WATERSHED ANALYSIS

for the

KERBY WATERSHED

BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
GRANTS PASS RESOURCE AREA

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I. INTRODUCTION

The Kerby Watershed Analysis is an attempt to describe the existing ecological conditions of the natural resources within the watershed boundaries and the social, biological, and physical processes that affect them. The analysis is based on existing information and is intended to guide ecosystem planning at the watershed scale. All of the information collected for the analysis is not included in this document. Including it all would make the analysis document too lengthy and many of the maps cannot be compressed to document size. All of the information compiled for the Kerby Watershed Analysis is kept on file in the Medford District Office and can be referenced and updated at any time.

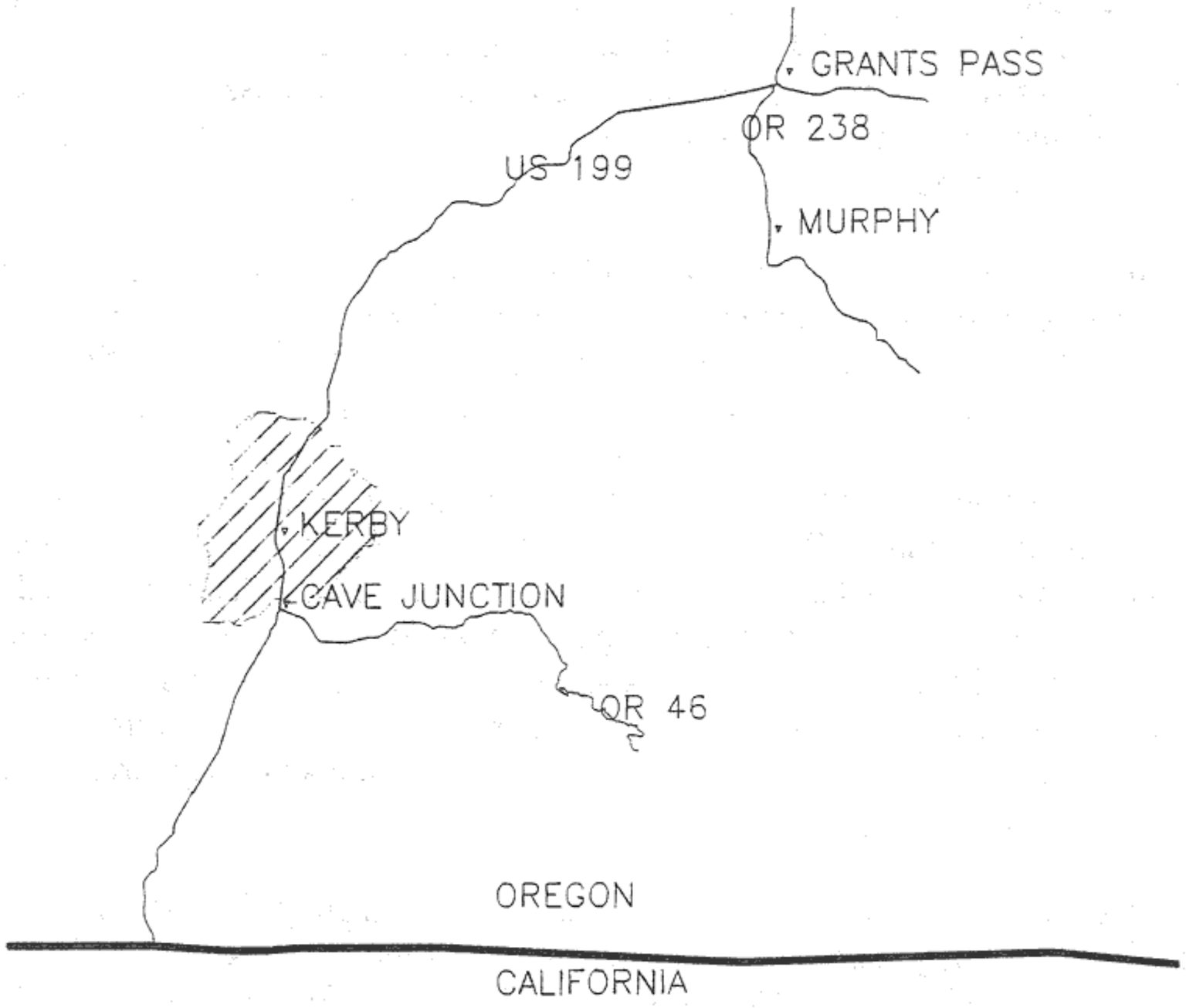
Watershed analysis is a key component of the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (the ROD). It is an analytical process, not a decision making process, and will serve as the basis for developing project specific proposals to improve the existing conditions on federal lands in the watershed. Watershed analysis is a new process and will likely evolve over time.

A watershed analysis is never really completed. The analysis will continually be updated as new information becomes available. Since the initial analysis is based on existing information, data gaps - data element components where little or no existing information exists, occur. The data gaps will be addressed over time as funding and workloads permit.

The Kerby Watershed is located between the communities of Selma and Cave Junction in southern Josephine County, Oregon. It is centrally located in the Illinois River Basin and is one of twelve major watersheds identified in the Illinois Basin. The watershed is bounded by Eight Dollar Mountain on the northern edge, Tennessee Mountain on the western edge, and the community of Cave Junction on the southern edge. The main stem of the Illinois River flows through the western one-third of the watershed. Other major drainages in the watershed include Reeves Creek, Montgomery Creek, Free and Easy Creek, George Creek, and Holton Creek.

The land base contained within the watershed is approximately 18,770 acres. Of this, the Bureau of Land Management (BLM) manages approximately 6,247 acres (33%), the U.S. Forest Service - 2,083 acres (11%), Josephine County - 1,084 acres (6%), and the remaining 9,356 acres (50%) are privately owned.

The Northwest Forest Plan allocated the federal lands in the watershed into three primary categories: matrix, riparian reserve, and marbled murrelet reserve. The murrelet reserve overlaps the Eight Dollar Mountain Area of Critical Environmental Concern (ACEC) and totals 609 acres. The exact acreage of the riparian reserves are not known as the reserve width depends on a number of factors including stream class and site tree potential. Specific riparian reserve boundaries are established on the ground at the time of initiation for any management activity that could impact riparian areas. It is estimated that 35-45 percent of the 7,721 acres of federal land in the watershed shown as matrix on Northwest Forest Plan maps would actually fall into the riparian reserve land allocation.



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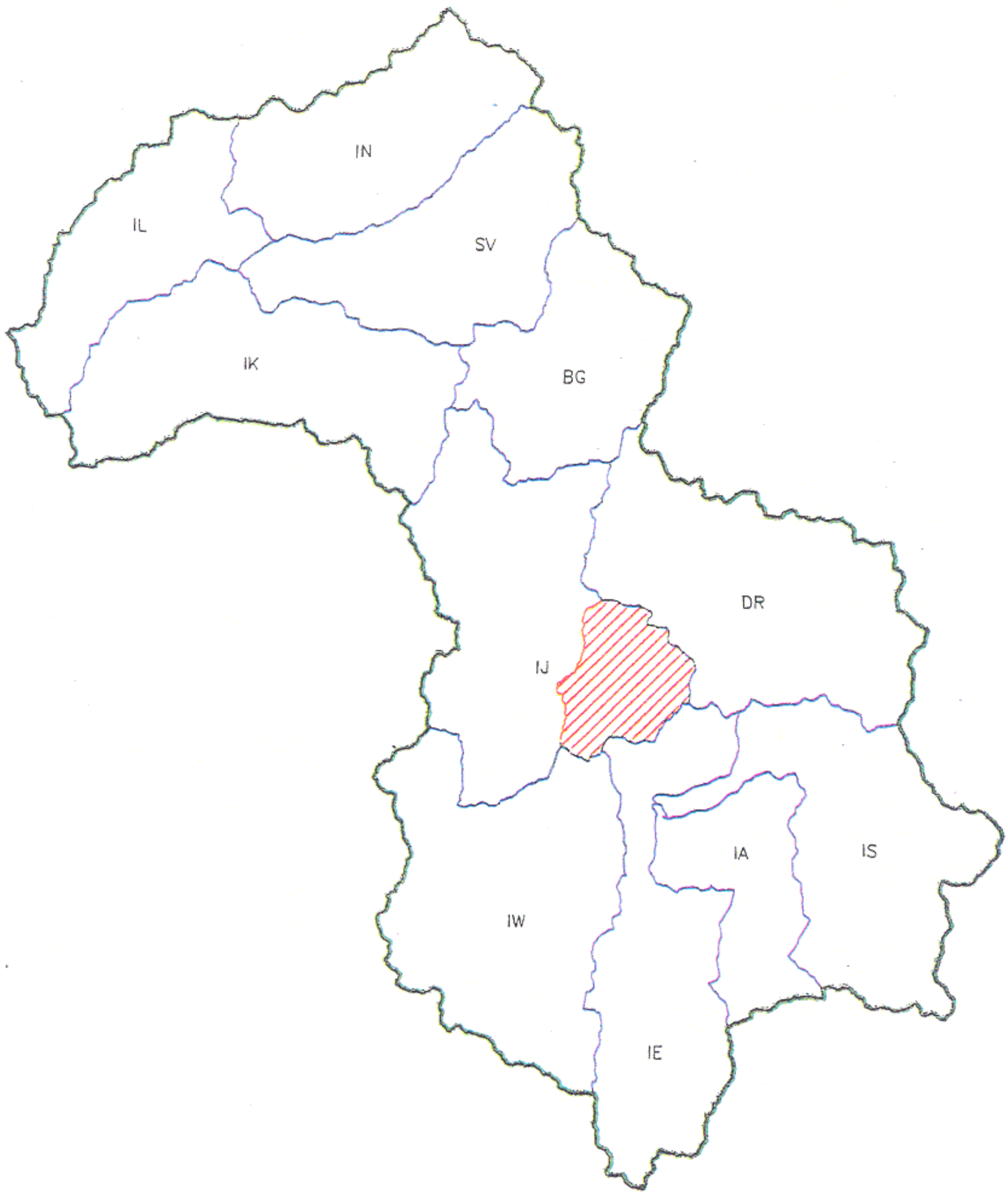
KERBY WATERSHED
OREGON BORDER

GENERAL LOCATION, KERBY WATERSHED



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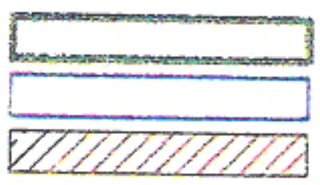
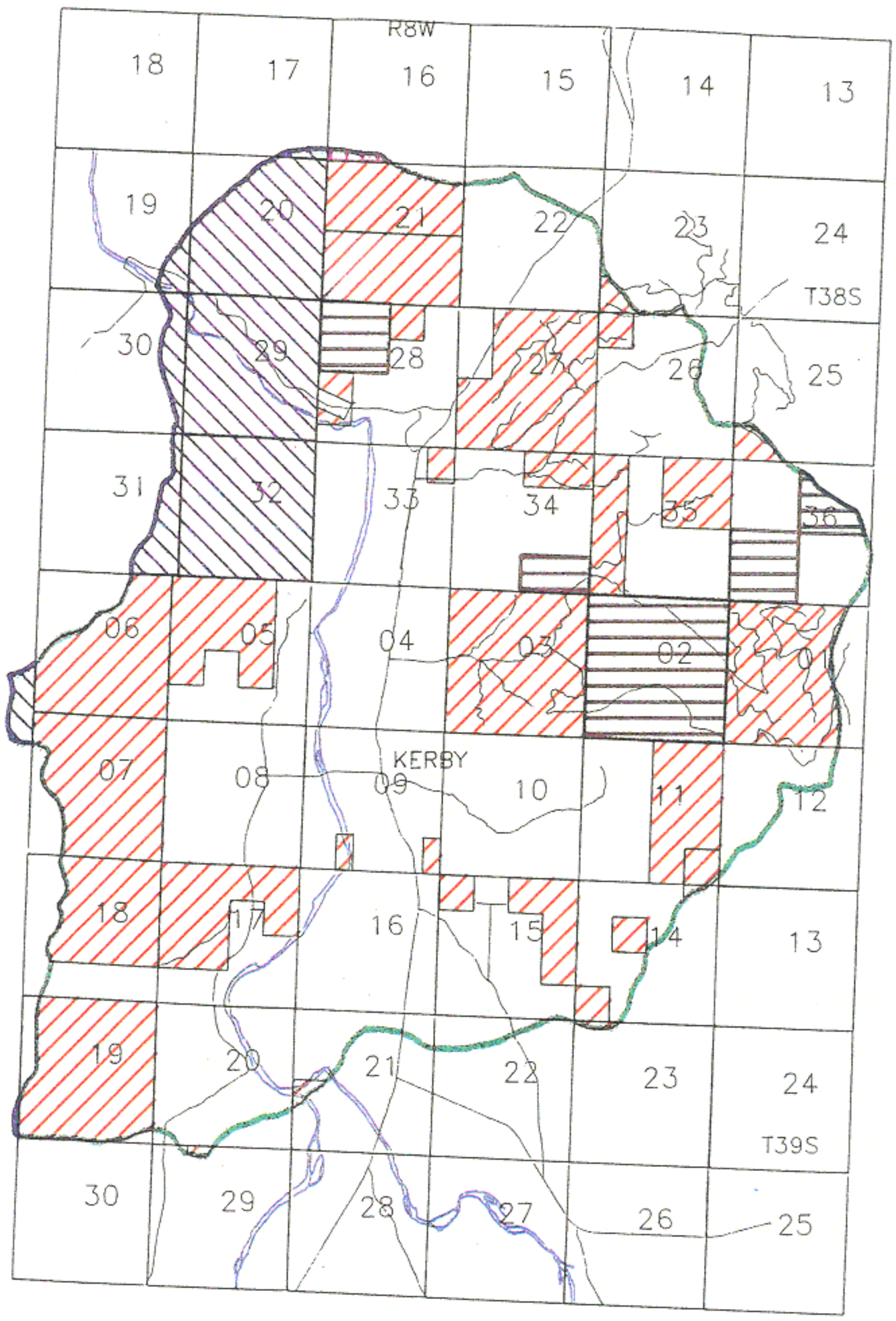
ILLINOIS BASIN
WATERSHEDS
KERBY SUBWATERSHED



ILLINOIS BASIN – KERBY WATERSHED



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WATERSHED BDY.
BLM
USFS
STATE
COUNTY

GOVERNMENT LANDS

II. KEY ISSUES

The watershed analysis team identified key issues and associated key questions for the Kerby Watershed. Key issues were identified from known regional and local issues, Northwest Forest Plan direction, BLM resource specialists' knowledge of the area, and public input.

FIRE AND AIR

1. What should the role of fire be in the future management of the watershed?

2. What can be done to reduce the wildfire hazard and risk in the rural interface and residential areas of the watershed?

VEGETATION

1. What are the threats to the special status and special emphasis plant species existing in the watershed and how should we manage for them?

2. What has been the role of fire and other natural processes in the development and maintenance of plant communities and how has fire suppression affected:

- Structure and composition of existing plant communities
- Health, vigor, and stability of existing forests
- Amount and distribution of seral stages and stages of stand development
- Amount of old growth

3. What affect has forest management practices and other human development activities (farming, ranching, home building, etc.) had on:

- Structure and composition of existing plant communities
- Health, vigor, and stability of existing forests
- Amount and distribution of seral stages and stages of stand development
- Amount of old growth

WILDLIFE

1. What are the threats to the special status and special emphasis wildlife species existing in the watershed and how should we manage for them?

2. What has been the role of fire and other natural processes in the development and maintenance of wildlife habitats and how has fire suppression affected:

- Spatial distribution of habitat types
- Composition and populations of wildlife species
- Structure of habitat types (snags, down woody debris, canopy layering, etc.)

3. What effect has settlement and associated human activities (timber harvest, home construction, roading, etc.) had on:

- Spatial distribution of habitat types
- Composition and populations of wildlife species
- Structure of habitat types (snags, down woody debris, canopy layering, etc.)

4. What are the special and unique habitats and how should we manage for them?

<u>WATER</u>

1. Is there a water quantity problem in the Kerby Watershed?

    Secondary question: What are the factors affecting water quantity?

2. Is there a water quality problem in the Kerby Watershed?

    Secondary question: What are the factors affecting water quality?

3. How do forest management/timber harvest activities affect water quantity/quality?

4. How do mining activities affect water quality/quantity?

<u>FISH</u>

1. What are the current riparian conditions and how does riparian condition affect fish habitat and populations?

2. How does the Kerby Watershed affect fisheries in the Illinois River?

3. Does the Kerby watershed provide high quality habitat for resident and anadromous fish?

4. What are the factors affecting stream productivity and habitat quality for fish populations?

5. What are the fish population trends in the Kerby Watershed?

6. How have rural urbanization and land use activities affected fish habitat in the watershed?

SPECIAL AND UNIQUE AREAS

1. What are the special and unique areas in the Kerby Watershed (i.e., Eight Dollar Mountain, Lime Rock Cave, Illinois Wild and Scenic River, Botanical Emphasis Area, Illinois River State Park, etc.)?

2. What are the values these special areas are being managed for?

    Secondary question: What activities should be prohibited to protect those unique values?

SOCIAL/ECONOMIC

1. How does the watershed provide for human/social values?

    Secondary question: What are the watershed specific conflicts for these values?

2. How does the watershed provide for human/economic values?

    Secondary question: What are the watershed specific conflicts for these values?

3. What affects have human development activities had on the social and economic values of the watershed (i.e., housing, roads, landfills, etc.)?

The descriptions in the Key Processes and Past and Existing Ecological Conditions sections that follow will attempt to address the identified key questions to the extent possible.

III. KEY PROCESSES

The key processes affecting the watershed can be broken down into three primary categories. These are physical, biological, and social.

PHYSICAL

Physical processes can also be broken down into three categories: geologic, hydrologic, and climatic.

Geologic: The Kerby Watershed is a very diverse and unique landscape. It is contained within the Klamath Geologic Province which is known for both its geologic and vegetative diversity and its frequent natural disturbance patterns. The Klamath Province is one of the oldest geologic provinces in Oregon. It was generally spared from major glaciation and recent volcanic activity, and the ecosystem processes that have shaped the current conditions in the province and the Kerby Watershed have developed over millions of years.

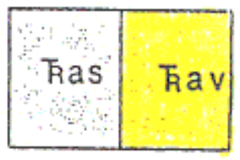
The Klamath Province was once part of the ocean floor millions of years ago. As the tectonic plates collided, uplifting of the plates occurred, exposing the formations to external forces such as climatic and hydrologic processes that began to shape and mold the landmass. Intrusions of magma that contained high quantities of serpentinite and granite amalgamated the plates. In their long history as part of the sea floor, as well as during the emplacement of serpentine and granitic intrusions, Klamath Province terrane rocks were enriched with a diversity of economic minerals including gold, copper, nickel, and chromite.

In the Kerby Watershed, the uplifted landmass has been eroded down by water over the years into what is known as the Illinois River Valley. The river has changed channel location numerous times and the floodplains have resulted in a relatively wide river valley with deep fertile soil. The mountains to the west consist of rocks with serpentinitic mineralogy. The soils formed from these rocks have a nutrient imbalance which is not conducive for growth by many species of plants. On the east side, the mountains consist of dominantly shale, slate, and siltstone. Soils formed from these rocks are moderately deep clay loams with characteristics conducive for all types of plant growth. People have worked and smoothed out the valley bottom into agricultural fields and homesites. As a result of the development, the river has been confined to a defined channel and vegetation along the river has been altered. The soils in the valley bottom and stream terrace have been tilled and fertilized and are very productive.

