP	2	BLM	LOC
39 S 08 W 29.02	COMBO B SP	CDR	0.14	0.00	0.00	0.14	NAT	14'		BLM	BP	1	BLM	LOC
39 S 08 W 29.03	COMBO C SP	OIMP	0.46	0.00	0.00	0.46	NAT	14'		BLM	BP	2	BLM	LOC
39 S 08 W 29.04	COMBO D SP	CDR	0.24	0.00	0.00	0.24	NAT	14'		BLM	BP	1	BLM	LOC
39 S 08 W 29.05	COMBO F SP	UCG	0.06	0.00	0.00	0.06	NAT	14'		BLM	BP	2	BLM	LOC
39 S 08 W 31.00A	WESTSIDE SP	UCG	0.00	0.00	0.49	0.49	ASC	15'	4"	PVT	PVT	2	NKN	LOC
39 S 08 W 31.00B	WESTSIDE SP	UCG	0.45	0.00	0.00	0.45	ASC	15'	2"	BLM	BA	2	BLM	LOC
39 S 08 W 31.00C	WESTSIDE SP	UCG	0.04	0.00	0.36	0.40	NAT	14'		PVT	PVT	2	NKN	LOC
39 S 08 W 33.00	SOUTHLINE	UCG	1.01	0.00	0.25	1.26	NAT	14'		BLM	BA	3	BLM	LOC
40 S 08 W 03.00	LOGAN SPUR 2	UCG	0.29	0.00	0.00	0.29	PRR	16'	4"	BLM	BP	2	NKN	LOC
40 S 08 W 04.00A	LOGAN CUT ML	OIMP	1.15	0.00	0.08	1.23	GRR	17'	6"	BLM	BP	3	BLM	LOC
40 S 08 W 04.00B	LOGAN CUT ML	UCG	1.18	0.00	0.00	1.18	NAT	17'		BLM	BP	2	BLM	LOC
40 S 08 W 09.00	LOGAN CUT SP	RFI	0.30	0.00	0.00	0.30	NAT	17'		BLM	BP	1	NKN	LOC
40 S 08 W 09.01	LOGAN SP	OIMP	0.44	0.00	0.00	0.44	NAT	17'		BLM	BP	2	BLM	LOC
40 S 08 W 21.00	WALDO SELECT SP	UCG	0.24	0.00	0.00	0.24	NAT	12'		BLM	BP	2	BLM	LOC
40 S 08 W 28.00	WALDO SELECT	OIMP	0.00	1.04	0.00	1.04	NAT	14'		BLM	BP	2	BLM	LOC
40 S 08 W 28.01	WALDO SP	OIMP	0.00	0.45	0.00	0.45	NAT	14'		BLM	BP	2	BLM	LOC
40 S 08 W 28.03	WALDO FLAT	UCG	0.09	0.00	0.00	0.09	NAT	12'		BLM	BP	1	BLM	LOC
40 S 09 W 27.00B	WIMER	OIMP	0.00	0.28	0.00	0.28	ASC	16'	8"	OTA	NKN	3	NKN	LOC