Hydrologic: The hydrological process affecting the Kerby Watershed involves water; how it gets into the watershed, how it is used, and how it leaves the watershed. Water is delivered to landmasses via two avenues, precipitation and geothermal. Since geothermal water sources have not been identified in this area, water delivery via precipitation will be interpreted. Most of the precipitation in the Pacific Northwest occurs during the winter months in the form of rain or snow. The precipitation falls on the landmass and either enters

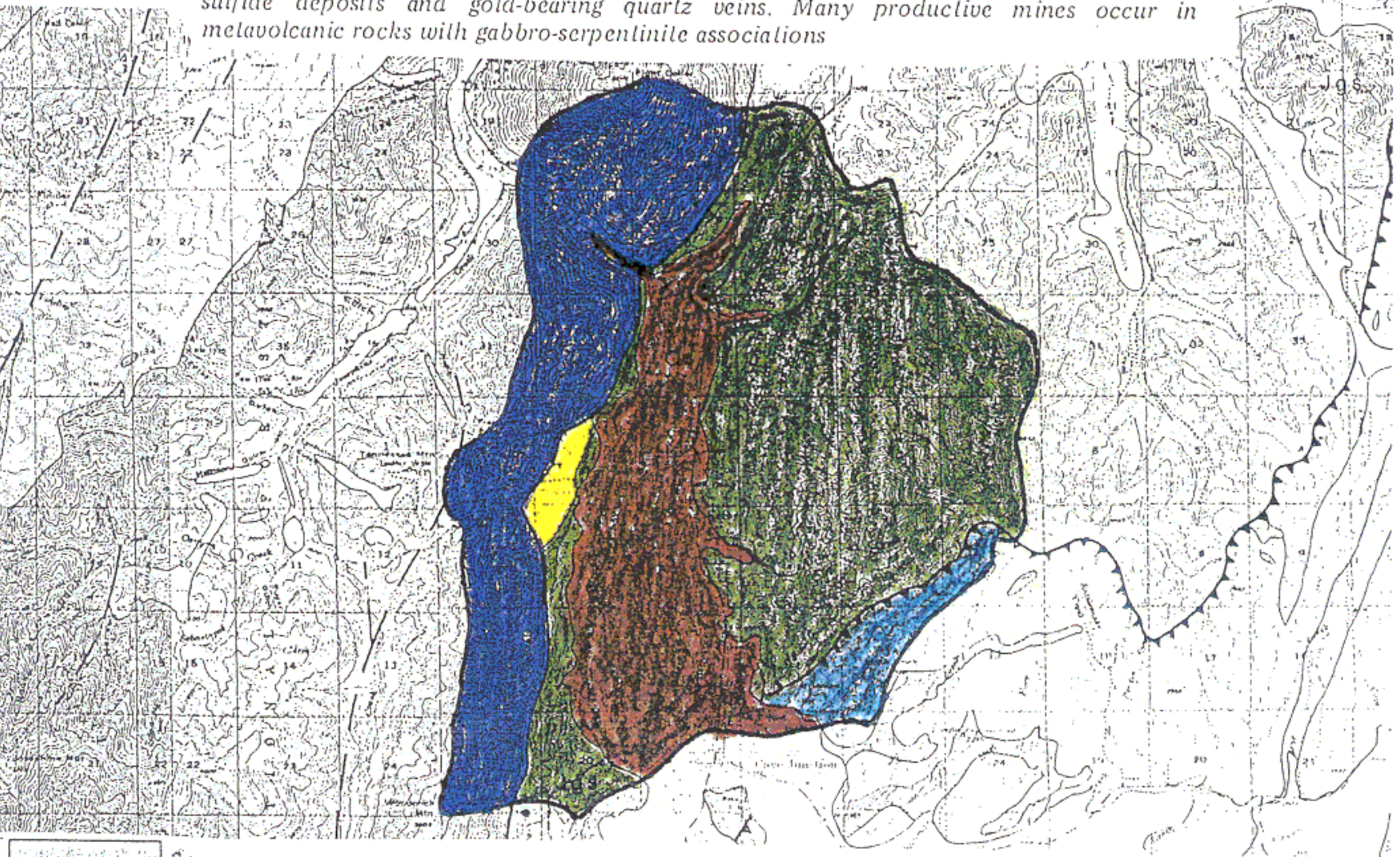
Kerby Watershed Geologic Map

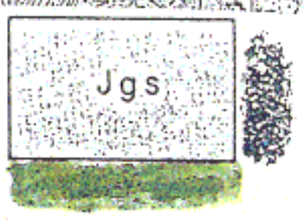
1979



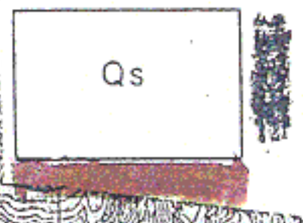
Applegate Group: *Metasedimentary rocks include slaty siltstone, argillite, quartzite, phyllite, schist, chert, conglomerate, and lenses of limestone (largely marble)* (Tras). *Metavolcanic rocks include pillow lavas, tuffs, breccias, agglomerates, and, locally, numerous gabbro and diabase dikes* (Tav). *Metallic minerals are found mainly with metavolcanic rocks and include volcanogenic base metal sulfide deposits near Takilma and numerous gold-bearing quartz veins. Lenses of high-purity limestone (marble) and pods of rhodonite are associated with metasedimentary rocks*

Metavolcanic rock: *Rogue and Galice Formations, including siliceous to basic tuffs, andesitic to basaltic flow rock, pillow lavas, breccias, and agglomerates; also contains minor interbedded tuffaceous sedimentary rocks including chert, graywacke, and mudstone. Diabasic dike swarms occur locally. Most favorable unit for locating massive sulfide deposits and gold-bearing quartz veins. Many productive mines occur in metavolcanic rocks with gabbro-serpentinite associations*

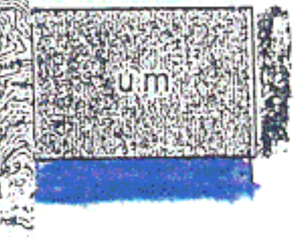




Metasedimentary rock: *Slaty siltstone, sandstone, and shale. Galice Formation of Diller and Kay (1924), Wells and others (1940, 1949), and Wells and Walker (1953). Gold mineralization in quartz veins and shear zones occurs locally. This unit is bed rock for numerous gold placer mines. Where deeply weathered, rocks form clay suitable for common brick and tile*



Quaternary sediment: *Stream-deposited sand, silt, and gravel; bench gravel deposits; glacial moraine; outwash and fan deposits (not always shown where thin). Source of sand and gravel where conveniently located. Some areas still contain important deposits of placer gold and minor platinum*



Ultramafic rock: *Largely serpentinite with some residual peridotite including harzburgite, dunite, and pyroxenite. Narrow serpentinite bodies are highly sheared and occupy zones of major faulting. Contains deposits of podiform and disseminated chromite, nickel in laterites, and minor copper and gold. Platinum of placer deposits also originates in these ultramafic rocks*

the ground or drains from the topography. The water that enters the ground often resurfaces at numerous spring sites on the landscape. These springs contribute water to the hydrological system throughout the dry summer months.

Water that does not enter the ground flows overland into drainages and streams that are tributaries of rivers. If the land that the surface water flows over has a vegetative cover, the water stays relatively clean. If the land is not vegetated and the soil is bare, the water erodes the soil and the smaller soil particles become suspended sediments. These sediments degrade the water quality by reducing the clarity and introducing different chemical elements.

Once the water is in the streams or river it is available to be diverted for domestic and agricultural purposes. If the banks of the waterways have vegetation that provides shading, the water remains relatively cool. If no vegetation exists then the water temperature will rise. Dams are used to store and/or divert water from the river into ditches for irrigation purposes to crops in the valley bottom. Irrigation water that crosses the fields soaks into the ground or drains back into the river. Irrigation water warms considerably before entering back into the river and may pick up additional chemicals. Irrigation water that enters the soil contributes to ground water recharge or may enter the river at a subsurface level.

Water not used for domestic or agricultural purposes is available for recreation, fish habitat, and wildlife uses. The quantity and quality of water left in the streams and river after the agricultural and domestic uses affects the habitat of the remaining users.

Data indicates that the average annual precipitation amount for the valley bottom area in the watershed and the mountains to the east is 45 inches while the mountains on the west side of valley annually receive over 60 inches. Runoff enters streams and tributaries of the Illinois River. Pomeroy Dam is a structure on the Illinois River that diverts water for irrigation. There are two major irrigation ditch systems, one on each side of the valley, that supply water for crops. Over one hundred points of diversions from streams and the Illinois River were recorded by the State of Oregon's Watermaster's Office in the Kerby Watershed.

Climatic: The climate of the Klamath Province and the Kerby Watershed, while varying during different geologic time periods, has not undergone major shifts like other regions of the Pacific Northwest. The Klamath Province was spared from major glaciation and resultant ice-age effects of physical processes. This has permitted some of the biological processes to evolve over very long periods of time resulting in highly diverse ecosystems. Moderate climatic changes resulting in warmer or cooler periods over time has resulted in species adapted to warmer and cooler climates migrating into the province. Many of these species can be found in the Kerby Watershed today.

The climatic conditions over the last several centuries are described as a Mediterranean type climate characterized by cool, moist winters and warm, dry summers. This type of climate is largely responsible for the frequent natural disturbance patterns, primarily fire, that characterizes the Klamath Province.

The same jet stream dominated weather patterns that affect the Pacific Northwest affect the Kerby Watershed. The frontal systems move inland from the Pacific Ocean and the coastal areas receive an average of 90 to 100 inches of precipitation annually. As the clouds come over the coastal mountain range the precipitation increases. Chetco Peak (elev. 4668 feet) receives an average annual amount of approximately 180 inches. The average annual precipitation amount decreases as the clouds cross over the coastal range into the Illinois Valley. The Kerby/Cave Junction area receives an average of approximately 45 inches annually. Precipitation in the Kerby area the last 9 out of 10 years has been significantly lower than the average. This period of drought has affected many other key processes in the watershed.

BIOLOGICAL

The key biological processes at work in the watershed will be described for natural disturbance patterns, vegetation, and wildlife. These are all closely linked as disturbance regimes affect vegetation and vegetation provides the habitat needed by many wildlife species.

Natural Disturbance: The Klamath Province has a history of frequent natural disturbances. The climatic processes that affect the province are such that the primary disturbance agent has historically been natural wildfire. Fire has provided an important process role in maintaining stable vegetation densities at the landscape scale and for contributing to the floristic diversity for which the Klamath Province is renowned.

Prior to Euro-American settlement the historical fire regime of the Kerby Watershed had been dominated by that of a low-severity regime. The low-severity fire regime is characterized as frequent (1-25 years) fires of low intensity.

Fires in a low-severity regime are associated with ecosystem stability, as the system is more stable in the presence of fire then in its absence. Frequent, low intensity fires that burn off surface litter and small understory vegetation keep sites open so that they are less likely to burn intensely even under severe fire weather. Most of the watershed experienced fire return intervals of 20 years or less.

The major vegetation communities of the Kerby Watershed were highly fire adapted and dependent on fire for their maintenance. At lower elevations these included oak woodlands and ponderosa pine stands with Douglas-fir mixed in. Douglas-fir/hardwood stands consisting of Douglas-fir dominating with ponderosa pine, Pacific madrone, and tanoak occurred only at the higher elevations. These vegetation communities were very stable and resistant to insects and diseases.

With the advent of aggressive fire suppression in the first decade of this century, the pattern of frequent low intensity fire was ended. Dead and down fuel and understory vegetation was no longer periodically removed by the frequent surface fires.

In the oak woodlands, the loss of frequent fire allowed conifer invasion which produced a dense

Douglas-fir understory replacing the formerly open oak understory. This created a fuel ladder and high fire hazard. Over time, Douglas-fir overtops Oregon white oak and the shade-intolerant mature oaks die. The result is a replacement of oak stands with conifer stands on all but the more dry sites.

In ponderosa pine/Douglas-fir stands the exclusion of fire allowed dense stands of Douglas-fir to form which eliminates the pine from these areas due to overcrowding causing increased competition for resources and shading.

In Douglas-fir/hardwood forest, shade tolerant and less fire resistant conifer and hardwood trees became established in both the overstory and understory. Douglas-fir increased in numbers creating dense stands with multi-layered canopies. These stands now have much higher levels of dead and down woody fuel present. The dense multi-layered overstory now have "ladder" fuels which can carry fire into the upper canopy.

Serpentine vegetation communities are present on the western portion of the Kerby Watershed. These communities experience relatively minor vegetation composition changes when frequent fire is removed. Only minor vegetation changes exist between seral (fire climax) and climax communities. The major effect of removal of frequent fire is a change to higher levels of vegetation density, ladder fuels, and increases in amounts of dead and down fuels.

The current fire regime is shifting to a moderate to high-severity regime. Fire is infrequent, burns with greater intensity, and can often be stand replacement fires. These fires can burn for longer duration and are not easily extinguished relative to the former regime. The probability of stand replacement type of fire is much higher due to the fuel ladder created by the understory vegetation and woody debris buildup. This tendency for increasing fuel buildup over time was kept in relative equilibrium by the frequent low intensity fires. The stability of the current vegetation is not as great as the former because of the lack of disturbance.

When the ecological state of the forest is dramatically altered by fire suppression the role of insects, disease, and wildfire are likewise altered. The frequent, low intensity fires of the past created forests that were ecologically more stable than the forests of today. The current forest conditions are more susceptible to insects, diseases, and stand replacement fires than have been observed and recorded before.

The closer a forest system is managed in harmony with the natural processes by which it evolved, the more successful that management will be. The role wildfire has played will need to be duplicated if ecosystem health and stability are to be achieved.

In addition to fire, other natural disturbance processes that have affected the watershed historically include: wind, landslides, flooding, ice storms, insects, and diseases.

Vegetation: Competition and succession are two other processes influencing vegetation in

addition to disturbance. Competition is the interaction between species, or within a group of species, that usually results in one individual species having an advantage and dominating or killing another. When the density of vegetation increases to a certain point, there are not enough site resources to sustain all of the vegetation present. This weakens the vegetation, making it more susceptible to environmental stresses such as drought, insects, and diseases. Accelerated mortality can occur at this point.

Succession is a process that involves a series of vegetation condition changes over time, following a disturbance, where one group of plants succeeds another through stages until the final or climax stage is reached. The developmental series of plant communities is called a sere and defined stages are called seral stages. This process can happen in two patterns. One pattern occurs when a species or a small group of species (i.e., grasses) invade an area following a disturbance and predominate. These species alter the environment on that site and help create conditions that permit another stage of vegetation to move in and succeed it. In the absence of disturbance, different stages of vegetation (seral stages) will succeed each other until the climax stage is reached. In late seral or climax conditions, no other species can successfully reproduce and succeed the climax species dominants. The vegetation will remain in this condition until some form of disturbance alters the site to favor earlier seral stages of succession. In the Klamath Province, late seral conditions are generally the least diverse, least stable, and most susceptible to disturbance.

Another form of succession, which is more common in the Klamath Province, occurs where many species invade a site following a disturbance but assert dominance at different times, depending on their competitive advantage. Species that eventually predominate were present soon after the disturbance but don't achieve a competitive advantage until later.

Wildlife: The primary wildlife processes which occur in the Kerby Watershed are dispersal, migration, and predator/prey relationships.

Dispersal is the movement of young away from their birth or hatching area. Most wildlife species are territorial to some degree, which means that they defend an area of ground to provide forage, cover, water, and suitable habitat for reproduction. When juvenile animals reach a certain stage of development they leave the natal area on their own or are chased from the area by the adults. Survival of the species requires that there is suitable habitat for the dispersal of the young in such quantities and locations to allow the young to find their way to a new area and to establish a territory of their own.

Habitat distribution patterns and abundance of certain habitat types are very limiting to many species. Old growth obligates, such as northern spotted owls and Del Norte salamanders, may be severally limited by lack of suitable habitat and by the positioning of that habitat. With 53 percent of the Kerby Watershed in suitable dispersal habitat, northern spotted owls should be able to successfully disperse. However, this dispersal habitat is all located on the east side of the watershed. Spotted owl dispersal habitat may have as little as 40 percent canopy closure which may not be suitable for non-mobile species like salamanders, small rodents, and invertebrates.

Many of these species require higher canopy closures and specific microhabitats which protect them from climatic extremes. A limited portion of the watershed provides habitat which may meet the needs of these species and most of the habitat is located in small, widely separated parcels. Due to these conditions, species like Del Norte salamanders may be severely limited in their dispersal opportunities. Some of the limitations in the watershed are natural, such as the large serpentine block located on the western edge of the watershed. This land is not capable of producing habitat sufficient to allow the dispersal of old growth obligates with exception of the riparian zones. Maintenance of these riparian zones in good condition is critical to the dispersal need of many species like spotted owls and salamanders. However, that portion of the watershed located east of the Illinois River has been altered by man so that it to has minimal value for dispersal of smaller, less mobile old growth obligates.

Species which use habitat provided by younger conifer stands have abundant dispersal opportunities in this watershed. Private lands now, and in the future, will most likely continue to offer an abundance of young conifer habitat which has a moderate level of connectivity.

Other habitats such as oak woodlands, talus, snags, and down woody material may be critical habitats for dispersal of many species of wildlife. The importance and the amount of this type of habitat and the species which may use them for dispersal is unknown at this time.

Successful dispersal also requires the connectivity of similar habitat types in adjacent watersheds. At this time the habitat condition and connectivity of the adjacent watershed is unknown.

Migration is the seasonal movement of both adult and juvenile animals. Habitat within the Kerby Watershed provides both cover and food for species that are moving through the area for points further south and for those species which will spend the winter there. Very little data is available about which species migrate through the Kerby Watershed. It is suspected that many species of neotropical birds may use the riparian zones, which still exist along the Illinois River, and the oak woodlands in the valley bottoms and lower elevation foothills. It will require additional inventory and monitoring to determine which species are passing through the area and which are wintering here. Monitoring will allow the determination of which habitats are important and those which are critical to successful migration of those species. Other species which migrate through the area include several species of bats, like the silver haired bat and the hoary bat. Habitats utilized by these species are unknown and further work will need to be done to determine the importance of the habitats in the watershed to migrating bats.

Many species of wildlife migrate to lower elevations during winter month or during periods of extreme climatic events. Species like black tailed deer, yuma myotis, juncos, and many others spend the winter in the snow free areas of the watershed. Many of these species depend on old growth or mature conifer habitat to provide thermal and optimal cover during the most extreme weather conditions. Thermal cover provides a stable microclimate during normal weather. Optimal cover provides protection and foraging opportunities during extreme weather. Optimal cover equates to old growth and mature conifer habitat conditions which are currently very limited in the Kerby Watershed. Minimum optimal cover is usually set at approximately 20

percent of the land base in a watershed. There are many other species which spend all or part of the winter in this watershed but little or no information is available on these species and their winter habitat requirements.

The natural process of predator/prey relationships, which functioned to keep wildlife populations in balance, has been disrupted by man. Historical predator and prey populations are not known but it is known that several species of predators and prey animals have been extirpated from the Kerby Watershed. It is suspected that elk lived in the watershed but were extirpated by white settlers in the early 1900s. Wolves were probably the major predator of both elk and deer. Wolves were eliminated from most agricultural areas of Oregon by the 1920s. Other predators which may be present in lower numbers than they were in presettlement times are cougar, coyote, and bob cat. Populations of black tailed deer, the only big game species still present, are now contained by hunting, poaching, and highway kills.

SOCIAL

The last category of key processes described that affect the Kerby Watershed are social processes. Social processes at work in the watershed include settlement and related population demographics, transportation, human values, and economic relationships.

Prior to white settlement in the 1850s, human influence in the Kerby Watershed was limited to the few indigenous peoples who inhabited the area. These included the Takelma and Athapaskan Indians. Takelma speakers occupied much of the Rogue Valley, and the Athapaskan speaking peoples occupied lands from the coast to the Applegate River and Galice Creek. Though Athapascan speaking peoples were comparatively new arrivals to this area, arriving on the coast about 1000-1500 years earlier, those who lived in the Illinois Valley practiced a way of life similar to that of their Takelma neighbors.

The earliest accounts of Takelma Indians, as observed by visitors to southwest Oregon, occurred around the 1830s. They were seldom seen as they usually remained hidden in the mountains. The Takelma occasionally fired arrows at the settlers and their horses and mules, and sometimes rolled boulders down the hills into the white camps. The subsistence of both the Takelma and Athapaskan Indians consisted of acorns, camas bulbs, manzanita berries, fish, and deer.

The lifeways of the Takelma and Athapaskan Indians changed drastically in the years between 1851-56 when gold was discovered in southwestern Oregon. Both tribes were confronted by hostile white miners. The Takelma and Athapaskans who survived the bloody conflicts were removed by the U.S. Army to the Siletz and Grand Ronde reservations in northwest Oregon.

The mineral resources of the Illinois Valley were first discovered in 1851 and first mined in 1852. The new discovery launched several decades of intensive gold mining in southwestern Oregon. By 1853 miners were at work along the Applegate River, Galice Creek, the Illinois River, and several smaller water courses in the Siskiyou Mountains.

Josephine County was formed by the territorial legislature in January 1856. The miners in the district had, however, established their own laws for governing their claims, use of water, and disputes in 1852. Their rules included mechanisms for enforcement.

The county seat of Josephine County, as was often the case with new counties, moved as population shifted. From Sailors' Diggings near Waldo, the government moved the county seat to Kerby in 1857. With the arrival of the railroad in the northern part of the county, the voters moved the county seat to Grants Pass in 1885.

Gold remained the cornerstone of mineral development in Josephine County. Placer gold mining dominated in the early period of economic development of the area. Among the most important placers in Josephine County were those at Waldo, Takilma, and Browntown on Althouse Creek.

To serve the social, economic, and governmental needs of the region, Kerbyville, later known as Kerby, grew up near the junction of Holton Creek and the Illinois River. Writing in 1884, A.G. Walling noted Kerby's early growth as a center of activity in the county in the 1850s. In 1858 he said it was "the liveliest town of its size in the state." Kerby then had two hotels, two stores, a livery stable, barber shop, and a billiard saloon.

By 1852-53 the needs of the miners in the Illinois and Rogue valleys created a tremendous market for merchants eager to sell tools, clothing, food, liquor, and other commodities. Initially supplies flowed into the region from Scottsburg on the Umpqua River far to the north or from Yreka in California to the south. By 1853 Crescent City had become an important port of entry for the white population in the interior of southwest Oregon. In 1853 the Cold Mountain Spring Trail turned south from the Applegate River to Kerbyville. The trail then crossed to the west side of the mainstem of the Illinois River heading in a southwesterly direction up the West Fork of the Illinois River and over the divide into the watershed of the Smith River into California.

Within five years, by 1858, the route from Crescent City to Kerby and on to Jacksonville had become a wagon road. Stage service on a triweekly basis between Jacksonville and the Smith River also began in 1858.

In 1872 Congress passed what is now known as the General Mining Law. This law, along with earlier less encompassing mining laws, formed the foundation of the rules and guidance for prospecting, development, occupancy, and finally patenting many mining areas in the west. This law, along with several amendments, is still in effect following several challenges in the courts and in Congress.

In the 1870s the Oregon and California Railroad was built from the south into the Rogue Valley, reaching Grants Pass in the 1880s. The magnetism of the railroad drew commerce and population from the Illinois Valley, and also drew the county seat from Kerbyville to Grants Pass. Eventually the railroad reached Waters Creek about 15 miles north of Kerby.

Although "Yankees" and others of northern European stock seemed to be dominant in the region,

the region's mining population was actually an assortment of different nationalities and races. A few of the place names, within the north Siskiyou unit, echo the area's past ethnic diversity: French Gulch, Portuguese Creek, China Gulch.

As mining diminished in the Illinois Valley in the 1870s, the settlements which once were crowded became ghost communities with a few lingering inhabitants. Gradually even the old townsites vanished, sometimes under the steady pounding of the hydraulic giants which washed away tons of earth and rock.

The development of timber resources for commercial purposes in the Illinois Valley began in the 1850s. Initial use of timber resources was primarily for settlement and in support of mining operations. Primary uses of wood in those days was for shelter and homes, fuelwood, sluices, diversion dams, saloons, bowling alleys, railroad ties, and coffins. As the mining boom in the Illinois Valley passed (essentially by 1884), the logging and lumbering activity decreased. The lack of rail connections and adequate roads restricted lumbering activity until the 1920s.

Grants Pass became the site of the most sustained lumber production in Josephine County. The city's population provided a regular labor force for the mills. The construction of the Oregon and California Railroad, later becoming the Southern Pacific Railroad, provided rail transport of milling equipment and lumber and logs to and from Josephine County.

In the 1920s several lumber mills were constructed in Kerby. The lumber mills there were used to supply the town of Kerby, which at that time had a large general store, two hotels, a post office with daily mail delivery, a school, and at least one church. Cave Junction did not exist at that time. Lumber excess to the needs of the community was taken to the rail terminus at Waters Creek for delivery elsewhere.

Over the next several decades logging in the area fluctuated with the establishment of several mills and logging companies in the Illinois Valley. Logging activity on privately owned lands in the watershed intensified after World War II. Logging activity on the public lands on the east side of the watershed intensified during the late 1960s and 1970s.

In recent years, market fluctuations and lack of availability of federal lumber resulted in several of the mills and logging companies merging or going out of business. Today, there are no major lumber mills in the Kerby Watershed. The only major mill in the Illinois Valley presently is Rough and Ready Lumber Company, located south of Cave Junction.

Like many communities, those within the Kerby Watershed have a dispersion of homeowners, whether retired or still in the work force, who choose to live in the uplands isolated from the main flow of human activity. The majority of the population in the watershed inhabits the area within one mile of the Redwood Highway. Much of the private land is not available for home development, either because of little road access or land use zoning oriented to agriculture and forestry. Because of these limiting factors, the population of the Kerby Watershed has remained relatively constant and increased less than one percent over the last twenty years. Land uses are

highly variable throughout the watershed, because of the diversity of landowners. The different management policies of each landowner can create challenges in coordinating activities on adjacent lands. State land planning and restrictions have a profound influence on where most private land use activities can take place.

Some segments of the public place importance on having permanent access to public and private lands, whether it be via roads or trails. Without an adequate transportation system, outside activities for recreation and the transportation of goods and services would be greatly reduced. Within the Kerby Watershed, a network of BLM and county roads presently provide excellent access to most BLM lands.

The Redwood Highway passes through the entire watershed and is the main travel route linking Interstate 5 and the Rogue Valley with the coast. The Reeves Creek road is a major access road within the watershed. It provides for limited home site development, but does provide a direct link to Lake Selmac, a well known recreation area.

Values equate to what is important to humans and generally change over time. In any population center there are numerous opinions of what values should take priority over others. Established residents may have different values than newer residents. This merging and changing of values is a primary social process that can have a profound effect on natural resources management policy.

IV. PAST AND EXISTING ECOLOGICAL CONDITIONS

To gather the information necessary to describe the past and existing ecological conditions in the watershed, categories of resource information called data elements were established. Minimum standards and definitions were defined for each data element category. The existing information assembled for the data elements is what provided the core information needed to describe the existing ecological conditions in the Kerby Watershed.

Data element categories include: air, fire, fish, grazing, human dimension, lands, minerals, recreation, roads, soils and geology, vegetation, water, and wildlife. Existing conditions will be described for each data element category. Past conditions are included in the descriptions when the information exists.

AIR

The Clean Air Act, as amended, directs the State of Oregon to meet or exceed national ambient air quality standards. The Oregon Smoke Management Plan (OSMP), a part of the required State Implementation Plan (SIP) of the Clean Air Act, identifies strategies for minimizing the impacts of smoke from prescribed burning on the densely populated, designated nonattainment, and smoke sensitive areas within western Oregon. A visibility improvement plan is also part of the implementation plan. It considers the impacts smoke from prescribed fire may have on visibility within class I areas of designated wilderness areas and Crater Lake National Park. Particulate matter with a nominal size of 10 microns or less (PM 10) is the specific pollutant addressed in the state implementation plans.

The Kerby Watershed is all within class II smoke management lands. This classification allows Oregon Department of Forestry to regulate federal and industrial prescribed burning. The objectives of the plan which influence the Kerby Watershed are general regional air quality. In practice this allows for burning to occur whenever conditions allow for smoke to disperse. The amount of burning permitted is based on suitable dispersion conditions.

The goal of the Oregon Smoke Management Plan is to reduce particulate matter emissions from prescribed burning by 50 percent by the year 2000 for all of western Oregon. Data in 1991 indicates particulate emissions have been reduced approximately 42 percent since the baseline period was established (ODF 1991). Future prescribed fire use is dependent on harvest activity and use of underburning of natural fuels. Underburning emissions would average between 5 and 10 tons per acre and 16 to 27 tons per acre from broadcast burning of slash fuels. This is significantly below the baseline amounts of 39 to 51 tons per acre used in the OSMP. It is expected that this reduction will continue and prescribed fire smoke emissions will not be a consideration in meeting air quality standards for PM 10 in western Oregon (RMP 1992).

Smoke dispersion factors are reviewed prior to initiating a prescribed burn on a site specific bases. The quality of dispersion is dependent on weather and fuel conditions. BLM uses on-site measured fuel conditions, smoke transportation, the atmospheric stability forecast issued by

Salem National Oceanic and Atmospheric Administration (NOAA), and local weather forecasts from NOAA in Medford to determine if dispersion will be adequate.

Air quality concerns from smoke in the Kerby Watershed center on impacts to local population areas. Prescribed burning smoke was not identified as an issue for the Kerby Watershed, however, it is understood that concerns by individuals living within and adjacent to the watershed do exist. Identification of individuals who are concerned about prescribed burning due to health concerns from smoke emissions is a data gap.

FIRE

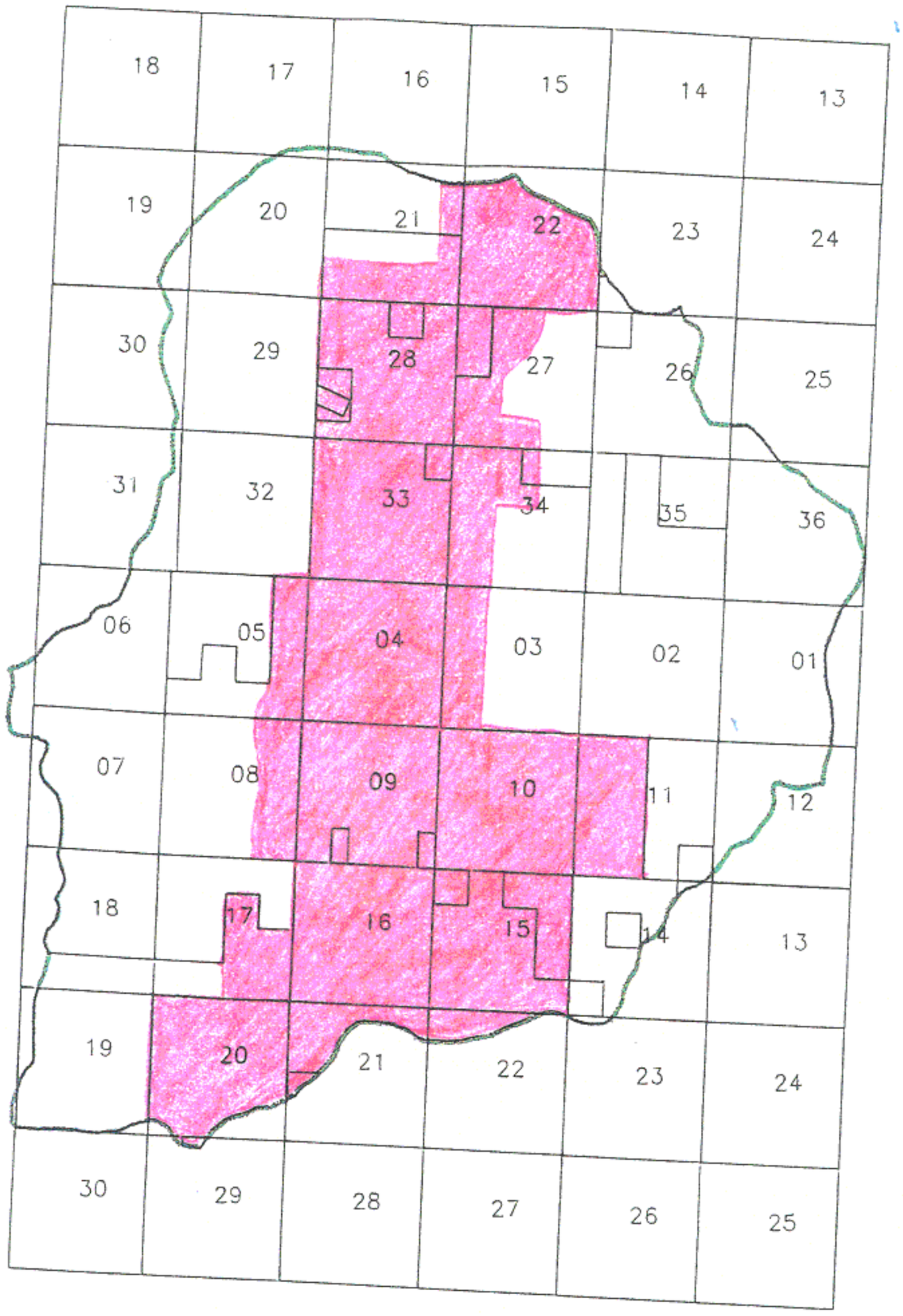
The watershed has had 154 fires within the boundary from 1967 to 1993. The majority of the fires have occurred in the more densely populated areas of the watershed. Lightning has caused 15 of those fires the remainder are human caused. Human cause is the highest risk for fire starts. Fires were kept at small sizes between 1967 - 1994, with only two fires over 10 acres.

Lightning occurrence data exists for the previous 8 years, 1985 to 1993. There have been 57 lightning strikes within the watershed boundary and 40 others within a mile of the boundary. Location is nearly uniform, except for the valley floor areas which experience less occurrence.

The fire occurrence pattern for the watershed from human cause would generally be a fire starting on private lands at low elevations and burning onto BLM lands. Lightning fire starts are possible at any location throughout the watershed but would most likely occur on the slopes rather then the valley floors. Large fire potential exists throughout the watershed due to the buildup of fuels, both live and dead, overstocking of conifers and hardwoods, and the presence of less fire resistant species which have invaded in the absence of fire occurrence.

In July of 1994 two large fires occurred within and adjacent to the Kerby Watershed. The Eight Dollar Mountain fire burned 143 watershed acres. The Mendenhall Complex fire burned over 7,800 acres west of the watershed and included approximately 20 acres within the watershed boundary.

Wildfire Risk: Risk is defined as the chance of various potential ignition sources causing a fire, threatening valuable resources, property, and life. Sources of ignition are humans and lightning. In general, human risk is high in the populated areas and lightning risk is relatively moderate for the entire watershed as compared to other watersheds in the Medford District.



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MAP FR3–2, HIGH WILDFIRE RISK AREAS

Table 1. Risk Classification				
Ownership	**High Risk**	**Moderate Risk**	**Low Risk**	**Total Acres**
BLM acres	1,058	5,227	0	6,285
Percent	17%	83%	0%	100%
Forest Service acres	0	1,850	0	1,850
Percent	0%	100%	0%	100%
Private acres	6,734	3,901	0	10,635
Percent	63%	37%	0%	100%
Total acres	7,792	10,978	0	18,770
Percent	41.5%	58.5%	0%	100%

Current assessment has 41.5 percent of the total watershed acreage classified as high risk areas. The remainder of the watershed is considered a moderate risk area. No portions of the watershed were classified in a low risk category due to high level of human presence and lightning activity.

The current condition is at a higher level of risk than in the past. This is a result of greater human population and use within the watershed from the beginning of the century to the present. While population has remained static for the past twenty years, road access and the resulting human use has increased the risk level.

Values at Risk: Values at risk is a fire management concept which places a relative value on a resource within a watershed. A value rating is assigned based on the potential impacts from the affects of a wildfire, such as the loss or degradation of the resource.

In the Kerby Watershed four categories of resources were identified as high values at risk:

1. Special Areas and Recreational Areas: Eight Dollar Mountain, Eight Dollar Botanical Area, Woodcock Bog, Lime Rock Cave, Illinois Valley State Park, and some potential future recreation sites along the Illinois River have been identified.

2. Young with significant investments: Stands with Vegetation Condition Class 4 and 5 (Age 0-5 and seedlings/saplings 0-5" dbh). This is due to high susceptibility for a wildfire to result in stand replacement and the monetary investments previously made in these stands. Data currently available (June 1994) is for BLM lands only.

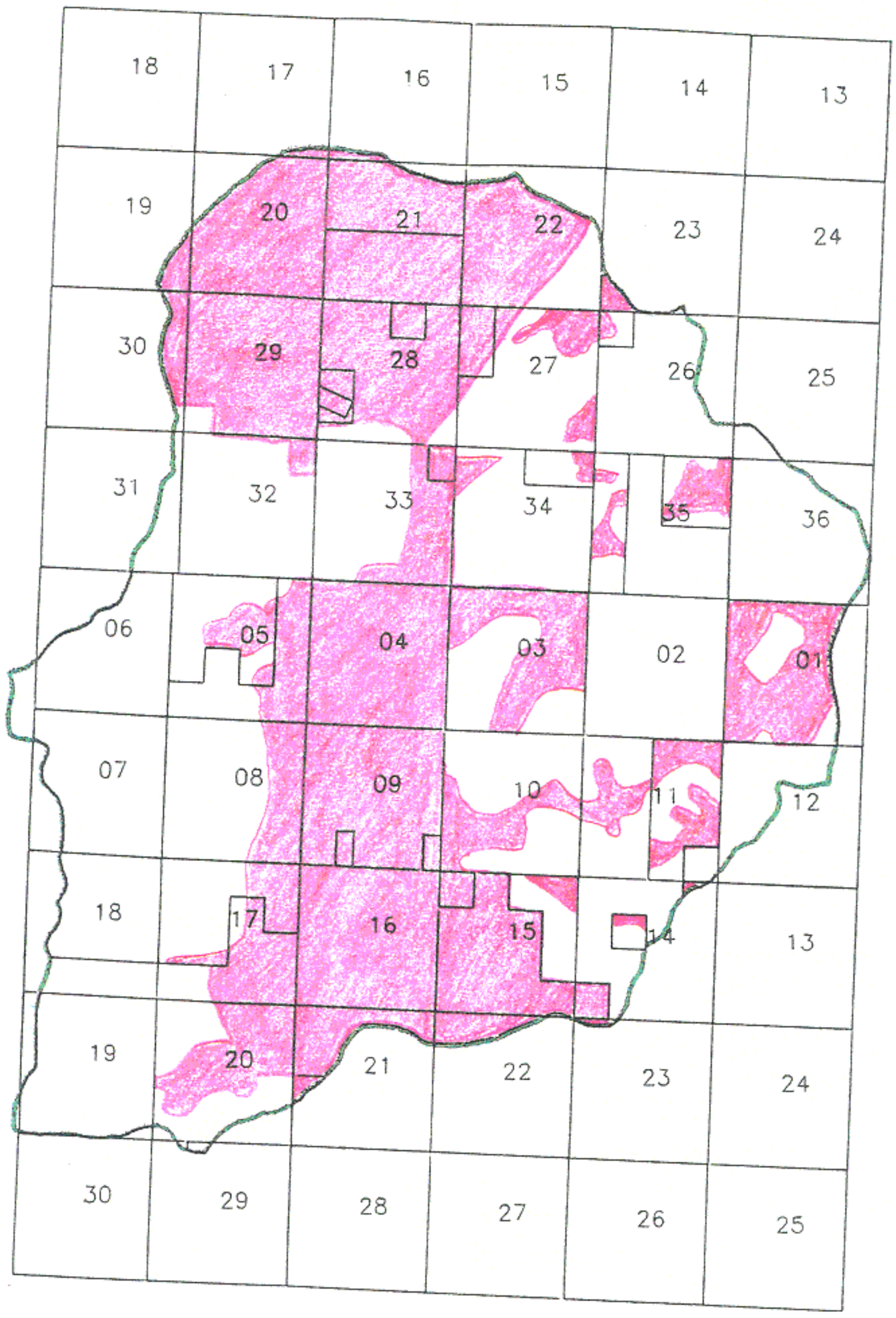
3. Wildlife areas - mature timber: Vegetation stands with Vegetation Condition Class 7 and 8 (Trees 11-21"dbh and Mature timber 21" dbh+) and with McKelvey Ratings of 1 and 2. This is due to value of mature timber as habitat. Data currently available (June 1994) is for BLM lands

only.

4. Residential areas: Areas of homes and other structures were identified from aerial photos and were considered a high value at risk due to potential loss of homes, buildings, and life from wildfire. This is for all privately owned lands.

A total of 7,613 acres were identified as a high value at risk. This represents 40.5 percent of the total watershed acreage of 18,770. Assignment of moderate and low value will be considered after further analysis.

The value at risk is a human assigned rating based on the current social and cultural values of society. The value society places on a particular resource, or those we choose to place high value on, can change as societal values change. Therefore, past values at risk are difficult to categorize and of little use in determining future desired conditions.



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MAP FR3–3, HIGH VALUE AT RISK AREAS

Table 2.	High Values at Risk				
Ownership	**Special Areas**	**Residential Areas**	**Young Timber**	**Mature Timber**	**Total Acres**
BLM acres	745	0	492	866	2,103
Percent	33%		100%	100%	
Forest Service acres	650	0	?	0	650
Percent	29%				
Private acres	840	4,020	?	?	4,860
Percent	38%	100%			
Total acres	2,235	4,020	492	866	7,613
Percent	29%	53%	7%	11%	100%
Total acres					18,770
Percent total watershed	11.9%	21.4%	2.6%	4.6%	100%

Wildfire and Fuel Hazard: Fire has been the primary disturbance agent which has maintained vegetative communities in healthy, stable, and resilient conditions in the Kerby Watershed. These vegetative communities were in balance with the climatic and physical conditions of the watershed. The removal of frequent low intensity fire has changed the vegetation composition and the fuel profile across the entire watershed. Forest communities are now less stable because of changes in composition, fuel loading, and densities. Forest health in the future could be impacted in the watershed because of these changes.

Species composition changes and increase in stocking densities create conditions which encourage high intensity stand replacement wildfire due to increases in ladder fuels, dense closely spaced crowns, and presence of greater amounts of less fire tolerant species.

Higher densities lead to increased mortality in stands because of competition for nutrients and water. Drought conditions amplify this effect and jeopardize the entire stand. The mortality created increased dead and down fuel loading and snags can create difficult fire control problems.

Dead and down fuel loadings increase without the frequent removal from the low intensity fires. This creates higher fuel loadings which can burn at higher intensities. This escalates the fire effects. Higher intensity fires create greater mortality in the overstory. They are much more damaging to soils, drastically lowering nutrient levels and heating soils enough to repel water, causing significant watershed and water quality impacts and hindering tree regeneration.

Vegetation changes have enriched habitat for defoliating insects. Douglas-fir tussock moth and western spruce budworm outbreaks have become dramatic over vast areas of the west because of the species composition shift to Douglas-fir and true fir as a result of loss of frequent fire which

maintained ponderosa pine dominated seral stage stands.

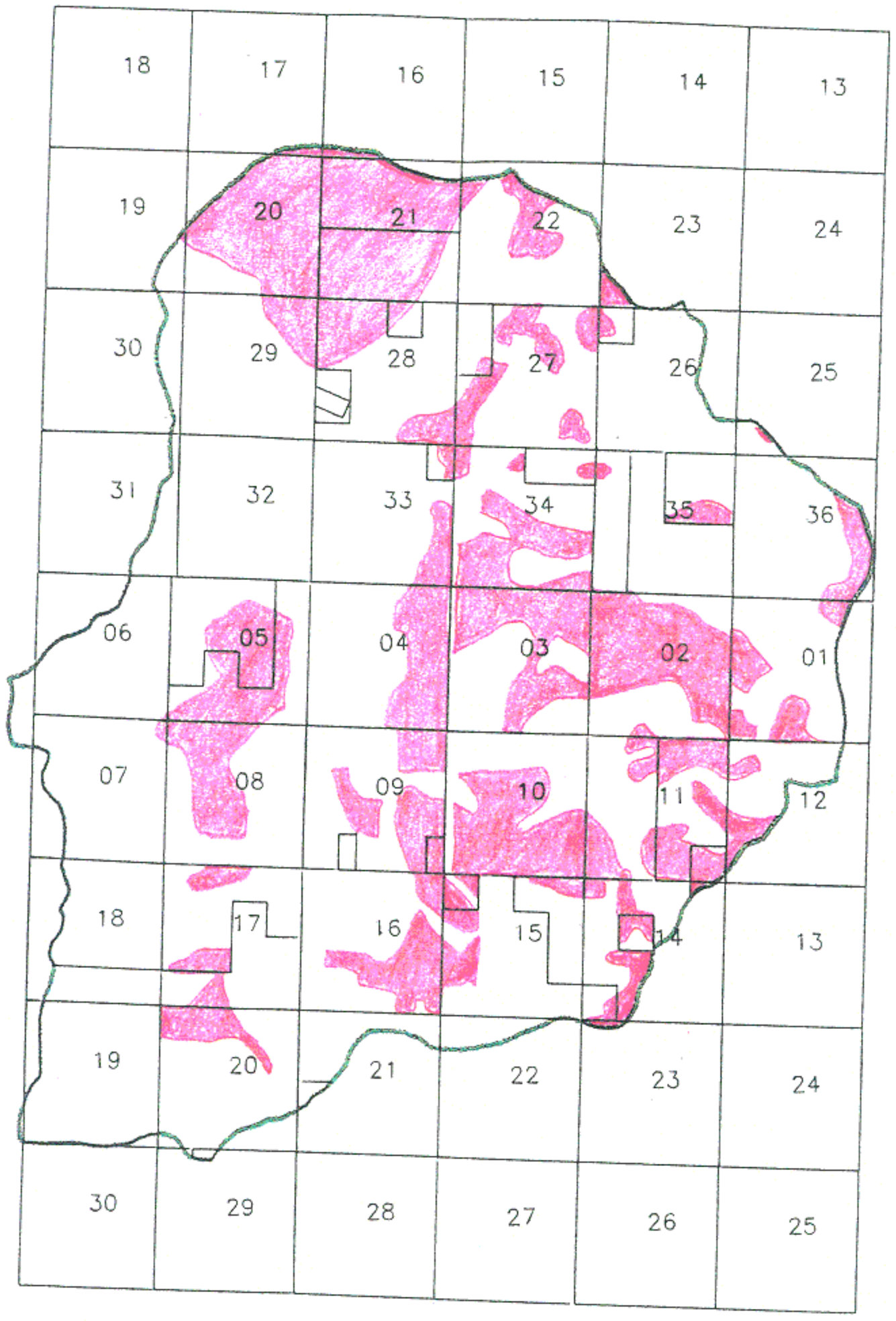
Wildfire will continue to occur in the watershed. The impacts from wildfire will increasingly be more detrimental rather than beneficial. The negative aspects of depriving the watershed of the process which maintained it as a healthy ecosystem will increase.

The role the natural fire process has played can no longer be permitted to continue as a wildfire or unplanned event. Current conditions create wildfire which are potentially more destructive than beneficial to the resource and human values within the watershed. Human presence and values placed on various resources within the watershed preclude the use of wildfire to achieve our management objectives.

Currently 31.4 percent of the watershed has been classified as a high hazard. This amounts to 5,891 acres of the 18,770 acres in the watershed. Private lands account for 2,950 acres, which is 28 percent of the total private acres. Thirty percent of BLM lands, 1,849 acres, are classified as high hazard. The high hazard private and BLM lands are typically adjacent to each other with the rural interface areas and residential zones. This constitutes a significant threat to both public and private lands.

Table 3. Hazard Classification

Ownership	High Hazard	Moderate Hazard	Low Hazard	Total Acres
BLM acres	1,849	1,652	2,784	6,285
Percent	30%	26%	44%	100%
Forest Service acres	1,092	0	758	1,850
Percent	59%	0%	41%	100%
Private acres	2,950	3,300	4,385	10,635
Percent	28%	31%	41%	100%
Total acres	5,891	4,952	7,927	18,770
Percent	31.4%	26.4%	42.2%	100%



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MAP FR3-1, HIGH FUEL HAZARD AREAS

FISH

The Kerby Watershed provides approximately 13 miles of stream habitat for winter steelhead, coho and fall chinook salmon. Resident cutthroat and rainbow occupy about 17 miles (see table 4). Nongame species such as speckled dace, Pacific lamprey, sculpin, Umpqua squawfish, and redside shiner also inhabit streams in the watershed.

Table 4. Miles of Anadromous and Resident Salmonid Habitat in the Kerby Watershed Analysis Unit

Subwatershed	Anadromous	Resident
Illinois River	7.9	7.9
Free and Easy Creek	-	1.8*
Reeves Creek	2.9	4.8
Holton Creek	1.8	2.7

* Access to the watershed is remote; mileage is an estimate. It is doubtful that fall chinook or coho salmon were historically capable of migrating past the Illinois River Falls (T.37 S.,R.9 W., Sec. 33, SW1/4), 8.5 miles downstream of the watershed boundary. However, during peak flows, which normally occur from December through February, passage of steelhead over the falls was historically possible. During high flow conditions, it is estimated that as many as 70 percent of Illinois River adult winter steelhead attempting to pass the falls were successful. The Oregon State Game Commission funded construction of a vertical slot fish ladder around the falls in 1960-61.