OC=Local

Table C-2: Supplemental Data Report

April 2000

	Road Grade				Road Drainage								Brush	
Road Number	*0-10%*	*10-20%*	*20+%*	for 20+% Adv / Fav	< 18" CMP	18" CMP	24" CMP	36" CMP	48" CMP	60+" CMP	Water Dips/ Bars	Condition G/F/P/U	Yes/No	**Comments**
39 S 08 W 29.00	1.19	0.09					1					P	y	Stream ford, potholes, tire ruts, deep ruts on slopes
39 S 08 W 29.01	0.06	0.23									WB-7	F	Y	Bypassed barricade at MP 0.12, effective one at MP 0.29
39 S 08 W 29.02												U	Y	Overgrown, can=t drive, nds
39 S 08 W 29.03	0.35	0.11				3						P	Y	Deep ruts on slopes w/nds
39 S 08 W 29.04														Earth barricade, overgrown, cannot drive, waterbars
39 S 08 W 29.05	0.06											F	Y	No drainage structures
39 S 08 W 31.00A	0.49				8"-3					90"-1		F	Y	Small x-drains, potholes
39 S 08 W 31.00B	0.45				3"-1 6"-2 8"-4							F	Y	Small x-drains, potholes
39 S 08 W 31.00C														Private gate blocks access
39 S 08 W 33.00	1.26											F	Y	Some puddles/potholes, lt rock to MP 0.10, spot rock to MP 0.40
40 S 08 W 03.00	0.22											G	N	Flat no drainage structures
40 S 08 W 04.00A	1.23									1		F	N	Potholes, GRR sinking into soil
40 S 08 W 04.00B	1.18					3						P	N	Deep tire ruts, potholes, barricade at end
40 S 08 W 09.00												U	Y	Tree plantation, no road
40 S 08 W 09.01	0.11	0.33									WB-8	P	Y	Bypassed berm, shallow to deep ruts
40 S 08 W 21.00	0.19	0.05										P	Y	Narrow, deep ruts, berm at MP 0.18
40 S 08 W 28.00	0.73	0.31				1					1	P	Y	Big potholes and ruts across road at beginning, deep ruts down road on slopes
40 S 08 W 28.01	0.45											P	N	Potholes, deep ruts on slopes, stream ford
40 S 08 W 28.03	0.09											F	Y	
40 S 09 W 27.00B	0.28					1	2					F	N	Some potholes, some new rock, needs a culvert

Table C-3: Transportation Management Objectives
West Fork Illinois River Watershed

Road Number	Road Name	TMO	Surf cond	Closure status	Closure reason	Closure device	Road width	Maint. Level	O&C Miles	PD Miles	Other Miles	Surface Type
39 S 08 W 29.00	COMBO MAINLINE	OIMP*	P	ST	ADM	GT	14'	2	1.28	0.00	0.21	NAT
39 S 08 W 29.01	COMBO A SP	UCG	F	ST	ADM	GT (39-8-29)	14'	2	0.13	0.00	0.00	NAT
39 S 08 W 29.02	COMBO B SP	CDR	U	ST	ADM	GT (39-8-29)	14'	1	0.14	0.00	0.00	NAT
39 S 08 W 29.03	COMBO C SP	OIMP*	P	ST	ADM	GT (39-8-29)	14'	2	0.46	0.00	0.00	NAT
39 S 08 W 29.04	COMBO D SP	CDR		ST	ADM	GT (39-8-29)	14'	1	0.24	0.00	0.00	NAT
39 S 08 W 29.05	COMBO F SP	UCG	F	ST	ADM	GT (39-8-29)	14'	2	0.06	0.00	0.00	NAT
39 S 08 W 31.00A	WESTSIDE SP	UCG	F	OP			15'	2	0.00	0.00	0.49	ASC
39 S 08 W 31.00B	WESTSIDE SP	UCG	F	OP			15'	2	0.45	0.00	0.00	ASC
39 S 08 W 31.00C	WESTSIDE SP	UCG		ST	ADM	GT (PVT)	14'	2	0.04	0.00	0.36	NAT
39 S 08 W 33.00	SOUTHLINE	UCG	F	OP			14'	3	1.01	0.00	0.25	NAT
40 S 08 W 03.00	LOGAN SPUR 2	UCG	G	ST	ADM	GT	16'	2	0.29	0.00	0.00	PRR
40 S 08 W 04.00A	LOGAN CUT ML	OIMP	F	OP			17'	3	1.15	0.00	0.08	GRR
40 S 08 W 04.00B	LOGAN CUT ML	UCG	P	ST	ADM	GT (40-8-4A)	17'	2	1.18	0.00	0.00	NAT
40 S 08 W 09.00	LOGAN CUT SP	RFI	U	FD	ADM	INA	17'	1	0.30	0.00	0.00	NAT
40 S 08 W 09.01	LOGAN SP	OIMP*	P	ST	ADM	GT (40-8-4A)	17'	2	0.44	0.00	0.00	NAT
40 S 08 W 21.00	WALDO SELECT SP	UCG	P	ST	ADM	GT (40-8-28)	12'	2	0.24	0.00	0.00	NAT
40 S 08 W 28.00	WALDO SELECT	OIMP*	P	ST	ADM	GT	14'	2	0.00	1.04	0.00	NAT
40 S 08 W 28.01	WALDO SP	OIMP*	P	ST	ADM	GT (40-8-28)	14'	2	0.00	0.45	0.00	NAT
40 S 08 W 28.03	WALDO FLAT	UCG	F	ST	ADM	GT	12'	1	0.09	0.00	0.00	NAT
40 S 09 W 27.00B	WIMER	OIMP	F	OP			16'	3	0.00	0.28	0.00	ASC