Approximately 50 percent of all Rogue basin coho salmon originate in the Illinois River Watershed. The Illinois contributes virtually all of the Rogue's wild coho. No hatchery-reared coho, chinook, steelhead, or resident trout are released in the Illinois River Basin. Illinois River steelhead are the only population in the state that is known to be in compliance with Oregon's Wild Fish Management Policy because of low straying rates of hatchery fish into the river. Efforts to restore wild coho to Rogue River tributaries outside the Illinois basin are totally dependent on maintaining a strong run of Illinois River fish.

The annual sport catch of winter steelhead taken from the Illinois River declined steadily from 3,223 in 1970-71, to 233 in 1990-91, a 94 percent decline in 20 years. However, there is considerable controversy about whether a decline in angler catch rates accurately reflects population status. Although it may not be appropriate to assume a ten-fold decrease, it is probably reasonable to assume that catch data over the 20-year time period reflects a relative trend in population size. Studies on the upper Rogue and Umpqua rivers supports this assumption. There is no data from the Illinois River to support or reject the idea of decreasing angler effort from 1970 to 1991. Resident cutthroat trout have also probably declined drastically

for the same reasons, but the decline is not as well documented. Activities and environmental conditions outside the watershed, such as ocean productivity, sport angling for all anadromous species, commercial harvest of coho and fall chinook salmon, and private and public land management activities also greatly influence the number of adult fish returning to spawn in streams within the watershed.

Refer to Fishery Background Paper for Revising the Hellgate Recreation Area Management Plan for information on life history of anadromous and resident salmonids in the Rogue basin.

Special Status Species: Environmental groups filed a petition with the National Marine Fisheries Service (NMFS) in May 1992 to list Illinois River winter steelhead as threatened or endangered. The petition was denied in May 1993. NMFS concluded that even though Illinois River winter steelhead lack a half-pounder component and, therefore, differ from other Rogue River steelhead, they are similar to most other winter steelhead populations and to all summer steelhead populations outside the northern California and southern Oregon area. This rationale led the NMFS to conclude that Illinois River winter steelhead are not a separate species under the Endangered Species Act (ESA), a prerequisite for listing as threatened or endangered. However, as part of their decision to deny the petition, they concluded that Illinois River steelhead are undoubtedly part of a larger ecologically significant unit (ESU) whose distribution probably extends along the northern California and southern Oregon coast. NMFS has begun to review the status of all coastal steelhead populations in Washington, Oregon, and California. The status review will provide additional evidence as to whether Illinois River steelhead may qualify for threatened or endangered status as part of an ESU. Results will probably be announced sometime during 1996.

Oregon coastal coho salmon were petitioned for listing as threatened or endangered in July and again in October 1993. A decision will probably be made, based on a status review, during fall 1995.

ODFW has classified populations of Illinois River steelhead, coho, and fall chinook salmon as "depressed" compared to historic levels.

The Endangered Species Committee of the American Fisheries Society (AFS) feels Illinois River winter steelhead face a moderate risk of extinction. The potential for extinction of Rogue basin coho (not Illinois River fish specifically) and Illinois fall chinook is high, according to AFS.

Habitat Condition: Juvenile coho and steelhead remain in Illinois River tributaries 1-3 years before emigrating to the ocean as smolts. During this critical time they are susceptible to impacts from land management activities. Resident trout never leave freshwater environments.

Streams in the Kerby Watershed have been degraded in a number of ways. Clearing vegetation from Illinois Valley bottom lands began with early settlement in the mid 1850s. Stream riparian areas were cleared either for farmland or by miners seeking gold. This practice continued into the 1970s. Roads have been constructed in valley bottoms in riparian zones (e.g., Holton and Reeves

creeks) and timber has been harvested to the edge of most streams, removing shade and potential sources of large woody debris. Even fishery streams on public land have received a moderately high degree of protection for only the last decade. Salvage operations commonly removed woody material from streams. Stream cleaning operations were occasionally conducted to prevent perceived fish passage problems. Erosion from tractor skid roads, as well as from poorly constructed and maintained road systems for logging and residential use, have degraded streams throughout the watershed on private and public lands.

Other problems include legal and illegal surface and groundwater withdrawal by residential and agricultural users, unscreened stream and pump diversions, stream channelization, historic and current illegal placer mining, and livestock grazing. Drought conditions for much of the past decade have intensified the problem of balancing human population growth with maintenance of healthy aquatic and riparian habitats.

Low streamflow and elevated water temperatures during summer are inherent to interior southwest Oregon. Natural contributors to these conditions include geology, climate, low elevation, and stream orientation. The current drought and water diversions compound the problem of high water temperatures that has always characterized the mainstem and both forks of the Illinois River in the valley bottom. Cool tributaries with adequate summer flow have always been the cornerstone of coho and steelhead production in the Illinois basin.

Many Illinois River tributaries contained excellent juvenile steelhead populations as late as the 1950s. Of the best remaining habitat in the Illinois River Basin, nearly all is situated in the upper reaches of tributaries; most are on lands administered by the U.S. Forest Service and BLM. It is believed that the major tributaries below the Illinois River falls contribute at least 70 percent of the entire steelhead smolt production of the Illinois River. This is most likely a reversal of the situation prior to the 1880s when low gradient, gravel-rich valley bottom streams in the upper basin were probably the major steelhead producers. Much of what was once prime coho and steelhead habitat in the lower reaches of Holton and Reeves creeks, as well as most other tributaries above the falls, has been severely degraded or permanently lost.

An interagency water temperature monitoring study during 1992 found that mean maximum river temperatures near Kerby from June through September ranged from 72° F to 77° F; mean minimums varied from 65° F to 72° F. The optimum for salmonids is between 50° F and 60° F. Water temperatures that exceed the optimum for salmonids contribute to oxygen depletion, poor growth, lower resistance to disease, as well as competition with and predation by warm water, nongame fish. There is no flow and water temperature data for Reeves, Holton, and Free and Easy creeks. However, it is suspected to be unfavorable for salmonid rearing.

An irrigation ditch on the Q Bar X Ranch has severed Free and Easy Creek's link with the Illinois River and has eliminated perennial flow and quality riparian habitat along the stream's first 1/4 mile.

Gold was discovered on Josephine Creek in 1851 at the northwestern corner of the watershed.

Hydraulic mining in the Illinois River Basin was extensive from 1880 to 1910. Mining activity at locations like Waldo, Sucker, and Althouse creeks (upstream of the watershed) removed riparian vegetation, destabilized entire hillsides and stream channels, and delivered millions of cubic yards of sediment to the Illinois River and tributaries. Hard rock gold mining operations introduced large quantities of cyanide to the Illinois and killed many fish.

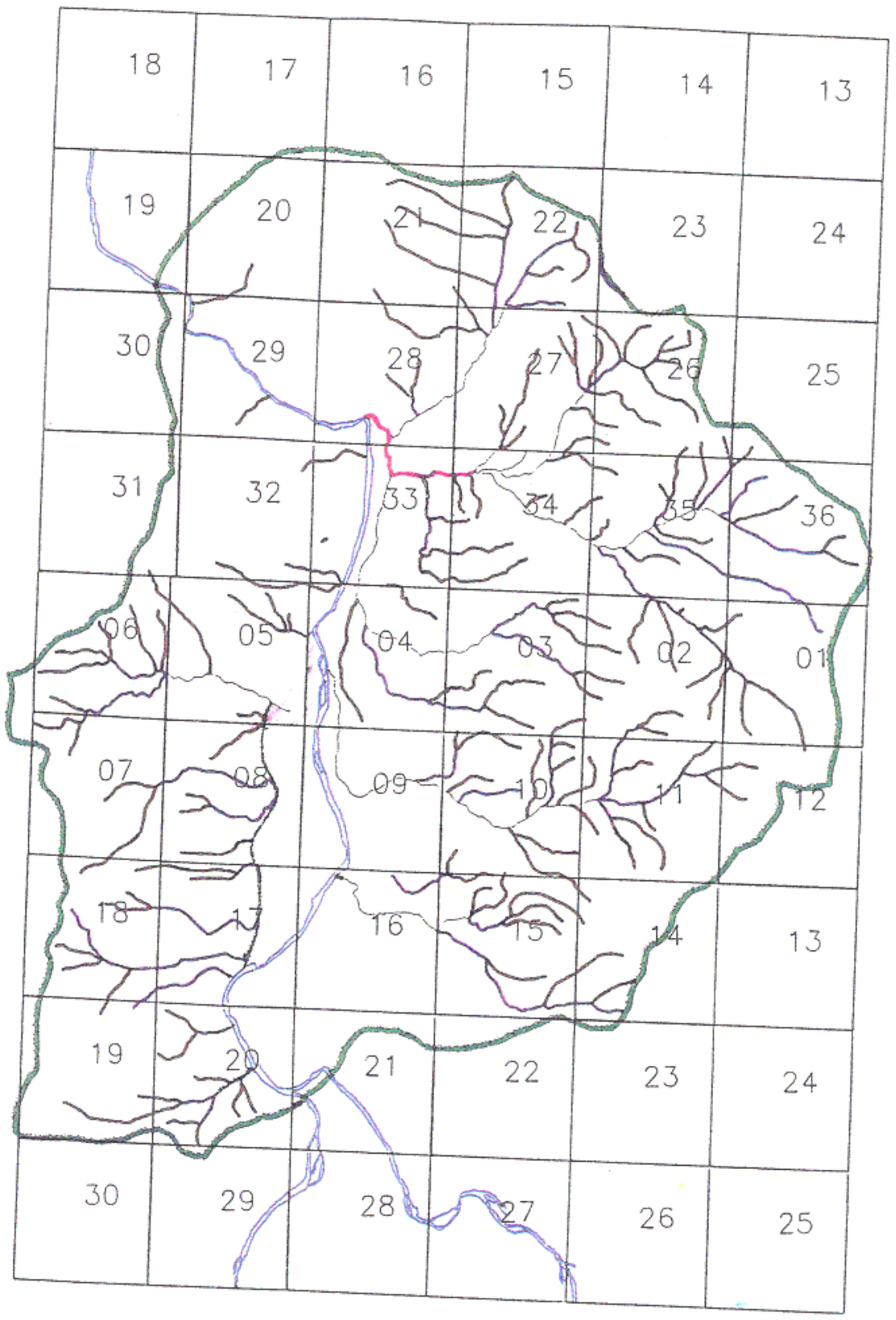
Table 5 describes the general condition of habitat in each fishery stream, along with perceived causes for degraded habitat. Detailed information on the condition of key components of fish habitat (i.e., flow, water temperature, sedimentation, pool depth, and instream cover) have not been collected for any stream in the watershed due to budget constraints. Ratings in table 5 are based on informal field observations.

Table 5. Fish Habitat Condition in the Kerby Watershed

Stream	Condition[1]	Factors Limiting Potential Stream Productivity[2]
Illinois River	P	T, M, A, W, TE
Free and Easy	U	*
Reeves	F/P	T, A, R, W, TE, C
Holton	P	T, M, A, R, W, TE, C

[1] G = Good, P = Poor, F = Fair, U = Unknown

[2]
T = Timber harvest-related (i.e., timber harvest near streams, soil erosion from roads or from tractor logging)
M = Historical or current placer mining
A = Agricultural practices
I = Industrial discharges
R = Road location
W = Water diversion
TE = Temperature
C = Channelization
* access is remote; virtually no information available



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WATERSHED BOUNDARY
ORDER 2
ORDER 3
ORDER 4
ORDER 5
ORDER 6 + 7

STREAM ORDERS

Pomeroy Dam, located on the Illinois River (T.39S., R.8 W., Sec. 20, NE 1/4), about 0.5 miles downstream of the confluence of the East and West Forks diverts approximately 27 cfs (water right: 1898, supplemented in 1953) to the Q Bar X Ranch and numerous smaller land parcels. Diversion during the summer of 1992, a drought year, was approximately 50 percent of the river flow. The concrete dam is not believed to significantly delay upstream migration of adult salmon and steelhead. A series of stop logs in the diversion canal wall (west side of the river) and at mid-river are pulled the first week of November and reinstalled between April and June. Adult fall chinook use the slot in the canal wall. Higher streamflow later in the year allows coho and steelhead to pass over the center section of the dam. A fish screen was installed in the diversion canal in 1946.

The Kerby Ditch, operating under an 1887 water right (supplemented in 1962), diverts 7.4 cfs from the East Fork near its confluence with the West Fork. The ditch runs through Cave Junction and Kerby and terminates near Reeves Creek.

ODFW has screened all known pump and ditch diversions on the mainstem of the Illinois River to prevent loss of juvenile salmonids. Legal and illegal diversions on tributaries have not been completely inventoried.

Expected Trend in Aquatic and Riparian Habitat Condition: Fish spawning and rearing habitats in the Kerby Watershed, as in most of the Illinois River Basin, have been progressively degraded over the last 140 years. A continuing demand from the valley's human population for its natural resources is a reality. Both factors make full recovery of fish stocks in the basin a remote possibility. And many factors, such as ocean survival, are beyond control of the BLM Medford District and the public within the watershed.

The potential trend in aquatic habitat conditions in the watershed will be influenced by three major factors: the rate and magnitude of sediment delivery, the quantity of water that remains in streams for use by aquatic life from May through October, and recovery of riparian vegetation. These factors will dictate the quality and quantity of habitat for fish, as well as for the watershed's amphibian and aquatic macroinvertebtrate communities. Potential recovery of lost or degraded aquatic habitat, especially fish habitat, in the watershed will not only require comprehensive watershed protection and restoration but will need a strong commitment to restoration maintenance and monitoring.

Future land-use activities on public lands should not delay recovery of aquatic and riparian habitats, provided that current objectives of the Aquatic Conservation Strategy are met. However, potential improvements could be limited or negated by activities on other ownerships, since only 44 percent of the acreage within the watershed is public land.

Timber harvest activities near streams on private lands should improve somewhat over what has occurred in the past due to more stringent State Forest Practice Rules. However, standards for riparian protection under state rules will probably remain far below what is required to allow for recovery of degraded aquatic and riparian habitats or to protect them if they are already in

optimum condition. In addition, county zoning laws that regulate disturbance to riparian vegetation on private non-forest lands are largely ineffective. Existing and future roads and tractor skid roads which are on private land, do not have better regulations in place. These roads generally do not receive regular maintenance, nor are many of them designed with adequate drainage or erosion control features. It is expected that erosion from these roads will continue in the future, along with the potential for erosion from new roads.

All streams are over appropriated for water rights. The amount of water diverted from them is expected to increase if drought conditions subside and we return to higher rates of annual precipitation.

To summarize, some stream reaches may improve because of better management of public lands; watershed rehabilitation efforts on private land will also help to heal degraded areas. However, little improvement in riparian protection and road construction standards is expected on private lands over the next decade. Overall, aquatic and riparian habitat conditions in the Kerby Watershed will continue to decline.

Existing and Potential Habitat Improvement Activities: The Illinois Basin Interest Group (IBIG), formed in 1992 in response to potential listing of winter steelhead as threatened or endangered, organized community tree planting projects throughout the basin in 1993, 1994, and 1995. Approximately 90,000 conifers and hardwoods have been planted on private, BLM, and Forest Service lands. Project objectives are to stabilize streambanks, lower water temperature and create better wildlife habitat in riparian areas. About 150 landowners with streams on their properties have contacted IBIG and expressed an interest in having trees planted on their lands. Trees have been planted at 3 locations on Holton and Reeves creeks.

No fisheries habitat improvement projects using instream structures have been initiated within the watershed boundaries. Any future proposals for placement of instream structures would be reviewed by an interdisciplinary team and, if implemented, would be just one component of a watershed restoration plan.

ODFW has been granted instream water rights on Althouse and Sucker creeks, with 1989 priority dates. All water rights prior to that time receive priority for use. However, more water rights can be obtained from abandonment of existing rights, purchases, and donations of other water rights. The resource area may be able to support the state's efforts throughout the Illinois River Basin through our sources of watershed restoration funding. Although only ODFW, Oregon State Parks Division, and the Department of Environmental Quality can apply for instream water rights, the BLM can play a key role in supplying a portion of the labor and equipment for collecting data for this effort.

There are no known barriers to passage of anadromous fish on any ownership in the watershed. Two BLM culverts on upper Reeves Creek that block the upstream movement of cutthroat trout should be replaced.

Except for sites planted through IBIG, specific opportunities for riparian manipulation or planting have not been identified. Opportunities undoubtedly exist and will be tabulated as data from stream and riparian surveys becomes available.

Blocking up BLM ownership in upper Reeves Creek would help improve habitat for resident cutthroat on site and for anadromous fish downstream. BLM manages 33 percent of the watershed, most in the headwaters. Lands lower in the watershed are private forest and agricultural lands.

Current Monitoring Efforts: ODFW, Oregon Department of Water Resources, Siskiyou National Forest, and the Medford District BLM monitored water temperatures throughout the basin at 17 locations in 1992. These agencies conducted an even more intensive survey during the summer of 1993. Results are not yet available but are expected to show serious habitat problems for salmonids at most locations.

GRAZING

There is currently one active grazing lease on BLM lands within the watershed. This grazing lease is operated by Mr. Phol on the Q/X Ranch. This lease is for fifteen acres and authorizes three animal unit months (AUMs) for the fifteen acre parcel.

Historically, there was one other grazing lease located within the watershed. This lease was active from 1961 to 1988 and was operated by Jack Sauer. This lease was canceled in 1988 by the BLM for non-use. The lease covered most of the acreage east of Highway 199 and those acres located on the portion of Eight Dollar Mountain located within the watershed. The lease authorized 95 AUMs.

One other active grazing lease that has the potential to effect lands within the watershed is operated by Chick Iverson of the Deer Creek Ranch. The lease is located on the north side of Deer Creek, north of the Kerby Watershed, and authorizes 77 AUMs. However, cattle occasionally stray onto the Eight Dollar Mountain side of Deer Creek. In normal years, Deer Creek itself could limit the cattle to the north side of the stream, but in drought years Deer Creek may dry up or become very narrow. This could permit the cattle to cross over to the Eight Dollar Mountain side of the stream. Once cattle are on Eight Dollar Mountain, there are no fences to control their movement.

HUMAN DIMENSION

Human dimension is a broad category that relates to the social and human aspects of ecosystem management. Considerations include cultural and historical resources, public involvement, and other social issues affecting the watershed.

A literature search was conducted to determine the location and extent of known cultural sites within the watershed. The search centered around site records available at the BLM office in Medford and included sites that were known and recorded.

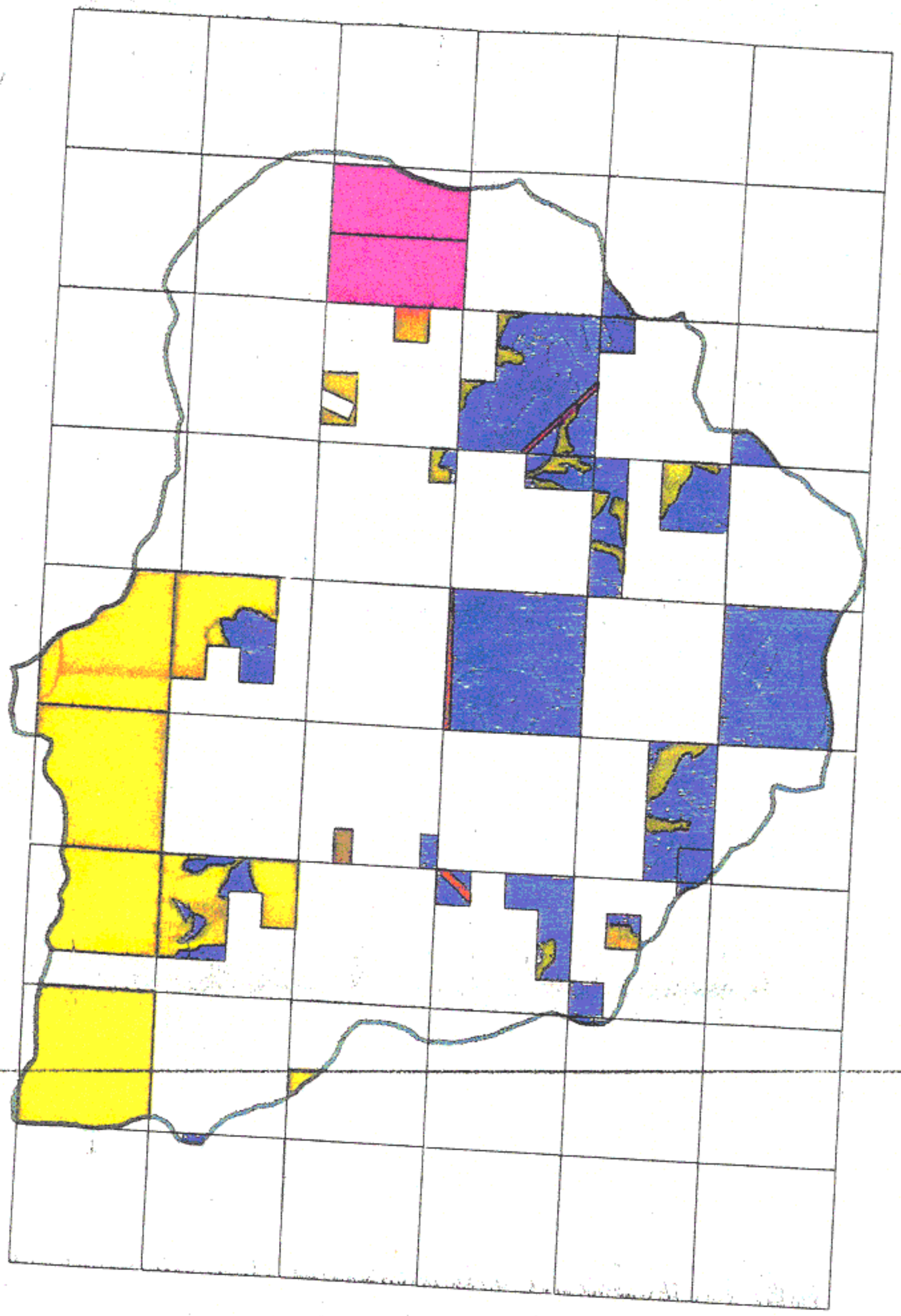
The search did not reveal any known cultural sites within the watershed. Sites are normally recorded when they are found and determined to be significant. Records are kept at the local BLM office, the State of Oregon Historic Preservation Office, and often in local historical records.

Although there are no known cultural sites within the watershed, there is a high probability of sites in the area. This is based on the past history of Native American presence in the area and the fact that the area was a well traveled route between southwest Oregon and California. The area also has a long history of mining, logging, and agricultural use. The watershed needs to be thoroughly inventoried because of the high probability of cultural resources in the area.