Appendix D: Wildlife Information

Table D-1: Spotted Owl Sites Located on Forest Service where Provincial Home Ranges include BLM Lands.	
Site Name	**Level of Protection**
Trapper=s Gulch	Activity Center
North Trapper=s Gulch	Activity Center

Special Status Species

Special status species are animals that are recognized by the federal or state government as needing particular consideration in the planning process, due to low populations (natural and human caused), restricted range, threats to habitat and for a variety of other reasons. This list includes species officially listed, proposed for listing. State Listed Species are those species identified as threatened, endangered, or pursuant to ORS 496.004, ORS 498.026, or ORS 546.040. Also included are Bureau Assessment Species which are plant and animal species that are found on List 2 of the Oregon Natural Heritage Data Base and those species on the Oregon List of Sensitive Wildlife Species (ORS 635-100-040) and are identified in BLM Instruction Memo No. OR-91-57. Bureau Sensitive species are those species eligible for federal listed, state listed, or on List 1 in the Oregon Natural Heritage Data Base, or approved by the BLM state director.

Table D-2: Special Status Species Habitat Needs

SPECIES (COMMON NAME)	HABITAT ASSOCIATION	SPECIAL HABITAT FEATURE	CONCERN
Grey wolf	Generalists	Large blocks of unroaded habitat	Extirpated
White-footed vole	Riparian	Alder/mature riparian	Naturally rare, modification/loss of habitat from development
Red tree vole	Mature/old growth conifer	Mature douglas-fir trees	Declining habitat quality/quantity from logging
California red tree vole	Mature/old growth conifer	Mature douglas-fir trees	Declining habitat quality/quantity from logging
Fisher	Mature/old growth riparian	Down wood/snags	Declining habitat quality/quantity & fragmentation from logging
California wolverine	Generalists	Large blocks of unroaded habitat	Declining habitat quality/quantity & fragmentation from logging and road building, human disturbance
American martin	Mature/old growth	Down wood, living ground cover	Declining habitat quality/quantity & fragmentation
Ringtail	Generalists	Rocky terrain, caves, mine adits	Northern limit of range
Townsend=s big-eared bat	Generalists	Mine adits, caves	Disturbance to nurseries, hibernacula & roosts, closing mine adits
Fringed myotis	Generalists	Rock crevices & snags	Disturbance to roosts and colonies
Yuma myotis	Generalists	Large live trees with crevices in the bark &	Limited mature tree recruitment
Long-eared myotis	Generalists	Large live trees with crevices in the bark	Limited mature tree recruitment
Long-legged myotis	Generalists	Large live trees with crevices in the bark	Limited mature tree recruitment