Several efforts were made to involve the public in the Kerby Watershed Analysis. A presentation was made at an Illinois Basin Interest Group Forestry Action Committee Meeting in May 1994. The presentation explained the purpose and need for watershed analysis and solicited input on issues and concerns. In September 1994, ninety-three letters were mailed to citizens living in the watershed, other interested citizens, groups, and federal, state, and county agencies to announce a public scoping meeting for the Kerby Watershed Analysis and explain why a watershed analysis was being conducted. A public meeting was held on October 6, 1994, at the Rogue Community College Belt Building in Kerby. The purpose of the meeting was to explain the watershed analysis process, display resource information gathered to date, answer questions, and to gather input on issues, concerns, and local knowledge of the watershed. Twenty-six people attended the meeting. A listing of the public comments received to date is included in the appendix.

LANDS

Of the 18,770 acres contained in the Kerby Watershed, 6,247 acres are managed by the BLM. This acreage comprises 33 percent of the watershed. Of the BLM managed lands, 4,845 acres are revested Oregon & California Railroad (O&C) land grant lands and 1,402 acres are former public domain (PD) lands. Approximately 3,424 acres of the BLM managed lands are classified as unsuitable for commercial forest production and have been withdrawn from the commercial forest land base; 2,823 acres have been classified as suitable as commercial forest lands.



SCALE 1: 90000

GFMA, IN BASE
GFMA, TPCC WITHDRAWN
NONFOREST
MURRELLET RESERVE
WATERSHED BOUNDARY

LAND USE ALLOCATIONS

The rural/urban interface area (RIA) are BLM managed lands that are within one-quarter mile of private lands zoned for one to twenty acre lots. Approximately 2,273 acres of BLM managed lands within the watershed fall within the RIA.

Of the remaining land base in the watershed, 2,083 acres are managed by the U.S. Forest Service, 1,084 acres by Josephine County, 1,887 acres are industrial forest lands, 1,295 acres are owned by private, nonindustrial forest landowners, and the remaining 5,860 acres are other privately owned lands.

There are several land allocations and designations that fall into the special and unique area category:

1. Eight Dollar Mountain ACEC, located in T.38S., R.8W., sections 9, 15, 21, and 28. Of the 1,241 total acres in the ACEC, 609 acres fall within the Kerby Watershed. The emphasis for the ACEC is to manage for the unique botanical values of the area. The ROD also designated this same acreage as a marbled murrelet reserve.

2. A portion of the designated Wild and Scenic Illinois River are located in the watershed in T.38S., R.8W., sections 20, 29, 30, and 32. This is administered by the U.S. Forest Service.

3. The Medford District's Resource Management Plan (RMP), designated 11,800 acres of BLM lands in the Illinois Valley as a Botanical Emphasis Area (BEA). Approximately 3,862 acres of BLM lands in the Kerby Watershed are included in the BEA. Objectives of the BEA are to manage for the habitat needs of the special status plant species present.

Josephine County land use planning has zoned the rural private lands intermingled with BLM administered lands in the watershed as rural residential or farm/forest. Rural residential zones are intended for residential living and the minimum allowable lot size ranges from 1-5 acres. Farm/forest zones are intended to protect commercial farm and forest land and the minimum allowable lot sizes range from 6-20 acres. Single family dwellings are allowed outright in the 1-5 acre zones and with conditions in the 6-20 acre zones. In the Kerby Watershed, approximately 1,142 acres are zoned R0-5 acre size lots, 2,037 acres are zoned R6-20 acre size lots, and 6,242 acres are zoned R20 acre and above size lots.

MINERALS

The existing conditions as a result of past mining vary throughout the watershed. The existing condition determination is based on the visual impacts that occur and on the amount of reclamation that should have been done to the mined area.

Areas of Eight Dollar Mountain were mined and explored for gold and nickel several times in the past. Several exploration cuts and roads crisscross the area, as visible from aerial photos and to the naked eye from Highway 199. Several of these disturbed areas have revegetated, some with native vegetation. However, the scars to the landscape remain. The existing condition of Eight

Dollar Mountain as a result of past mining is considered moderate. Reclamation of the mined areas on the mountain were adequately done to meet federal and state standards at the time the past mining occurred.

Mining in the Illinois River caused some changes in channels and probably some riparian impacts, however, no major visual impacts have been noted and all reclamation has been done to federal and state standards.

The existing condition of all other areas within the watershed that have been mined is good. There may be some specific sites that show visual impacts, but overall these are small. The mined sites in these locations have all been adequately reclaimed.

RECREATION

Recreational opportunities in the Kerby Watershed, both existing and potential, are limited. Most of the lands with the highest recreation potential are along the Illinois River and these are predominantly privately owned.

There are currently no established hiking trails or dispersed recreation sites existing in the watershed. The development of some botanical interpretive trails within the Eight Dollar Mountain ACEC has been discussed. Decisions on establishing these trails would be a part of the coordinated management plan prepared for the Eight Dollar Mountain ACEC.

The Illinois Valley State Park, managed by the State of Oregon, is the only designated recreation site currently existing within the watershed. A portion of the park is located on BLM administered land and is currently under a lease with the state.

Visitor use and user profile data from the State of Oregon for Illinois Valley State Park indicates visitor use in the park during 1993 was 197,648 visitors. The use for 1994 through the month of June was 202,268 visitors. It is estimated that the majority of the users are local residents of the Illinois Valley.

The BLM has identified two areas along the Illinois River as potential recreation sites. An analysis that was completed for all potential recreation sites on the Medford District rated these two sites as low in priority for development. There is presently no plans to develop these sites in the future. The following is a description of the two potential sites:

Westside Illinois Recreation Site - T.39S., R.8W., Section 17. Forty acre BLM parcel. Potential is for day-use area only. An access road would need to be constructed across BLM land. Visitor use is estimated to be less than the Illinois Valley State Park.

Kerby Recreation Site - T.39S., R8W., Section 9. Twenty acre BLM parcel. Recreation potential is for a day-use area only. There is presently no public access to this BLM parcel. Visitor use is estimated to be less than the Illinois Valley State Park.

ROADS

Before settlement of the west, ground disturbance was generally from wildfire, trails, and natural slides. As the west developed, trails became narrow roads used to transport people and supplies. These roads were generally natural surface with the amount of sediment flow dependent upon use, location, and weather conditions. As the use of these roads increased over the years, the roads themselves changed in design. Many of today's highways started out as trails and are now widened, realigned, and surfaced to meet the increase and change in vehicle traffic. Even though there has been a substantial increase in traffic flow, road improvements such as crushed rock surfacing, asphalt, modern techniques in road stabilization, and improved road drainages have actually decreased the amount of erosion and sedimentation compared to the original natural surfaced roads.

Many new roads in the Kerby Watershed have been designed and constructed based on the public's need for access. These roads were built over lands that had little or no original disturbance and range in design from natural to asphalt surfaced.

Road construction and improvement across BLM managed lands was based mainly on timber management needs as directed under federal O&C land management. Many natural roads remained opened for administrative access after timber sales were completed. These natural surfaced roads are now known to be major contributors to sediment flow creating higher turbidity levels in streams. All BLM roads in the Kerby Watershed will be evaluated for present use, future needs, and environmental concerns to determine whether the road should be decommissioned, remain as it exists, or improved.

The Kerby Watershed varies in road density and type of roads within the drainage area. The road density of BLM capitalized roads is 3.4 miles per square mile of BLM lands. This figure is misleading when looking at actual miles of road per square mile over the entire watershed. There are many BLM noncapitalized roads, private roads, and skid trails throughout the watershed that need to be considered. These roads add significantly to the total road density of the watershed and will require further analysis for future reduction. See the road table in the appendix for specific information on BLM capitalized roads in the watershed.

The BLM has no authority over private land use. Many natural road systems are built over private lands and are a major source of erosion and sedimentation into streams. This is a concern in the Kerby Watershed and will require community involvement by private landowners to establish a policy on private land transportation management.

SOILS

The soils in the Kerby watershed are relatively young as compared with soils of the rest of the world. This is the result of the short geologic time period that has passed since the tectonic plates collided with the North American landmass and were uplifted from the ocean.

Consequently, most of the soils in the watershed are less than 40 inches deep and are inherently low in nutrients. The exception to this would be the valley bottom and the toeslopes of the mountains on the east side of the watershed. These soils are deep but only the soils that received artificial fertilizers have an adequate nutrient base. The rest of the soils on the east side of the watershed have been formed from shale, siltstone, and slate parent material and, except for a limited rooting depth and organic matter content, provide an adequate plant medium.

Soils on the west side of the Kerby Watershed were formed from serpentine rocks and, as a result, have a magnesium/calcium imbalance. This nutrient imbalance allows only a narrow range of plants to grow on these soils. Exotic plants are often found on soils with these characteristics. Soils formed form serpentine parent material usually have a high clay and rock content.

Since these soils are in the younger stages of formation, vegetation types and amounts are important factors in their development. Large trees that produce high amounts of needle and leaf litter are important sources of organic matter for nutrient recycling. The fire frequency and intensity has had a major impact on the amount of organic material that covers and protects the soil. Organic matter is also the food for soil microbes that convert plant litter into nutrients. Hot, intense fires consume most of the organic matter that covers the soil and volatilizes the nutrients they hold. Intense fires often sterilizes the soil, drastically reducing the microbial population that converts organic matter into plant nutrients. As stated previously, organic matter content for most soils in the Kerby Watershed is low.

Erosion also plays a major role in the soil building process. Soils that have the vegetation removed are more susceptible to erosion and loss of fertile topsoil. Vegetative litter on the ground protects the soil from being detached by raindrop splash and slows the overland flow of water during rains thus reducing the amounts of soil particles that become suspended. Currently erosion rates on most land managed by the BLM in the Kerby watershed are only slightly higher than natural rates.

KERBY WATERSHED

Soil Association Map Units

#1 - Newberg-Camas-Evans
#4 - Pollard-Abegg
#8 - Josephine-Speaker-Pollard
#9 - Beekman-Vermisa-Colestine
#11 - Pearsoll-DuBakella-Eightlar

VEGETATION

The existing vegetation conditions across the landscape of the Kerby Watershed are highly variable. This is the result of both human and natural influences.

The vegetation on the west side of the watershed is heavily influenced by serpentine geology. Serpentine rock is made of heavy minerals and unusual metals such as chromium and arsenic. When serpentine rocks break down and become part of the soil, their ions can poison plants by substituting for similar ions in enzyme molecules. This can render the enzymes useless and disrupt plant metabolism. These poisons and dry conditions found on serpentine soils prevent most species from growing there. The existing and potential vegetation of the plant communities found on the serpentine sites is very different from the plant communities found on the valley bottom and nonserpentine sites found on the east side of the watershed. This variety of conditions, coupled with a frequent natural disturbance pattern primarily by fire, results in a floristic diversity unparalleled most places in North America.

The vegetative conditions found in the watershed today differ in some ways from the historic conditions. Prior to Euro-American settlement in the mid to late 1800's, natural disturbances, primarily from fire, were common. Additionally, Native Americans were known to have used fire frequently to provide better habitat for some plants and animals. These disturbance patterns resulted in dynamic forest ecosystems that changed constantly over time. Disturbance has played a vital process role in providing for a diversity of vegetative types, structures, and for maintaining sustainable densities over time.

The disturbance patterns changed significantly with the advent of white settlement. Mining, ranching, settlement, fire suppression, timber harvest, and road building replaced wildfire as primary disturbance agents. These actions have not been evenly distributed across the landscape of the Kerby Watershed.

To try and assess vegetative conditions in the watershed at the turn of the century, the 1916 O&C Land Survey Notes were examined. The 1916 O&C Revestment Surveys were done to determine: the economic worth of the land at that time, how much timber volume was present, and how the land should be used. Every 40 acre piece of O&C land was surveyed. Although some of the notes were hard to comprehend, conclusions can be drawn as to what the general landscape looked liked in 1916.

Sugar and ponderosa pine were quite abundant and were the dominant species in 1916. This is very consistent throughout the notes. Douglas-fir is mentioned in several areas as "being a carpet of undergrowth" or of not being a very important species (low wood quality). Sugar and ponderosa pine were large in diameter, commonly in the 32 to 36" dbh range and although dominant as mentioned were still scattered, usually numbering only 3 to 8 trees per acre.

The landscape was in a more open condition in 1916 than at the present time. The notes show

that a typical 40 acre piece in the Kerby Watershed averaged 10 to 15 trees/acre and a "dense" piece, 20 trees/acre. Since this inventory took place during the homestead entry period, high emphasis was placed on potential agricultural endeavors. Because the landscape was so open, the bulk of the land was classified as agricultural. Agricultural land was anything that didn't have enough timber on it to log or would be too expensive to log. The agricultural land classification implied nontimber use and didn't necessarily imply crop farming. If the parcel was too steep for crop farming but could still be used for cattle grazing, it usually was classed as agricultural land. The 1916 O&C Inventory Land Classification map shows the areas that were surveyed and their classification. The 1916 Seral Stage map gives an indication of what the 1916 vegetation condition was.

Aerial photographs of the watershed in 1953 show that most of the private lands had just recently been logged. This occurred in the late 1940s and early 1950s, just after World War II. This is supported by the fact that the predominance of the private lands are presently pole and large pole sized stands in the forty to fifty year age class.

Existing vegetation conditions were described and mapped for features such as major plant series, existing condition class with respect to size, structure, and stand intactness (previous harvest history), the Diaz and Apostol approach to describing the ecological function of the vegetation as either matrix, corridor, or patch, and the conditions for special status plant species and their habitats.

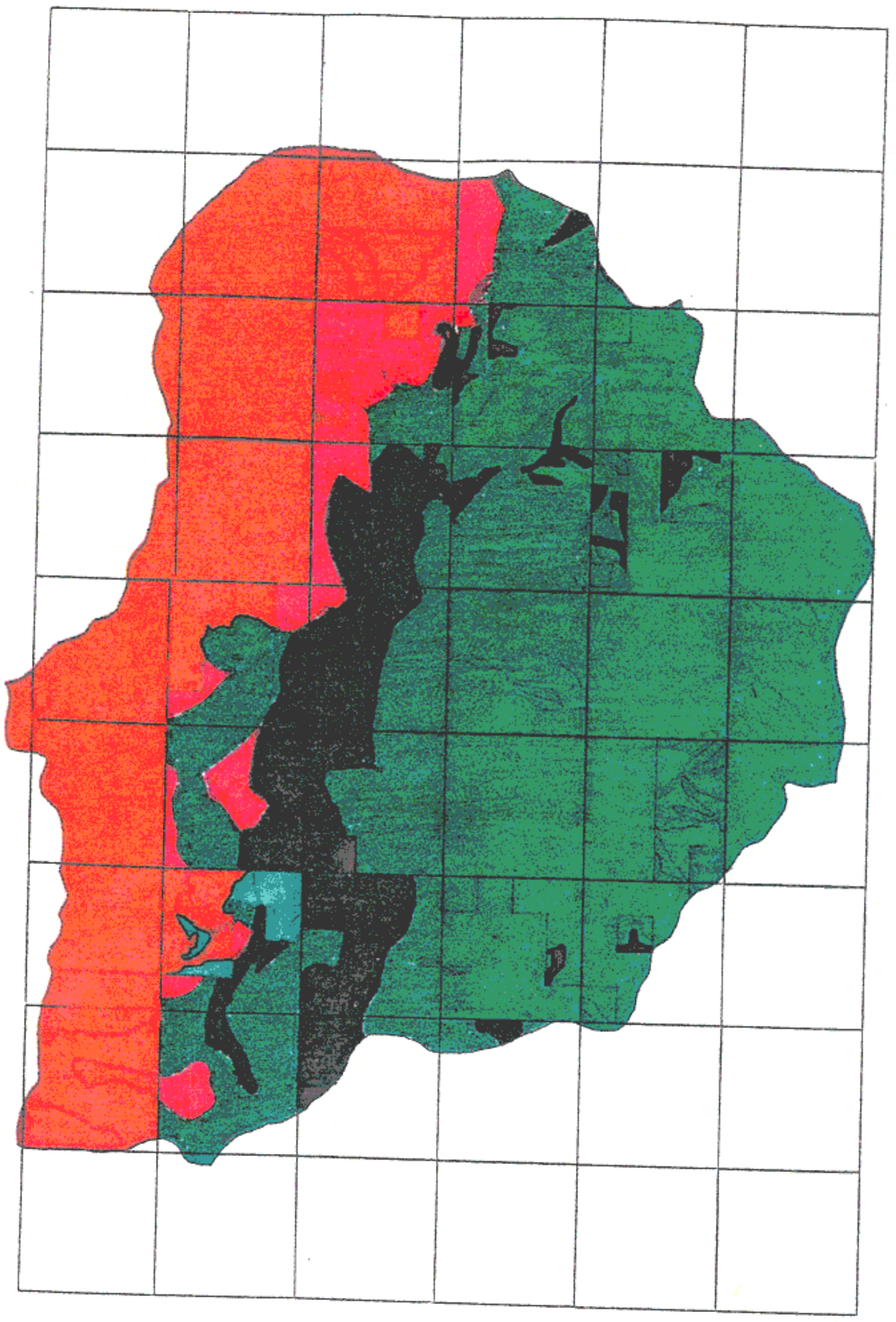
Major Plant Series: Major plant series is an aggregation of plant associations with the same climax species dominants. It defines the potential natural vegetation that would exist on the site at the climax stage of plant succession, or the end point of succession. The Douglas-fir series, for example, consists of plant associations in which Douglas-fir is the climax dominant species. Major plant series also tells us something about site productivity and site potential. In the Kerby Watershed, 53 percent of the land is classified as belonging in the Douglas-fir plant series. Douglas-fir is the dominant tree species with varying amounts of sugar pine, incense cedar, and ponderosa pine. The dominant hardwood species are California black oak and Pacific madrone. Big leaf maple and red alder exist in many of the wetter draws. Common shrub species include poison oak, California hazel, and oceanspray. Ground cover includes moss, hairy honeysuckle, dwarf Oregongrape, poison oak, and grass.

Thirty-five percent of the watershed is classified as being in the Jeffrey pine plant series. The Jeffrey pine series is generally on the west side of the Illinois River where the serpentine soils dominate. Jeffrey pine and incense cedar are the dominant tree species but depending on the serpentine influence, sugar pine and Douglas-fir are present also. Port-Orford-cedar is quite common in the riparian areas of this series. There is a rich mixture of ground and shrub species, including many special status plants that are endemic to these sites. Huckleberry oak, coffeeberry, azalea, and myrtle are the most common shrub species. The remaining portion (approximately 12%) of the watershed is in the white oak plant series. This includes much of the valley bottom lands that have been converted to irrigated agricultural farmland. Oregon white oak and ponderosa pine are the major tree species. Poison oak and grasses are the major ground

cover species.

Existing Vegetation Condition Classes: Existing vegetation condition is grouped into eight classes. The size ranges for classes five through eight were limited by how the existing data is stored in the BLM's Micro*STORMS land database.

Class	Description
1	Grass, forbs, herbaceous vegetation
2	Shrubs, nonforest land, usually natural shrub fields
3	Hardwood/woodland, includes nonforest and low site lands, could include commercial lands dominated with hardwoods
4	Early, 0 - 5 years stand age
5	Seedlings/saplings, 0 - 4.9" dbh
6	Poles, 5 - 11" dbh
7	Mid, 11 - 21" dbh
8	Mature/old-growth, 21" + dbh



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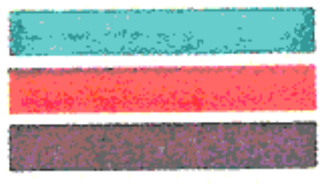
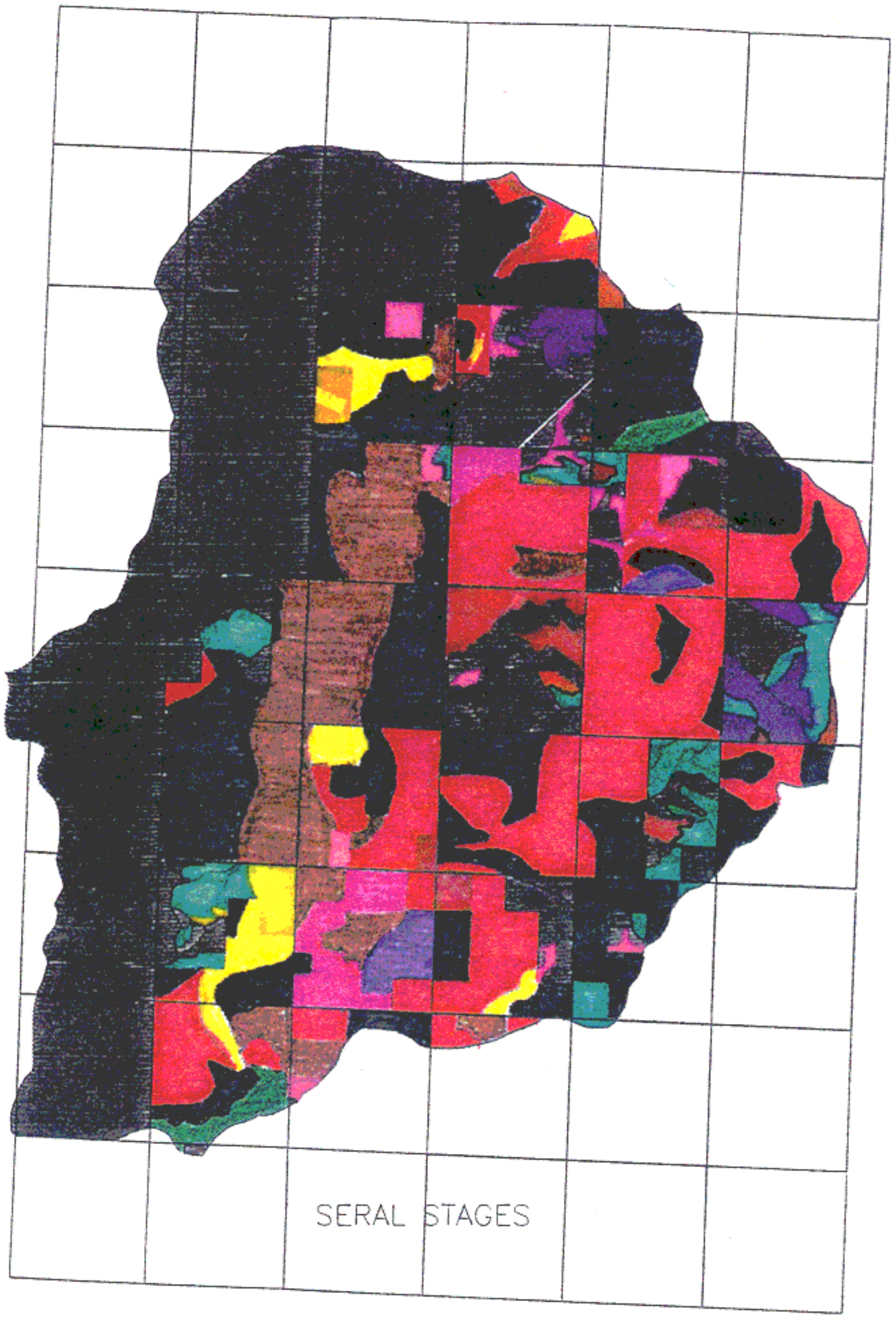
NONFOREST
D.FIR
J.PINE
W.OAK



PLANT SERIES



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NONVEGETATED
GRASS/FORBS
SHRUBS
HARDWOOD/WOODLAND
EARLY
SEEDLING/SAPLING
POLES
MID
MATURE

For all land ownerships in the Kerby Watershed, the current condition by size class is shown in table 6.

Table 6. Existing Condition Classes - Kerby Watershed

Grass/ Forbs	Shrubs	Hardwood/ Woodland	Early	Seeding/ Sapling	Poles	Mid	Mature
1,663 ac.	670 ac.	646 ac.	70 ac.	514 ac.	3,666 ac.	10,668 ac.	931 ac.
9%	4%	3%	<1%	3%	19%	56%	5%

The above condition classes in themselves do not describe the structural characteristics of the vegetation and its degree of intactness (open vs. closed canopy, partial cut previously, never entered, etc.). Lumping the stands into one diameter range will often not permit us to assess the functional characteristics of the class for vegetative and habitat assessments. Natural stands in the Klamath Province are rarely single size class, single storied forests. They are generally multi-aged, multi-storied stands that contain trees with a variety of different sizes. As an example, a class 7 in a Douglas-fir plant series on the east side of the watershed could be much different than a class 7 in a Jeffrey pine series on the west side of the watershed. This is because the Jeffrey pine stand will naturally have a much more open canopy (as seen on the serpentine hill sides). For these reasons, two other qualitative descriptors have been added which can provide additional information for the condition classes. These are the McKelvey Rating and whether the stand is intact or not.

The McKelvey rating classes come from the McKelvey model - a model developed to predict spotted owl populations based on habitat availability for given time periods. McKelvey classes rate a stand for how functional the unit is for spotted owl habitat. It takes into account factors such as degree of canopy layering, canopy closure, size of trees and species composition. McKelvey rating classes range from one to six, with class one being the best (meets all life requirements for spotted owls). A complete definition of the McKelvey Rating Classes can be found in the appendix.

Table 7. McKelvey Habitat Rating Class

Class One	Class Two	Class Three	Class Four	Class Five	Class Six
37 acres	886 acres	6,641 acres	9,048 acres	2,313 acres	0 acres
< 1%	5%	36%	48%	12%	0%

Similarly, whether the stand has had previous timber harvest activity gives an indication of whether the stand has been modified through previous management activities. Intact,

unharvested stands of a given condition class may function differently than partial cut stands of the same condition class. An intact rating is given if less than 30 percent of the acreage of a stand has had any previous harvest activity (including mortality salvage). In the Kerby Watershed, 32 percent of the land base is considered intact. The number exceeds 60 percent when looking at federal lands only. The largest block of intact acres are located on the west side of the watershed in the serpentine areas.

The effects on the existing vegetation conditions found in the watershed today from suppressing fire this century and replacing the natural disturbance pattern with human disturbances such as logging, farming and settlement, generate two areas of concern:

1. Fire suppression has resulted in many of the forests in the watershed reaching very high densities that are not sustainable over time.

2. The past harvesting patterns on the east side of the watershed, particularly on the private lands, have resulted in a predominance of the forests in the watershed to presently exist in one to two age and size classes.

The vegetative and structural conditions of the forests in the watershed have seldom been constant and have changed frequently with the historic disturbance patterns. Disturbance has played a vital process role in providing for a diversity of vegetation and structures and for managing vegetation density over time. The presence of fire, insects, disease, periods of drought, and resultant tree mortality have always been components of these ecosystem processes but have occurred within a range of natural conditions. Maintaining vegetative diversity and densities that are sustainable over time are important terrestrial and riparian ecosystem processes that have been impacted by the shift from frequent, low intensity wildfire to settlement related disturbances and fire suppression. When forest density, species composition, structure (variety of tree sizes, presence of snags and large down logs, etc.), populations of insects, presence of disease, incidence of catastrophic wildfire, and tree mortality occur outside the range of natural conditions, some component of the ecosystem processes has been impacted. This is the current trend for many of the forests in the Kerby Watershed.

The previous timber harvest patterns on the east side of the watershed have tended to simplify forest structures and alter the natural mix of seral and age class distributions. A high percentage of the Douglas-fir series forests on the east side of the watershed are presently pole and large pole size stands (condition classes 6 and 7). The Jeffrey pine series forests on the west side of the watershed have had little harvesting impact due to their low productivity.

When forests remain at unsustainable densities for too long, a number of trends begin to occur that effect forest 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.

Forests of the Klamath Mountain Province are known for their rich species diversity. This

diversity is not only an important habitat quality for plants and animals, diverse forests are much better able to withstand environmental stresses such as drought and insect and disease attacks. Species such as ponderosa and sugar pine, California black oak, and Pacific madrone have historically been important components of the forests of the Kerby Watershed. These are considered mid-seral species and to flourish require the less dense, more open canopy conditions that existed in the forests of the watershed prior to fire suppression. As stand densities increase beyond the range of natural conditions, these species drop out and the forests become dominated by late seral climax dominants such as Douglas-fir at lower elevations and true fir at higher elevations. Forests composed of climax dominant species, as is the trend in the watershed, are more unstable and become increasingly vulnerable to environmental stresses.

Relative density is a measure of the density of a forest that compares the current density with the biological maximum density. It is expressed in percent. The threshold of concern for relative density is 60 percent. When relative densities exceed 60 percent, tree mortality begins to occur from competition. A significant portion of the forests on the east side of the watershed are presently at densities significantly greater than 60 percent.

Percent live crown ratio and radial growth are physiological indicators of trees' abilities to produce food and defensive compounds. Healthy live crowns are essential for healthy trees. The threshold of concern for live crown ratio is 40 percent. When the average live crown ratios of forests drop much below 40 percent, the canopy's ability to support vital processes in the tree becomes diminished. Live crown ratios begin to recede as forests remain in an over-dense condition for too long. When live crown ratios are reduced too far, trees are unable to respond to the release provided by density management thinnings and partial cutting management prescriptions may no longer be a forest management option. The trend for average live crown ratios in the forests of the watershed is below 40 percent. Similarly, radial growth rate is an indicator of whether trees have sufficient resources to support vital physiological processes. Low production of stem wood per unit of foliage has been associated with a trees inability to accumulate reserves or to produce defensive compounds. Stem growth only occurs once the resource demands of foliage and root growth have been accommodated. When trees are not able to produce sufficient photosynthate and defensive compounds, they become increasingly vulnerable to insect and disease attacks.

Periods of extended drought are not particularly harmful to trees if densities are maintained within the range of historic natural conditions and trees are able to have well developed root systems and canopies that capture sufficient sunlight so they can photosynthesize when conditions are suitable. The accelerated mortality occurring in the forests of southwestern Oregon during the recent drought period is a result of the over-dense conditions in the forests. Insect activity and population levels in the forests of southwestern Oregon, including the Grants Pass Resource Area, have shown a marked increase since 1989. Overstocking is probably the most predisposing factor to vulnerability to bark beetle attacks on most sites in the Kerby Watershed.

Forest inventory data has been collected in several areas of the Kerby Watershed for recent timber sale project analysis. The data shown in table 8 reflects the very dense stand conditions.

Table 8. Existing Forest Density Conditions From Forest Inventory Data Collected in the Kerby Watershed

Location	Stand	Relative Density	Basal Area	Total Trees Per Acre	Average Live Crown Ratio
T. 38 S., R. 8 W., Sec. 35	CT-I	89%	229	765	23%
	CT-D	79%	162	1,717	31%
	CT-F	100%	348	1,142	25%
	CT-G	78%	212	534	30%
T. 39 S., R. 8 W., Sec. 3	3-2	100%	300	1,665	26%
	3-1	94%	217	1,269	30%
T. 39 S., R. 8 W., Sec. 5	5-2	92%	230	858	29%
T. 39 S., R. 11 W., Sec. 11	11-1	92%	296	309	33%
	11-2	81%	188	1,016	38%
	11-3	95%	257	649	27%
	11-4	68%	188	439	31%
	11-5	78%	186	868	55%
	11-6	85%	208	892	34%
	11-7	93%	281	421	39%
	11-7B	100%	339	563	26%
T. 39 S., R. 8 W., Sec. 14	14-2	77%	221	420	56%
	14-3	96%	246	834	38%
	14-4	86%	216	793	39%
T. 39 S., R. 8 W., Sec. 17	17-2	73%	161	1,157	42%
	17-4	92%	207	1,348	39%

Matrix, Corridor, or Patch: The concept of identifying landscape elements as matrix, corridor or patch comes from the Diaz and Apostol Forest Landscape Analysis and Design handbook. They help define how general vegetation patterns function at the landscape level.

Matrix: This is the most connected portion of the landscape. In the Kerby Watershed, it is the vegetation structural size that is the most contiguous. The matrix landscape element exerts strong control over landscape flows such as wildlife and fire. The pole (5-11" dbh), mid (11-21" dbh), and mature (over 21" dbh) condition classes (classes 6, 7, and 8) comprise the matrix landscape element in the Kerby Watershed. Approximately 80 percent of the lands in the watershed fall in the matrix element.

Patches: These are areas of vegetation that are relatively the same internally and differ from what surrounds them. The patch elements in the watershed are the areas identified as grass/forb, shrub, hardwood/woodland, early stands (under 5 years), and seedling sapling (up to 5" dbh). They can also be rock outcroppings and garbage dumps.

Corridors: These are landscape elements that connect similar patches through a dissimilar matrix or aggregation of patches. Examples include riparian zones, roads, trails, and utility corridors. Corridors are important because they define major migration routes or flows, be it wildlife, people, or other important resources like water. The major riparian zones identified in the Kerby Watershed are Free and Easy Creek, Holton Creek, Reeves Creek, and the Illinois River. Highway 199 is the major highway to the coast that runs north and south through the middle of the watershed. There is also a major utility corridor just east of the highway.

Special Status Plant Species: The Kerby Watershed contains the highest concentration of special status plants in the entire Grants Pass Resource Area (in fact, in the entire state of Oregon). The protection of this diversity is a high priority in the watershed.

Portions of the watershed were systematically surveyed for special status plants in 1994. The remaining portions should be surveyed in 1995. Within the Kerby Watershed, seventeen special status plant species have been found. Table 9 lists these species with their current protection status and their associated habitats. Eleven of the special status plants found are federal candidates and six are bureau assessment species. One species, Lomatium cookii, has been formally proposed for listing under the Federal Endangered Species Act and is already listed endangered by the State of Oregon. Another species, Cypripidium fasciculatum, is not only a federal candidate, but also a SEIS special attention species.

As described in the Medford District Botany 2000 (draft), the objectives for management of special status plants and their habitats are as follows:

1. Listed and Proposed Listed Species - Those species that have been formally listed by the U.S. Fish and Wildlife Service as endangered or threatened or officially proposed for listing. Enhance or maintain critical habitats and increase populations of threatened and endangered plant species on BLM-managed lands to restore species and populations to historic ranges

consistent with approved recovery plans and BLM land use plans, after consultation with federal and state wildlife agencies.

2. Candidate and Bureau Sensitive Species - Federal or state candidates and those species considered by the BLM to be of concern in becoming federal candidates. Manage the habitat to conserve and maintain populations of candidate and bureau sensitive plant species at a level that will avoid endangering species and the need to list any species as endangered or threatened by either a state or federal government.

3. State-Listed Species and Their Habitats - Those plants listed under the Oregon Endangered Species Act. Conservation will be designed to assist the state in achieving their management objectives.

4. Bureau Assessment Species - 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. Manage where possible so as not to elevate their status to any higher level of concern.

5. SEIS Special Attention Species - Both nonvascular and vascular plant species identified as needing special management attention by the SEIS ROD (table C-3), also called survey and manage species. Vascular plants must be managed at known sites and located prior to ground-disturbing activities. Nonvascular plants must also be inventoried extensively.

6. Special Status Species Habitat - Maintain or restore community structure, species composition, and ecological processes of special status plant habitats.

Table 9. Special Status Plants - Kerby Watershed		
Species Name	**Species Status**	**Habitat**
Lomatium cookii	FC1/SE	vernal/patterned ground, moist meadow areas
Cypripidium fasiculatum	FC2/SA	moist to dry mixed evergreen with filtered sun
Hastingsia bracteosa	FC1	springs, meadows, serpentine bogs
Calochortus howellii	FC1	dry, rocky serpentine
Gentiana setigera	FC2	meadows, bogs on serpentine
Microseris howellii	FC2	dry, rocky serpentine
Perideridia erythrorhiza	FC2	wet valleys, pastures, meadows, ditches
Senecio hesperius	FC2	dry, rocky serpentine
Limnanthes gracilis var. gracilis	FC2	moist to wet serpentine
Epilobium oreganum	FC2	bogs, often serpentine
Cardamine gemmata	FC2	creek banks, wet areas
Carex livida	AS	bogs, wet areas
Fritillaria glauca	AS	barren, dry rocky often serpentine
Poa piperi	AS	dry, rocky serpentine slopes
Salix delnortensis	AS	low elevation creeks
Monardella purpurea	AS	dry, open, rocky
Hieracium bolanderi	AS	dry hills, wooded

FC = Federal candidate
AS = Bureau assessment
SA = Special attention as designated in the SEIS ROD
SE = State endangered

There are required actions that must take place for special status species by protection category as directed by the Oregon and Washington BLM State Office (memorandum 11/90). All special status species require environmental clearances before projects begin. Federal listed, proposed, candidate, and bureau sensitive species require protection and/or mitigation of impacts.

Although federal listed species are the only species requiring formal consultation with the U.S. Fish and Wildlife Service (USFWS), proposed species require an informal conference with the USFWS if proposed actions may impact the plants. The USFWS recommends that technical assistance requests be made on proposed actions effecting federal candidate species.

As can be seen in table 9, the majority of special status plants are found in serpentine soils. Most occur in the vicinity of Eight Dollar Mountain, both in and outside of the Kerby Watershed. Part of Eight Dollar Mountain is in the Deer Creek Watershed, but the majority of BLM holdings are located in the Kerby Watershed. Other serpentine belts occur in the watershed in the area of Tennessee Pass. Six of the federal candidates in the watershed are found at both Eight Dollar Mountain and Tennessee Pass area.

Serpentine species have adapted to cope with the unusual parent material of their substrate which is high in iron, magnesium, and heavy metals. Most plants cannot tolerate such soil conditions. Those that can are endemic to serpentine soils or at least can tolerate these sites, outcompeting other species. This results in a rich and unique botanical diversity for these areas.

Hastingsia bracteosa is a particularly sensitive species since its only known locations are on sloping serpentine bogs in the vicinity of Eight Dollar Mountain. Population sizes are fairly significant where the plant exists, but its range is extremely limited. Therefore, the species is critically linked to the health of the serpentine bogs. The health of the serpentine bogs is particularly linked to an undisturbed water supply which could be affected by groundwater diversion or ground disturbing activities such as mining or grazing. The other serpentine bog species may have larger ranges, but their existence is still directly linked to the water supply from the bogs (see table 9).

Species of the dry, rocky serpentine soils such as Calochortus howellii, exist because of such soils; therefore, mining is considered a threat to them. The mining of the valuable metals found in serpentine is in direct conflict with the health of the serpentine plant community.

Other activities considered a threat would be such ground disturbing activities as development or grazing. It is unknown if fire plays a major role for these communities, but if so, fire suppression is another activity that could be impacting these areas where once open Jeffrey pine communities are becoming encroached by surrounding trees.

Of special note is the occurrence of Lomatium cookii, a wet area species that has been located in some atypical habitat within the watershed. The plant was found at the head of small draws under sparse white oak. As mentioned above, Lomatium cookii, is proposed to be federally listed and is already state listed. In other parts of the Illinois Valley, the plant has been impacted from off road vehicle use. It is important to protect the Kerby Watershed populations from such activities.

Other species in the table such as Cardamine gemmata and Salix delnortensis can be found in riparian areas. Because of riparian reserve requirements of the SEIS ROD, such species and their

habitat should be protected.

Special Attention Species: Cypripidium fasiculatum (listed in table 9) is closely associated with late successional forests. The species is sparsely distributed through a large range, but historically used to be more common (FEMAT 1993). It was postulated by the Forest Ecosystem Management Assessment Team that past timber activities may have contributed to this reduction, therefore leading to its identification as a survey and manage species.

The team proposed that the role of fire for this species should be investigated. Fire suppression could be a limiting factor for the species leading to the need for studying seedling establishment under controlled burning conditions.

According to the ROD, survey and manage vascular plants, such as Cypripidium fasiculatum, fall within strategies 1 and 2. Strategy 1 (which is the highest priority strategy) calls for managing known sites of the species. Efforts must be taken to acquire information on these known sites and to manage this information so that it is available to all project planners. This information must then be used to design or modify activities to mitigate impacts to the species. Management could also include such treatments as prescribed fire.

Strategy 2 calls for surveying for these species prior to any ground-disturbing activities. This is essentially already being done by the BLM for all special status species. There is a need, though, to design and implement consistent monitoring protocols throughout the range of a species (i.e., a monitoring protocol consistently used by all agencies involved). It was recommended by the ROD that survey efforts start on the watershed analysis level with identification of likely species locations based on habitat.

Cypripidium fasciculatum needs to be surveyed in existing vegetation condition classes 7 and 8. The species needs filtered sunlight, but no studies have been done to quantify canopy cover needs and the species has been found in most forest plant series.

Special and Unique Designations: Eight Dollar Mountain is an Area of Critical Environmental Concern (ACEC) within the Kerby Watershed. An ACEC is an area "...within the public lands where special management attention is required (when such areas are developed or used, or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards" (Sec. 103(a) of FLMPA and IBI of Guidelines). The ACEC process is to be used to provide whatever special management is required to protect those environmental resources that are most important, i.e, those resources that make certain specific areas special places, endowed by nature or man with characteristics that set them apart. In addition, the ACEC process is to be used to protect human life and property from natural hazards.

Woodcock Bog is a Research Natural Area (RNA) located within the watershed. An RNA is an ACEC that contains natural resource values of scientific interest and is managed primarily for

research and educational purposes.

Eight Dollar Mountain is 1,247 acres in size and protects the habitats of the largest concentration of special status plants in the State of Oregon. It is located in both the Deer Creek and Kerby watersheds. Many of the serpentine endemics (plants that can exist nowhere else but on serpentine sites) occur in or near this ACEC. A continuing concern for the ACEC is the possibility of mining due to the mineral rich serpentine. Multiple use activities can still occur in ACECs, as long as activities can be compatible with the management objectives of the ACEC. Mining could not only disrupt the surface vegetation of the ACEC, but could also disturb the groundwater patterns that are critical for the survival of the serpentine bogs.

One grazing allotment is located in the Eight Dollar Mountain ACEC, in the Deer Creek Watershed. There is a possibility of cattle straying on Eight Dollar Mountain proper from this allotment depending on the flow level of Deer Creek. There are currently no fences to control their movement into special habitat if this occurs.

Because of the possibility of mining and other ongoing ground-disturbing activities in the area of the ACEC, it is critical that a management plan be developed for the Eight Dollar Mountain ACEC. Because the mountain itself is split into several ownerships, this management plan must be cooperatively written by all parties concerned. The completion of Eight Dollar Mountain ACEC management plan is the highest priority of all ACECs in the Grants Pass Resource Area. A significant part of the planning process would be to develop a fire management plan for the ACEC as well. This would allow for a concerted planning effort regarding the use of fire as a management tool in this special type of vegetation.

Other projects considered high priority for Eight Dollar Mountain include building an interpretive trail to increase public awareness and support for ACECs. The trail would lead to an overlook of the serpentine bog adjacent to the Eight Dollar Mountain Road. This trail would be built with a raised boardwalk to mitigate impacts to the bog and its many special status species and would provide information regarding the plants. A site plan is to be designed in 1995, but funding for the project is unsure at this time.

Research studies describing and mapping plant communities, researching the ecology of the communities, monitoring hydrologic patterns and establishing long term monitoring protocol for the special status plants are also important projects to consider. Such activities should be encouraged by the BLM and other agencies sharing ownership of Eight Dollar Mountain.

The Woodcock Bog RNA is comprised of 111 acres of bog interspersed with Jeffrey pine savannah. Like Eight Dollar Mountain ACEC, a number of serpentine vegetation types are represented. Unauthorized water withdrawal for domestic use has been a problem in the past as well as vehicular trespass. As with Eight Dollar Mountain, a management plan for the RNA must be written in cooperation with adjacent landowners. Also, a fire management plan should be a part of the overall management planning process. Because of its status as a RNA, such studies as mentioned above should be encouraged at Woodcock Bog by the BLM.

WATER

In the past, an abundance of water was available for mining, farming, domestic uses, recreation, fish, and wildlife. There wasn't a lot of land cleared for agricultural purposes and the population in the watershed was not large enough to cause a great demand for the resource. Consequently, most of the major streams in the watershed flowed all year long. These streams had stable banks with ample riparian vegetation and provided good fish habitat for salmon, steelhead, and resident trout species.

Currently, there is a great demand for the water in the Kerby Watershed. Precipitation amounts have been below average for 9 out of the last 10 years. Springs and creeks that historically flowed all year long now dry up in early August. The population of the area has increased over the years and more land has been cleared for agricultural purposes. Stream channels in the valley floor have been diverted into irrigation ditches and some have been obliterated completely. This practice has cut off anadromous fish from reaching spawning and rearing habitat. Stream habitat in the upper reaches of the watershed is in adequate functioning condition but the lack of water is the limiting factor.

Summer water temperature in the Illinois River at the base of Eight Dollar Mountain is often over 80 degrees as a result of low flows, lack of shade, and irrigation water returned to the river. The numerous roads that dissect the watershed have increased the sediment levels in the local streams and the Illinois River.

Overall, the main hydrological concern in the Kerby Watershed is the lack of water to meet the demand. Recent court battles between neighbors over water rights indicate how scarce the resource is becoming. Several years without "normal" amounts of precipitation are the main reason for the water problem but numerous diversions from springs and streams (both legal and illegal) have also affected the amount of water that is available.

WILDLIFE

Vegetation in the watershed varies dramatically as a result of soils, elevation and aspect. The west side of the Illinois River contains large areas of serpentinite and peridotite soils which are vegetated with sparse Jeffrey pine with an understory of brush (major brush species are wedgeleaf ceanothus, sticky manzanita and huckleberry oak). Riparian areas in these soils are narrow and dominated by Port-Orford-cedar in the overstory and azalea in the understory. Other important habitats located in the serpentine soils are two areas of inclusions of Douglas-fir forest located in sections five and seventeen.