Pacific pallid bat	Generalists	Snags, rock crevices	General rarity/disturbance/snag loss
Peregrine falcon	Generalists	Cliff faces	Low numbers, prey species contaminated with pesticides
Bald eagle	Lacustrine/rivers	Large mature trees with large limbs near water	Populations increasing
Northern spotted owl	Mature/old growth	Late-successional mature forest with structure	Declining habitat quality/quantity & fragmentation
Marbled murrelet	Mature/old growth	Large limbed trees, high canopy closure	Declining habitat quality/quantity
Northern goshawk	Mature/old growth	High canopy closure forest for nest sites	Declining habitat quality/quantity & fragmentation, human disturbance
Mountain quail	Generalists		No concern in the watershed
Pileated woodpecker	Large trees	Large diameter snags	Snag and down log removal from logging, salvage & site prep
Lewis' woodpecker	Pine/oak woodlands	Large oaks, pines & cottonwoods adjacent to openings	Declining habitat quality/quantity fire suppression, rural & agriculture development, riparian modification
White-headed woodpecker	Pine/fir mountain forests	Large pines living and dead	Limited natural populations, logging of large pines and snags
Flammulated owl	Pine/oak woodlands	Pine stands & snags	Conversion of mixed-aged forest to even-aged forests
Purple martin	Generalists	Snags in burns with excavated cavities	Salvage logging after fire and fire suppression
Great grey owl	Pine/oak / true fir / Mixed Conifer	Mature forest with adjoining meadows	Declining quality/quantity of nesting and roosting habitat
Western bluebird	Meadows/ open areas	Snags in open areas	Snag loss/fire suppression competition with starlings for nest sites
Acorn woodpecker	Oak woodlands	Large oaks	Declining habitat quality/quantity
Tricolored blackbird	Riparian	Wetlands, cattail marshes	Limited & dispersed populations, habitat loss from development
Pygmy nuthatch	Pine forests	Large dead & decaying pine	Timber harvest of mature trees, salvage logging
Black-backed woodpecker	Pine	Snags and pine	Removal of mature insect infested trees
Williamsons sapsucker	Montane conifer forest	Trees with advanced wood decay	Removal of heart rot trees, snag removal, conversion to managed stands
Northern pygmy owl	Mixed conifer	Snags	Snag removal, depend on woodpecker species to excavate nest cavities
Grasshopper sparrow	Open savannah	Grasslands with limited shrubs	Limited habitat, fire suppression, conversion to agriculture
Bank swallow	Riparian	Sand banks near open ground or water	General rarity, declining habitat quality
Western pond turtle	Riparian/uplands	Marshes, sloughs ponds	Alteration of aquatic and terrestrial nesting habitat, exotic species introduction
Del Norte salamander	Mature/old growth	Talus	Declining habitat quality/quantity & fragmentation
Siskiyou mtn. Salamander	Closed canopy forest	Talus	Declining habitat quality/quantity & fragmentation
Foothills yellow-legged frog	Riparian	Permanent streams with gravel bottoms	Water diversions, impoundments, general declines in genus numbers
Red-legged frog	Riparian	Marshes, ponds & streams with limited flow	Exotic species introduction loss of habitat from development
Tailed frog	Riparian	Cold fast flowing streams in wooded area	Sedimentation and removal of riparian vegetation due to logging, grazing & road building
Clouded salamander	Mature	Snags & down logs	Loss of large decaying wood due to timber harvest and habitat fragmentation
Variegated salamander	Riparian	Cold, clear seeps & springs	Water diversions & sedimentation from roads & logging
Black salamander	Generalists	Down logs, talus	Limited range, lack of data
Sharptail snake	Valley bottoms low	Moist rotting logs	Low elevation agricultural and development projects that

	elevation		remove/limit down wood
California mountain kingsnake	Habitat generalists	Habitat generalists	Edge of range, general rarity, collectors
Common kingsnake	Habitat generalists	Habitat generalists	Edge of range, general rarity, collectors
Northern sagebrush lizard	Open brush stands	Open forests or brush with open understory	Edge of range, fire suppression

Other Species and Habitats

In the watershed, species dependent upon snags and down wood are of special concern. Historically, snags were produced by various processes including drought, windthrow, fires, and insects. In response to these events, the amount of snags fluctuated through time. This natural process has largely been interrupted by fire suppression and demands for timber harvest. The potential recovery of snag dependent sensitive species such as the pileated woodpecker will depend on the ability of the federal agencies to manage this resource.