Habitat provided by the serpentine associated vegetation resembles sites along the low elevation south and west slopes of the Cascades. Reptiles are much more common in these habitats than in other habitats in the Klamath Province. Very little wildlife inventory work has been completed on these serpentine associated habitats. However, casual observations indicate that the areas of wedgeleaf ceanothus patches are not extensively used by black tailed deer for winter forage as

they are in other soil types. Other wildlife species that one would expect to find in this habitat type are either absent or present in low numbers. This may be a result of poor nutritional values in serpentine associated vegetation or the absence or imbalance of some required trace minerals. The riparian areas in much of the serpentine soil are in good condition probably as a result of little or no timber harvest activity in these areas. Limited surveys in 1994 have documented a healthy population of yellow legged frogs in these streams and tailed frogs and variegated salamanders are suspected. As previously stated, most of this wildlife data is the result of casual observations or very limited studies and there is a great need to establish base line data and monitor these unusual sites.

Soils of the Illinois River flood plain are a result of deposition from upstream sources and most are currently being used for agricultural purposes. A narrow riparian area, which has been highly modified by past and current uses, is located on both sides of the river. This riparian zone along the Illinois River was much larger historically than it is currently, as is indicated by the undisturbed area in T. 39 S., R. 8 W., Section 17. In this section there are several sloughs, ponds, and small areas that are filled by flooding or subsurface flows from the river. Wetlands such as these provide habitat for western pond turtles (category II), waterfowl, neotropical birds, and many other species of plants and wildlife. In the adjacent agricultural land these wetlands have been cleared of vegetation, filled in, and leveled, which has destroyed these important wetland habitat features.

Soils on the east side of the Illinois River produce vegetation that is more typical for southwestern Oregon. Vegetation on this side of the river varies more in conjunction with elevation than with soils type. The lower slopes are vegetated with pine and white oak grassland which convert to mixed conifer on the upper slopes. Again this vegetation has been highly modified by past uses. In the undisturbed areas, remnant pine/oak grasslands are still present. These were also destroyed with the establishment of agricultural practices which converted these lands into hay fields and non-native grasslands.

The east side watershed habitats have been highly modified by past practices of forest management, agriculture, and mining. The low elevation white oak woodlands have been converted to hay fields or other agricultural uses and are very limited in both quantity and quality of habitat. Many of the oak woodlands that were located on slopes have converted to Douglas-fir stands due to fire suppression. Oak woodlands have been identified as one of the five critical habitats by the Oregon/Washington Neotropical Bird Working Group. Many of the oak woodlands are small inclusions or remnants that are located in Douglas-fir or pine stands. Most of these sites are not identified on the current records due to their small size and are included with the larger vegetation type.

The mixed conifer vegetation that is dominant on the east side of the watershed has been heavily impacted by logging in the past fifty years and has an abundance of mixed conifer habitats less than 50 years old. There is currently limited amounts of mature conifer habitat and one small patch of old growth habitat in the watershed (38 acres located on BLM land). This type of habitat also provides thermal cover for species during inclement weather. Due to the checkerboard

ownership patterns associated with BLM lands, past forest management, agriculture, and mining impacts, the distribution pattern of the remaining mature and old growth habitats are widely scattered and do not provide proper dispersal paths for many species.

Other special habitats available include two small caves located in the Holton Creek drainage which are utilized by Plecotus townsendii (western big eared bat, a category II species). The talus slopes associated with the limestone karst provide habitat for Del Norte salamanders (category II) as well as other salamanders and invertebrates. Past harvest practices conducted on BLM and private lands have impacted the numbers and quality of snag habitat available to both interior forest dwelling and edge associated wildlife species. The exact effects of this loss of habitat is not known but it is suspected that both numbers of individuals of certain species as well as the composition of wildlife guilds have been diminished in the watershed. For occurrence and existing population information on special status species (see table 12).

Species of game animals that are located within the Kerby Watershed are: black tailed deer, black bear, mountain lion, wild turkeys, ruffed grouse, blue grouse, grey squirrels, mountain and valley quail. The watershed includes two Oregon Department of Fish and Wildlife (ODF&W) game management units, the Applegate and Chetco units. At this time there is no data concerning numbers of individuals of these species currently present. Communication with ODF&W in the summer of 1994 indicated that black tail deer populations are stable in the watershed. In these units there are no specific state guidelines for desired population levels of game species other than black tailed deer.

Table 10. Cover/Forage Acres

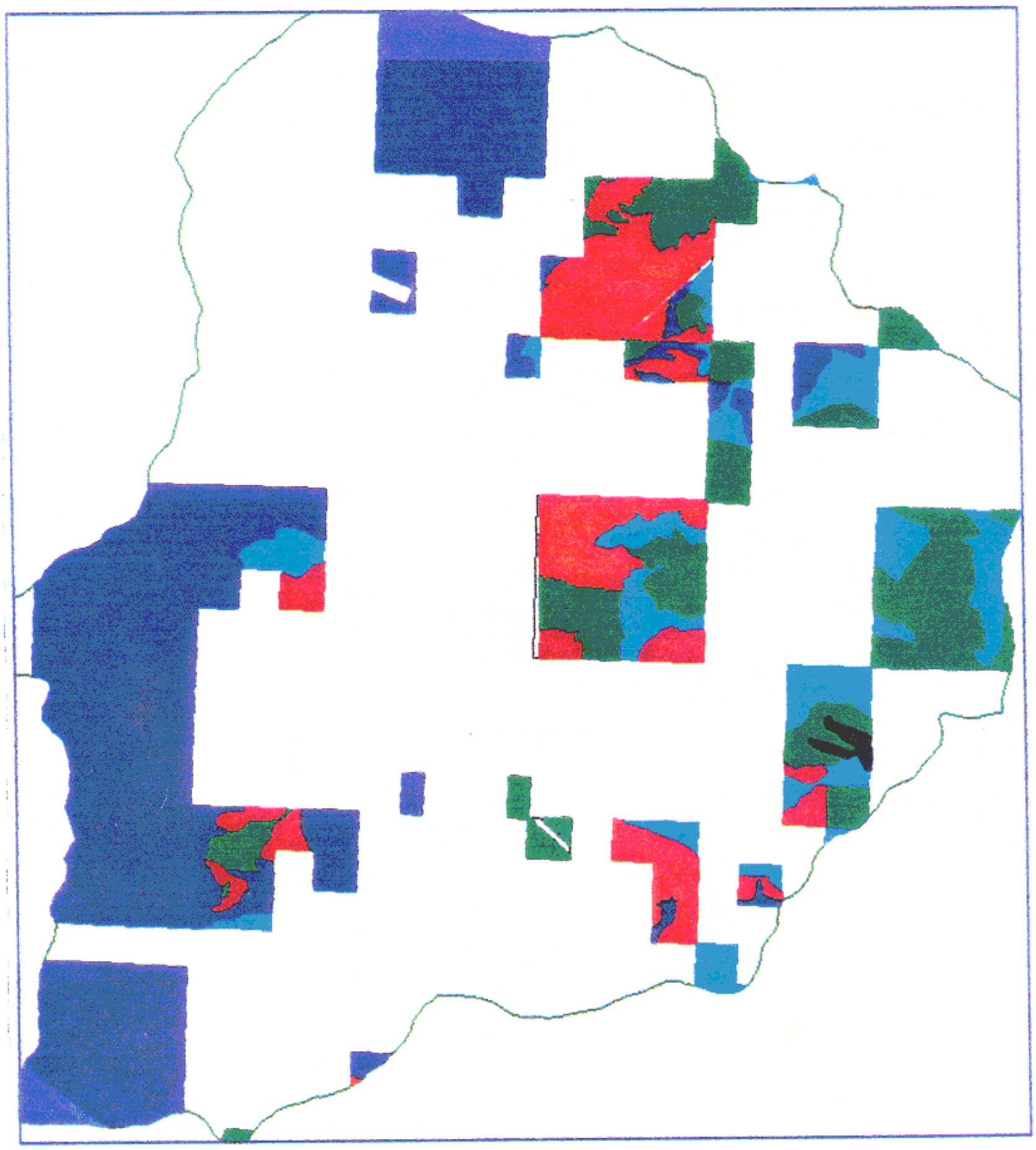
Habitat	BLM	Private
Forage, (veg:1, 2, 3 4,& 7) (Mck:3&4)	4,922 acres	4,298 acres
Hiding, (veg:3 & 5) (Mck:3,6 &7)	998 acres	4,064 acres
Thermal, (veg:6, 7 & 8) (Mck:1,2 &5)	1,527 acres	1,167 acres

Table 11. Habitat Association Acres		
Habitat	**BLM**	**Private**
Serpentine (veg 7, Mck 4)	4,792 Acres 58%	790 Acres

Woodland (veg 3)	294 Acres 3.6%	388 Acres
Shrubs (veg 2)	148 Acres 1.8%	501 Acres
Large Poles & Mature (dispersal) (veg 7 & 8, Mck 5)	789 Acres 9.5%	1,526 Acres
Large Poles & Mature (not disp) (veg 7 & 8, Mck 3)	597 Acres 7.2%	2,058 Acres
Large Poles & Mature (suitable) (veg 7 & 8, Mck 1 & 2)	919 Acres 11.1%	0 Acres
Seedlings/Saplings & Small Poles (veg 5 & 6, Mck 3)	58 Acres 6.3%	3,167 Acres
Small Poles (veg 6, Mck 5)	138 Acres 1.7%	0 Acres
Grasses & Forbs (veg 1 & 4)	78 Acres 0.1%	1,437 Acres

MAP 1 SPOTTED OWL HABITAT ON BLM LANDS

Habitat 1:black:37 acres
Habitat 2:blue:869 acres
Dispersal:red:935 acres
nonsuitable:green and purple:4408 acres



MAP 3 MARBLED MURRELET HABITAT

Marbled Murrelet habitat in red

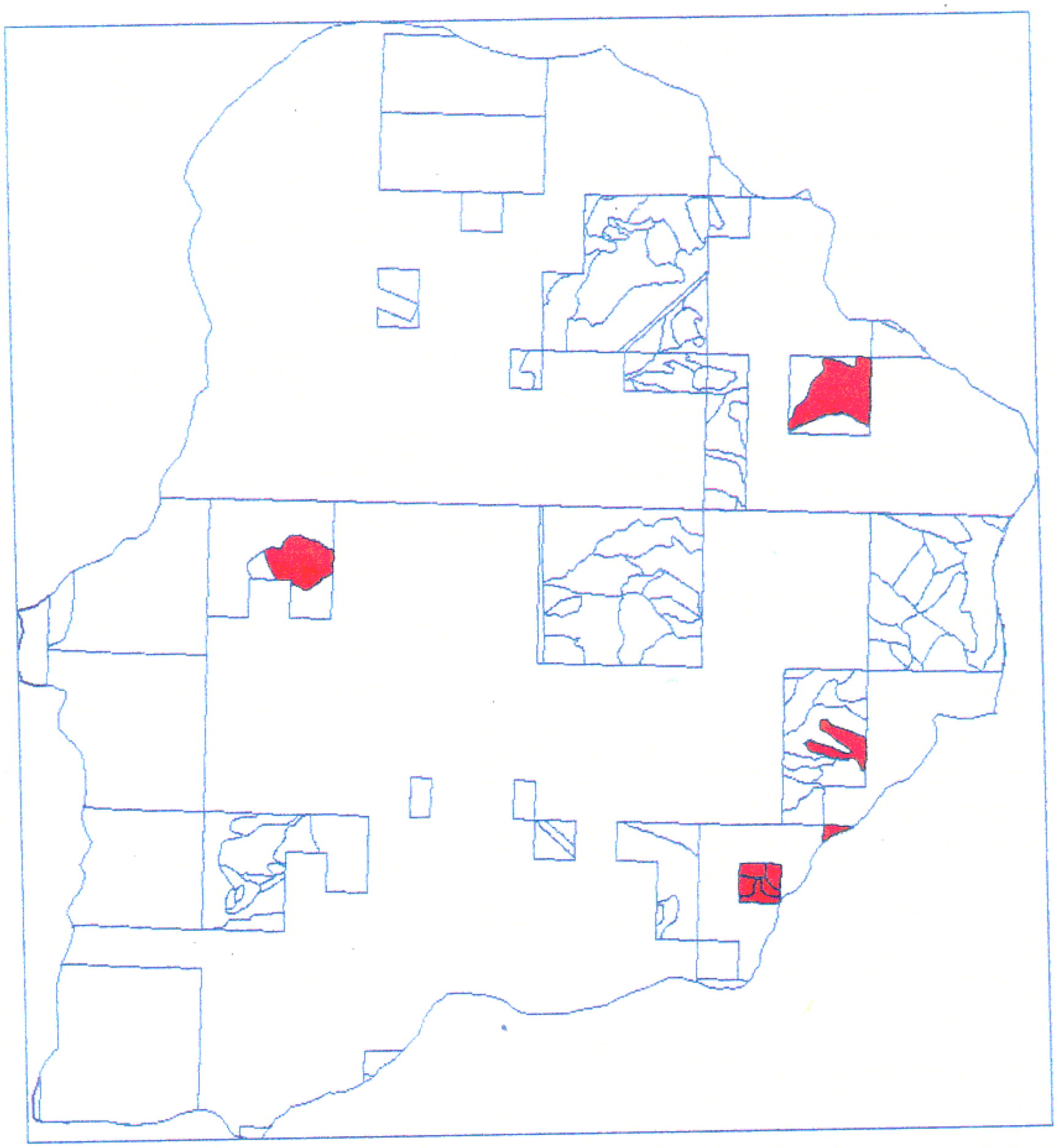


Table 12. Grants Pass Special Status Species						
Species (common name)	**Status**	**Presence**	**Survey Level**	**Habitat**	**Monitor Y/N**	**Future Survey Efforts**
Gray wolf	FE,SE	A	N	H	N	N
White-footed vole	FC,SP	S	0	U	N	N
Fisher	FC,SC, AS	D	1	I	N	N
Wolverine	FC,ST	A	N	N	N	N
American marten	SC,AS	S	0	I	N	N
Ringtail	SU	D	1	U	N	N
Peregrine falcon	FE,ST	U	2	U	Y	Y
Bald eagle	FT,ST	S	1	H	Y	Y
Northern spotted Owl	FT,ST	D	3	I	Y	Y
Marbled murrelet	FE,SC	S	3	U	Y	Y
Northern goshawk	FC,SC, AS	S	3	I	Y	Y
Mountain quail	FC	D	5	Y	N	N
Pileated woodpecker	SC,AS	D	5	I	N	N
Lewis' woodpecker	SC,AS	D	5	I	N	N
White-headed woodpecker	SC,AS	A	N	N	N	N
Flammulated owl	SC,AS	U	0	I	N	Y
Purple martin	SC,AS	S	0	I	N	N
Great gray owl	SV,AS	S	0	U	N	N
Western bluebird	SV,AS	S	0	I	N	N
Pygmy nuthatch	SV	U	0	U	N	N
Acorn woodpecker	SU	D	5	I	N	N
Williamsons sapsucker	SU	U	0	U	N	N
Pygmy owl	SU	S	0	U	N	N
Bank swallow	SU	U	5	H	N	N

Table 12. Grants Pass Special Status Species						
Species (common name)	**Status**	**Presence**	**Survey Level**	**Habitat**	**Monitor Y/N**	**Future Survey Efforts**
Townsend's big-eared bat	FC,SC	D	3	I	Y	Y
Fringed myotis	BS,SV	S	0	I	Y	Y
Pacific pallid bat	SC,AS	S	0	I	Y	Y
Western pond turtle	FC,SC	D	3	I	Y	Y
Del Norte salamander	FC,SV	D	3	I	N	Y
Siskiyou Mtn. Salamander	FC,SV	A	N	N	N	N
Foothills yellow-legged frog	FC,SU	D	2	Y	N	N
Red-legged frog	FC,SU	S	0	H	N	N
Clouded salamander	SC,AS	S	0	I	N	N
Tailed frog	SV,AS	S	O	U	N	N
Variegated salamander	SV	S	2	I	N	Y
Black salamander	SP,AS	D	2	U	N	N
California Mtn. kingsnake	SP, AS	D	1	Y	N	N
Common kingsnake	SP,AS	D	1	Y	N	N

Invertebrates				
Species (common name)	**Status**	**Presence**	**Survey**	**Habitat**
Burnell's false water penny beetle	FC	U	O	U
Denning's Agapetus caddisfly	FC	U	O	U
Green Springs Mtn. farulan caddisfly	FC	A	N	N
Schuh's homoplectran caddisfly	FC	U	O	U
Obrien rhyacophilan caddisfly	FC	S	O	U
Siskiyou caddisfly	FC	S	O	U
Alsea Ochrotichian micro caddisfly	FC	S	O	U
Franklin's bumblebee	FC	U	O	U
Oregon pearly mussel	FC	A	N	N

STATUS ABBREVIATIONS:

FE--Federal Endangered
FT--Federal Threatened
FP--Federal Proposed
FC--Federal Candidate
SE--State Endangered
ST--State Threatened
SC--ODFW Critical
SV--ODFW Vulnerable
SP--ODFW Peripheral or Naturally Rare
SU--ODFW Undetermined
BS--Bureau Sensitive
AS--Assessment Species (BLM)

PRESENCE:

D--Documented
S--Suspected, habitat present
U--Uncertain
A--Absent

SURVEY LEVEL:

N--No surveys needed
0--No surveys done
1--Literature search only
2--One filed search done
3--Some surveys completed
4--Protocol completed
5--Opportunistic sightings

HABITAT CONDITION:

H--Historic
N--None, out of species range
Y--Suitable for stable populations
U--Unknown
I--Suspect negative impacts

* Surveys planned prior to completion of watershed analysis project implementation

V. DESIRED FUTURE CONDITIONS AND PROJECT OPPORTUNITIES

Through an understanding of the key processes at work in the Kerby Watershed and linking that with the conditions that exist today, it is possible to make some qualitative judgments and describe the desired future conditions for the natural resources in the watershed. The following table lists some desired future conditions for the watershed that were identified by the Kerby Watershed Analysis Team. Some of the desired future conditions listed may seem to conflict. That is because many different resources are addressed in the watershed analysis and some may have conflicting needs. These conflicts will be addressed through the interdisciplinary team process as specific projects are designed.

Specific projects are one vehicle that can be used to move an existing condition to a desired future condition. Included in the table is a list of potential projects and their locations that can help achieve desired future condition goals.

VI. LIST OF PREPARERS

The following BLM Grants Pass Resource Area specialists comprised the Kerby Watershed Analysis Team:

Data Element Category	Individual Responsible	Position
Team Leader	John Prendergast	Silviculturist
Air, Fire	Tom Murphy	Fire and Fuels Specialist
Fish	Bob Bessey	Fisheries Biologist
GIS Map Products	John McGlothlin	GIS/ARD Specialist
Grazing	Cliff Oakley	Wildlife Biologist
Human Dimension	Matt Craddock John Prendergast	Lands and Realty Specialist Silviculturist
Lands	Bob Murray Jay Dunham	Forester Forester
Minerals	Matt Craddock	Lands and Realty Specialist
Physical	Ted Hass	Soil Scientist
Recreation	Greg Chandler	NEPA Coordinator
Roads	Doug Lindsey	Lead Engineer
Soils and Geology	Ted Hass	Soil Scientist
Vegetation	Kenny McDaniel John Prendergast Linda Mazzu	Forester Silviculturist Botanist
Water	Ted Hass	Soil Scientist
Wildlife	Laura Finley	Wildlife Biologist
Wordprocessing	Floy Aschenbrener	Office Automation Assistant

VII. APPENDICES

Appendix A: Data Gaps

Data gaps are information or data that does not presently exist, or exits in a form or place that make its use impractical for this watershed analysis. It is information that has been identified as being important to fully analyze the existing conditions in the watershed. The intent is to address the data gaps over time as funding and workload priorities permit. The Kerby Watershed Analysis Team identified the following data gaps for the Kerby Watershed:

Actual emissions that would be produced with prescribed underburning and other related ecosystem restoration burns. Presently only have predictions from models.

Water sources available for fire suppression efforts.

Flow characteristics of each GIS stream reach (intermittent vs. perennial).

The number of salmon and steelhead spawning in Reeves and Holton creeks annually, either through spawning surveys or smolt traps. (ODFW would take the lead on this since virtually all anadromous fish habitat is on private land).

The range of daily water temperatures during the summer in Reeves, Holton and Free and Easy creeks and the number of hours each day that temperatures exceed the optimum for salmonids.

Population characteristics of fish and other aquatic life (including macroinvertebrates) in upper Reeves Creek to track response of aquatic animal communities to watershed rehabilitation projects and to other activities in the watershed (or lack of activity).

Stream microhabitat and riparian surveys on fishery streams. Quality information is critical for establishing baseline information for measuring effects of land management activities on aquatic resources on-site, as well as cumulative effects across a landscape. This information can also provide an estimate of a stream's steelhead and salmon smolt production capability.

Grazing information on private lands.

Road drainage, road grade: some of this information is in the road records under the original design, if the original design exists. Changes may have been made during construction with no reflection of the changes made in the road records.

Road surface depth: the original surfacing is listed in the road records. As the road is used, the surface depth is reduced. In some cases rock is added to the road without this information reaching the road records.

Road condition: some roads have not received field review for up to three years. These roads need to be identified and field investigated to complete the data gap.

Barricades: barricades are placed during timber sales and administratively by the BLM maintenance crews. There is no accurate inventory of barricades in the Grants Pass Resource Area.

BLM noncapitalized roads and skid trails: these types of roads and trails have not been inventoried.

Non-BLM roads and skid trails: these types of roads and trails have not been inventoried. Permission from private landowners for field investigations will be required. If permission cannot be obtained, other methods will be considered.

Active and depleted quarries: quarry data gaps exist where the required information is not filled in on the rock resource inventory sheet. All quarries will require field investigation and documentation to complete this data gap. A determination needs to be made as to which quarries are depleted. A restoration strategy will be developed for each depleted quarry.

Data on the location of special status plants will be complete once the Kerby Watershed survey is finished. This watershed will have the most complete listing of Special Status plants to date in the Grants Pass Resource Area. Although locations are known, little information is available on the ecological requirements of these species especially related to structure and composition. Information on plant series and seral stages best suited for these species has yet to be adequately compiled. Long-term monitoring of the most critical species should be initiated in order to gain an understanding of population changes over time as related to habitat changes.

Information on the role of fire in perpetuating these plants, especially in serpentine areas. In areas burned under wildfire conditions, some plants appear to be reacting positively according to the U.S. Forest Service. This has led to the planning of prescribed burns in the area of Tennessee Pass (part of the Canyon Integrated EIS, U.S. Forest Service). Part of these burns will occur on BLM lands. These activities are supported by the BLM. Pre- and post- burn monitoring will take place for special status species located within the burn units (with technical assistance from the USFWS) to begin gathering fire effects data.

Information on the location of special status nonvascular plants. The BLM and the Medford District has acknowledged special status to eighteen liverwort species, seventeen moss species, and twenty lichen species. No inventory work has been initiated on these species or surveys in project areas. This is basically due to lack of expertise for nonvascular plants. Some of these species will be inventoried as part of the survey and management protocol recommended in the ROD.