Silvicultural practices have historically focused on even-aged stands and have resulted in deficits of snags and down logs in harvested areas. Other activities that have depleted snags and down logs are site preparation for tree planting (particularly broadcast burning), fuel wood cutting, post fire salvage, and previous entries for mortality salvage. Managed stands that currently contain 10-12 (5 MBF) overstory trees per acres or less are also of concern from a wildlife tree/down log perspective. Stands with remaining overstory trees have the potential to provide for current and future snag/down log requirements throughout the next rotation if existing trees are removed.

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). For some species, the presence or absence of suitable snags will determine the existence or localized extinction of that species. In forested stands, cavity nesting birds may account for 30%-40% of the total bird population (Raphael and White 1984). The absence of suitable snags (snag decay stage, number and distribution) can be a major limiting factor for these snag dependent species.

The hardness (decay stage) of a snag is an important factor in determining its foraging, roosting and nesting use by individual species. Woodpeckers, like the pileated woodpecker (*Dryocous pileatus*) often choose hard snags (stage 1) for nesting where as wrens and chickadees use the softer stage 2 and 3 snags. The use of snags as a foraging substrate also changes with time and the decay stage of the snag. As a snag decomposes the insect communities found within it changes. Evans and Conner (1979) identified three foraging substrates provided by snags: the external surface of the bark, the cambium layer and the heartwood of the tree.

Snags are also used as food storage sites and as roosting/resting sites for many species. A variety of mammals, birds and some owls use snags to cache prey and other food items. Vacated nesting cavities are often used by wildlife for protection from inclement weather or on hot summer days. The marten (*Martes americana*) often uses snags as resting and hunting sites and a pileated woodpecker may use up to 40 different snags for roosting.

Snags continue their function as a key element of wildlife habitat when they fall to the ground. Once again, the use of down logs by individual species is dependent on the decay stage of the log. A log with greater diameter and longer length is more functional for wildlife. Depending upon the decay stage of the log, it will be used for lookout and feeding sites, nesting and thermal cover, for food storage or for foraging. For example, species like the clouded salamander (*Aneides ferreus*) require the micro-habitat provided by bark sloughing of the log where as small mammals such as red-backed voles (*Clethrionomys occidentalis*) burrow inside the softer logs.

As outlined in the RMP, the target is to maintain primary cavity nesting species at a minimum of 40% of their naturally occurring population levels (biological potential). Maintaining biological potential at 40% is considered to be the minimal viable population level for any given species. By managing for primary cavity nesters at 40% of the naturally occurring population level, it is may also be possible to manage for many other snag dependent species, such as flying squirrels (*Glaucomys sabrinus*), mountain bluebirds (*Sialia currucoides*) and Vaux's swift (*Chaetura vauxi*) at an unknown level.

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:

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

2) Aspect (In Degrees):

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

3) Position On Slope:

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

4) Fuel Model:

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 forest vegetation has DBH of 5" or greater (vegetation condition class 6). Exceptions are possible based on stand conditions.)

	Points
Ladder fuel absent.	0
Present on less than one-third of area; vertical continuity > or < 50%.	5
Present on one-third to two-thirds of area; vertical continuity is <50%.	15
Present on one-third to two-thirds of area; vertical continuity is > 50%.	25
Present on greater than two-thirds of area; vertical continuity is <50%.	30
Present on greater than two-thirds 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 and use, and on lightning occurrence.

High rating when human population areas are present on or within 1/4 mile of the area; area has good access with many roads; relatively higher incidence of lightning occurrence; area has high level of human use.

Moderate rating when area has human access and experiences informal use; area is used during summer and fall seasons as main travel route or for infrequent recreational activities. Lightning occurrence is typical for the area and not notably higher.

Low rating when area has limited human access and infrequent use. Baseline as standard risk, mainly from lightning occurrence with only rare risk of human caused fire.

C. VALUE AT RISK

Best assigned through interdisciplinary process. Based on human and resource values within 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 rating - 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 rating - Granitic soils, informal recreation areas and trails. Vegetation and McKelvey rating of 85, 75, 65.

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