Noxious weed locations. The unchecked spread of these species threatens not only special status species, but all native vegetation.

The occurrence of nonvascular special attention species is unknown. A regional survey for these species will be undertaken as required by the ROD. Some of the nonvascular species on the survey and manage list do require Strategy 1 and 2 compliance. In that case, those species must be inventoried and managed for on all projects beginning in 1997.

More information is needed on the biological and ecological requirements of Special Status species plants. As recommended by FEMAT, prescribed fire experiments on Cypripidium fasciculatum should be completed in order to study the long term recovery of the species after such a disturbance. Such a treatment can only be undertaken where a stable population has been located. This may have to occur within another watershed.

Stand examination inventory data, including snag and down woody debris inventories, for the remaining federal lands in the watershed outside of the Free and Easy and Moosehorn timber sale project areas.

Known Port-Orford-cedar and Port-Orford-cedar root disease locations in the watershed.

Incidence of western pine beetle, mountain pine beetle, and fir engraver beetle activity in the watershed.

Density condition information for private land forests.

Stream survey and stream class information for all streams in the watershed.

Riparian associated wildlife species data.

Species inventories and inventory techniques for the survey and manage species listed in the ROD.

Appendix B: Road Data Element Definitions and Kerby Watershed Road Information

RD1 - BLM Capitalized Roads

If a BLM road has an investment value of over $1,000.00 the road is analyzed to determine capitalized or noncapitalized status. During this analysis the BLM considers many elements including present and future needs, type of road, total investment, and road location to reach a conclusion of road status. Each capitalized road is identified with a BLM road number and a capitalized value. BLM capitalized roads are managed and controlled by the BLM. Capitalized roads are periodically re-evaluated to confirm their capitalized status.

RD2 - 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 continued public and administrative use. Skid trails are ground disturbances, created under a timber sale, that have not been restored to their natural surrounding environment.

RD3 - Non-BLM Roads and Skid Trails

Non-BLM roads and skid trails are administered by private landowners and/or other government agencies.

Example of sub elements for RD1, RD2, and RD3:

road density	road surface	surface depth	road use
road drainage	road condition	road grade	gates
R/W agreements	easements	maintenance levels	barricades

RD4 - Quarries

Quarries are areas of land used as rock sources, to develop aggregate material, for the surfacing of roads within the watershed.

Example of sub elements for RD4:

active quarry	depleted quarry

Information on all of the road data elements and sub elements is available through the Medford District's road record files, 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 landowners and/or other government agencies.

Kerby Watershed Road Information

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
38S	8W	26.00		Siss Gap Sp	0.20	0.03	0.00	0.23	GRR	17'	6"	BLM	2	2	BLM	
38S	8W	26.01		Siss Gap Sp	0.00	0.00	0.12	0.12	NAT	17'	6"	PVT	1	1	Other	No legal access
38S	8W	27.00		Siss Gap Sp	3.52	0.00	0.00	3.52	PRR	14'	6"	BLM	3	3	BLM	Only use part of this road for Kerby WAU
38S	8W	27.01		Siss Gap Sp	1.44	0.00	0.00	1.44	PRR	14'	6"	BLM	3	3	BLM	
38S	8W	27.02	A	Siss Gap Sp	0.40	0.17	0.00	0.57	GRR	14'	8"	BLM	3	3	BLM	
38S	8W	27.02	B	Siss Gap Sp	0.14	0.00	0.00	0.14	NAT	17'		BLM	2	2	BLM	
38S	8W	27.03		Siss Gap Sp	0.24	0.00	0.00	0.24	NAT	17'		BLM	2	2	BLM	
38S	8W	27.04		Siss Gap Sp	0.80	0.00	0.00	0.80	NAT	17'		BLM	2	2	BLM	
38S	8W	27.05		Siss Gap Sp	0.18	0.00	0.00	0.18	NAT	17'		BLM	2	2	BLM	
38S	8W	27.06		Siss Gap Sp	0.20	0.00	0.00	0.20	NAT	17'		BLM	2	2	BLM	
38S	8W	27.07		Siss Gap Sp	0.07	0.00	0.00	0.07	NAT	17'		BLM	2	2	BLM	
38S	8W	27.08		Deer Selmac B Sp	0.15	0.00	0.00	0.15	NAT	14'		BLM	2	2	BLM	
38S	8W	34.00	A	Siss Gap Sp	0.40	0.52	0.09	1.01	PRR	17'	6"	BLM	3	3	BLM	
38S	8W	34.00	B	Siss Gap Sp	0.00	0.00	0.34	0.34	PRR	17'	6"	PVT	3	3	BLM	
38S	8W	34.01		Siss Gap Sp	0.00	0.00	0.36	0.36	NAT	17'		BLM	2	2	BLM	
38S	8W	34.02		Siss Gap Sp	0.00	0.04	0.00	0.04	NAT	17'		BLM	2	2	BLM	
38S	8W	35.00		Reeves Creek H	1.23	0.00	0.36	1.59	PRR	14'	6"	BLM	3	3	BLM	

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
39S	8W	01.00		Reeves Ck Rdg Sp	0.30	0.00	0.00	0.30	GRR	14'	8"	BLM	3	3	BLM	
39S	8W	01.01		Reeves Ck Rdg S	0.70	0.00	0.00	0.70	GRR	14'	8"	BLM	3	3	BLM	
39S	8W	01.02		Remullin Sp	0.28	0.00	0.00	0.28	GRR	14'	8"	BLM	3	3	BLM	
39S	8W	01.03		Reeves Ck Rdg Sp	0.60	0.00	0.00	0.60	GRR	14'	8"	BLM	3	3	BLM	
39S	8W	01.04		Reeves Ck Sp	0.80	0.00	0.00	0.80	ASC	14'	6"	BLM	3	3	BLM	
39S	8W	01.05		Reeves Ck Sp	0.36	0.00	0.00	0.36	ASC	16'	6"	BLM	3	3	BLM	
39S	8W	01.06		Reeves Ck Sp	0.51	0.00	0.00	0.51	NAT	14'		BLM	3	3	BLM	
39S	8W	01.07		Reeves Ck Sp	0.84	0.00	0.00	0.84	NAT	14'		BLM	3	3	BLM	
39S	8W	01.08		Reeves Ck Sp	0.53	0.00	0.00	0.53	ASC	14'	6"	BLM	3	3	BLM	
39S	8W	01.09		Reeves Ck Sp	0.14	0.00	0.00	0.14	NAT	14'		BLM	3	3	BLM	
39S	8W	03.00	A	Reeves Ck Rdg	1.22	0.00	0.13	1.35	PRR	14'	6"	BLM	3	3	BLM	
39S	8W	03.00	B	Reeves Ck Rdg	0.00	0.00	1.25	1.25	PRR	14'	6"	BLM	3	3	BLM	
39S	8W	03.00	C1	Reeves Ck Rdg	0.51	0.00	0.44	0.95	GRR	14'	6"	BLM	3	3	BLM	
39S	8W	0.300	C2	Reeves Ck Rdg	0.43	0.00	0.00	0.43	GRR	14'	6"	BLM	3	3	BLM	
39S	8W	03.00	D	Reeves Ck Rdg	0.98	0.00	0.00	0.98	GRR	14'	6"	BLM	3	3	BLM	
39S	8W	03.00	E	Reeves Ck Rdg	1.93	0.09	0.09	1.93	GRR	14'	6"	BLM	3	3	BLM	
39S	8W	03.01		Kerby Demo Sp A	0.63	0.00	0.00	0.63	NAT	14'		BLM	2	2	BLM	
39S	8W	03.02		Kerby Demo	0.59	0.00	0.00	0.59	NAT	14'		BLM	2	2	BLM	

T.	R.	Sec.	Seg.	Name	O&C	PD	Other	Total Miles	Srf. Type	Sub. Wid.	Srf. Dp.	Who Ctrls.	Cus. Mtn.	Opr. Mtn.	Who Mtn.	Comments
39S	8W	03.03		Kerby Demo	0.54	0.00	0.00	0.54	NAT	14'		BLM	2	2	BLM	
39S	8W	04.00	A	Kerby Highline	0.75	0.00	0.58	1.33	BST	18'	6"	BLM	3	3	PVT	
39S	8W	04.00	B1	Kerby Highline	0.36	0.00	0.00	0.36	BST	18'	6"	BLM	3	3	PVT	
39S	8W	04.00	B2	Kerby Highline	0.00	0.00	0.19	0.19	BST	18'	6"	BLM	3	3	PVT	
39S	8W	04.00	C	Kerby Highline	0.23	0.00	1.00	1.23	ASC	14'	6"	BLM	3	3	BLM	
39S	8W	04.00	D	Kerby Highline	1.97	0.00	0.00	1.97	ASC	14'	6"	BLM	3	3	BLM	
39S	8W	10.01	A	Holton Creek	0.00	0.00	0.85	0.85	NAT	12'		PVT	1	1	Other	No legal access
39S	8W	10.01	B	Holton Creek	0.34	0.00	0.00	0.34	NAT	12'		BLM	1	1	Other	No legal access
39S	8W	12.00	A	Lime Rock	0.00	0.00	1.46	1.46	NAT	12'		PVT	1	1	Other	No legal access
39S	8W	12.00	B	Lime Rock					NAT	12'		BLM	1	1	Other	No legal access
39S	8W	17.00		Pomeroy Lookout	1.00	0.00	0.00	1.00	NAT	14'		BLM	2	2	BLM	

Definition of Columns in
Kerby Watershed Road Information Table

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 is 35-7-24 A.

Name — The name of the road.

O&C — Length of road, in miles, that crosses O&C lands.

PD — Length of road, in miles, that crosses public domain lands.

Other — Length of road, in miles, that crosses other lands.

Total Miles — Total length of the road in miles.

Srf. Type — Road surface type. NAT- Natural, PRR- Pit Run, GRR- Grid Rolled, ABC- Aggregate Base Course, ASC- Aggregate Surface Course, BST- Bituminous Surface Treatment.

Sub. Wid. — Subgrade width of the road in feet.

Srf. Dp. — Road surfacing depth in inches.

Who Ctrls. — Who controls the road. BLM- Bureau of Land Management, PVT- Private.

Cus. Mtn. — BLM Custodial Maintenance Level. Level of maintenance needed during normal administrative use with no timber haul.

Opr. Mtn. — BLM Operational Maintenance Level. Level of maintenance needed during active timber hauling.

Under Column for Cus. Mtn. and Opr. Mtn.

(1) This level is assigned to intermittent service roads during the time management direction requires that the road be closed or otherwise blocked to traffic. Basic custodial maintenance is performed to protect the road investment and to keep damage to adjacent resource to an acceptable level. Drainage facilities and runoff patterns are maintained.

(2) This level is assigned where management direction requires that the road be open for

limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level.
Roads in this maintenance level are normally characterized as single lane, primitive type facilities intended for use by high clearance vehicles. Passenger car traffic is not a consideration.

(3) This level is assigned where management direction requires the road to be open and maintained for safe travel by a prudent driver in a passenger car. Traffic volumes are minor to moderate; however, user comfort and convenience is not considered a priority. Roads at this maintenance level are normally characterized as low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. The functional classification of these roads is normally local or minor collector.

(4) This level is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes are normally sufficient to require a double lane aggregate surfaced road. Some roads may be single lane and some may be paved and/or dust abated. The functional classification of these roads is normally collector or minor arterial.

(5) This level is assigned where management direction requires the road to provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Functional classification of these roads is normally arterial.

Who Mtn. This column changes based on who's responsible for maintaining the road. BLM- Bureau of Land Management, PVT- Private, TSO- Timber Sale Operator, or Other.

Comments Comments pertaining to each road.

Appendix C: Soil Series Descriptions

Newberg-Camas-Evans (#1)

The Newberg soil series is deep (>40") and somewhat excessively drained. This soil is found on flood plains and contains less than 35 percent rock fragments in the 10 to 40 inch control section. Typically, the surface layer is dark brown fine sandy loam about 15 inches thick. The underlying material, to a depth of 61 inches or more, is dark yellowish brown sandy loam stratified with loamy sand and loamy fine sand stratified with sandy loam. Permeability of the Newberg soil is moderately rapid to a depth of 24 inches and rapid below this depth. Available water capacity is about 5 to 8 inches. Runoff is slow and the hazard of water erosion is moderate. This soil is subject to occasional, brief periods of flooding in winter and spring. Channeling and deposition are common along streambanks.

The Camas soil series is deep (>40") and excessively drained. This soil is located on flood plains and contains more than 35 percent rock fragments in the 10 to 40 inch control section. Typically, the surface layer is very dark grayish brown gravelly sandy loam about 10 inches thick. The underlaying material, to a depth of 60 inches or more, is variegated, mostly brown, dark brown, and dark grayish brown very gravelly sand. Permeability of this Camas soil is very rapid. Available water capacity is about 1.5 to 3.5 inches. Effective rooting depth is 12 to 24 inches. Roots are restricted by the very gravelly sand below this depth. Runoff is slow and the hazard of water erosion is moderate. This soil is subject to occasional, brief periods of flooding in winter and spring. Channeling and deposition are common along streambanks.

The Evans soil series is deep and well drained on flood plains. Typically, the surface layer is very dark grayish brown loam and silt loam about 23 inches thick. The underlying material, to a depth of 60 inches or more, is very dark grayish brown silt loam and dark brown very fine sandy loam. Permeability of this Evans soil is moderate. Available water capacity is 8.5 to 12 inches. Effective rooting depth is 60 inches or more. Runoff is slow and the hazard for water erosion is moderate because of flooding. This soil is subject to occasional, brief periods of flooding in winter and spring. Channeling and deposition are common along streambanks.

Pollard-Abegg (#4)

The Pollard soil is deep and well drained. This soil contains less than 35 percent rock fragments in the control section. Typically, the surface is covered with a mat of undecomposed leaves, needles, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 20 inches thick. The upper 13 inches of the subsoil is yellowish red clay. The lower 27 inches is yellowish red clay. Bedrock is at a depth of 60 inches or more. Permeability of the Pollard soil is slow. Available water capacity about 5.5 to 8 inches. Runoff is rapid on steep slopes and the hazard of water erosion is moderate to high depending on the steepness of the topography.

The Abegg soil is deep and contains more than 35 percent rock fragments in the 10 to 40 inch control section. Typically, the surface is covered with a mat of needles, leaves, and twigs about 1.5 inches thick. The surface layer is very dark grayish brown (wet) gravelly loam about 4 inches thick. The next layer is dark brown gravelly loam about 5 inches thick. The upper 7 inches of the

subsoil is dark brown gravelly loam. The substratum to a depth of 60 inches or more is variegated brown and reddish brown extremely gravelly loamy sand. Permeability of this Abegg soil is moderate to a depth of 56 inches and moderately rapid below this depth. Available water capacity is 4 to 6 inches and effective rooting depth is 60 or more inches. Runoff is medium and the hazard of water erosion is moderate.

Josephine-Speaker-Pollard (#8)

The Josephine soil series is deep (>40") and contains less than 35 percent rock fragments in the 10 to 40 inch control section. Typically, the surface texture is brown gravelly loam with moderate fine granular structure and approximately 25 percent pebbles. The subsurface texture is pink to reddish yellow loam or clay loam with moderate fine subangular blocky structure and approximately 10 percent weathered pebbles. Depth to weathered bedrock is 40 to 60 inches. Permeability of the Josephine soil is moderately slow. Available water capacity is about 4.5 to 12 inches. The erosion potential of this soil is moderate.

The Speaker soil series is moderately deep (20-40") and contains less than 35 percent rock fragments in the control section. Typically, the surface texture is brown gravelly loam with moderate fine subangular blocky structure and contains approximately 20 to 30 percent pebbles and cobbles. The subsurface texture is reddish brown to yellowish red loam or clay loam with approximately 20 percent weathered pebbles. Depth to weathered bedrock is 20 to 40 inches. Permeability of the Speaker soil is moderately slow. Available water capacity is about 3.5 to 6.5 inches. The erosion potential of this soil is moderate.

The Pollard soil is deep and well drained. This soil contains less than 35 percent rock fragments in the control section. Typically, the surface is covered with a mat of undecomposed leaves, needles, and twigs about 1 inch thick. The surface layer is dark brown gravelly loam about 20 inches thick. The upper 13 inches of the subsoil is yellowish red clay. The lower 27 inches is yellowish red clay. Bedrock is at a depth of 60 inches or more. Permeability of the Pollard soil is slow. Available water capacity about 5.5 to 8 inches. Runoff is rapid on steep slopes and the hazard of water erosion is moderate to high depending on the steepness of the topography.

Beekman-Vermisa-Colestine (#9)

The Beekman soil series is moderately deep and contains more than 35 percent rock fragments in the 10 to 40 inch control section. Typically, the surface texture is brown very gravelly loam that has a weak fine granular structure and contains 30 to 60 percent angular pebbles. The subsurface texture is grayish brown extremely gravelly loam that has a weak moderate subangular blocky structure and contains 35 to 70 percent angular pebbles. Depth to fractured bedrock is 20 to 40 inches. Permeability of the Beekman soil is moderate. Available water capacity is about 1 to 4 inches. The erosion potential of this soil is high due to the steepness of the slopes. Dry ravel and mass movement are found to occur frequently on Beekman soils.

The Vermisa soil series is shallow (>20") and contains more than 35 percent rock fragments in the control section. Typically, the surface texture is yellowish brown extremely gravelly loam with weak very fine granular structure and contains approximately 60 percent pebbles and 15 percent

cobbles. The subsurface texture is light brown very gravelly loam with weak very fine granular structure and contains approximately 45 percent pebbles and 15 percent cobbles. Depth to fractured bedrock is less than 20 inches. Permeability of the Vermisa soil is moderately rapid. Available water capacity is 1 to 2 inches. The erosion potential of this soil is high due to the steepness of the slopes. Dry ravel potential of this soil is high.

The Colestine soil series is moderately deep (20-40") and contains less than 35 percent rock fragments in the control section. Typically, the surface layer is dark brown about 12 inches thick. The subsoil is yellowish brown gravelly clay loam about 22 inches thick. Fractured metamorphic bedrock over hard bedrock ranges from 20 to 40 inches. Permeability of the Colestine soil is moderate. Available water capacity is 2 to 7 inches. The erosion potential of this soil is high due to the steepness of the slopes and runoff is rapid.

Pearsoll-Dubakella-Eightlar (#11)

The Pearsoll soil is shallow and contains over 35 percent rock fragments in the control section. It formed in colluvium derived dominantly from serpentinite and peridotite. Typically, The surface layer is dark reddish brown extremely stony clay loam about 5 inches thick. The subsoil is reddish brown extremely cobbly clay about 9 inches thick. Serpentine bedrock is at a depth of between 10 and 20 inches. Permeability of this Pearsoll soil is slow. Available water capacity about 1 to 2.5 inches. Runoff is very rapid and the hazard of water erosion is high.

The Dubakella soil is moderately deep and contains more than 35 percent rock fragments in the control section. It formed in colluvium from serpentinite and peridotite. Typically, the surface layer is dark yellowish brown very cobbly clay loam that has moderate fine subangular blocky structure. The subsurface layer dark reddish brown very cobbly clay loam with approximately 35 to 60 percent cobbles and pebbles. Depth to serpentine bedrock is 20 to 40 inches. Permeability of the Dubakella soil is moderately slow. Available water capacity is about 1.5 to 3.5 inches. The erosion potential of this soil is high and runoff is rapid.

The Eightlar soil is deep (<40") and contains over 35 percent rock fragments in the control section. It formed in colluvium and alluvium from serpenitite and peridotite parent material. Typically, the surface layer is dark reddish brown extremely stony clay about 10 inches thick. The subsoil is dark reddish brown and dark brown extremely stony clay about 34 inches thick. The substratum to a depth of 61 inches or more is dark brown extremely stony clay. Permeability of the Eightlar soil is very slow. Available water capacity is 3.5 to 7.5 inches. Runoff is rapid and the hazard of water erosion is high.

Cornutt-Dubakella (#12)

The Cornutt soil is deep and well drained. It formed in colluvium derived dominantly from mixed ultramafic rock and altered sedimentary and extrusive igneous rock. This soil contains less than 35 percent rock fragment in the 10 to 40 inch control section. Typically, the surface layer is dark reddish brown cobbly clay loam about 6 inches thick. The next layer is reddish brown cobbly clay loam about 6 inches thick. The subsoil is dark red cobbly clay about 30 inches thick. Metavolcanic rock is at a depth of 41 inches. Depth to bedrock ranges from 40 to 60 inches.

Permeability of the Cornutt soil is slow. Available water capacity is about 4 to 8.5 inches. Effective rooting depth is 40 to 60 inches. Runoff is medium and the hazard of water erosion is moderate.

The Dubakella soil is moderately deep and contains more than 35 percent rock fragments in the control section. It formed in colluvium from serpentinite and peridotite. Typically, the surface layer is dark yellowish brown very cobbly clay loam that has moderate fine subangular blocky structure. The subsurface layer dark reddish brown very cobbly clay loam with approximately 35 to 60 percent cobbles and pebbles. Depth to serpentine bedrock is 20 to 40 inches. Permeability of the Dubakella soil is moderately slow. Available water capacity is about 1.5 to 3.5 inches. The erosion potential of this soil is high and runoff is rapid.

Appendix D: Public Input

The following is public input received for the Kerby Watershed Analysis. Most of the input was received at the public meeting held in Kerby on October 6, 1994. A handout was passed out at the meeting which had several questions attached that were designed to solicit information from the public on issues, concerns, and general information important for the Kerby Watershed. The questions are listed below followed by the individual responses for each one. Some general comments that were not specific to a question are included also.

What should the role of fire be in the future management of the watershed?

- Fire should have no role in future management unless it's caused by nature.
- As little as possible. Why is it that natural fires or light burns are OK for ecosystem forestry, but slash burns from logging are terrible. Smoke is smoke.

What can be done to reduce the wildfire hazard and risk in the rural interface and residential areas of the watershed?

- Log high risk trees.
- Leave all the big trees; 200 large trees per acre would be less hazardous than 25 large and lots of scrubby trees per acre.

What are the threats to the special status and special emphasis plant species existing in the watershed and how should we manage for them?

- Threats are road building, logging. We manage them by avoiding the intrusion of man-made machines. Hiking trails are OK, but no roads.
- No threat in the long run. No activity is no assurance plants will be here forever.

What has been the role of fire and other natural processes in the development and maintenance of plant communities and how has fire suppression affected:

Structure and composition of existing plant communities?

- If everything were left as it originally was, fire is simply a part of nature that cleanses and then restores. Would help them exist longer to get larger.

Health, vigor, and stability of existing forests?

- Our existing forests are so small that fire suppression is so necessary. Would, therefore, increase health and vigor and stability.

- Logging, same affect.

Amount and distribution of seral stages and stages of stand development?

- Unfortunately, these are mostly tree farms and not forests. Fire suppression is necessary to perhaps restore them to "forest" status.

- Spotty.

Amount of old growth?

- Save what's left. There should be a moratorium on cutting any old growth, before we all face the no-reversal effect, i.e., changing climatic conditions, soil conditions, H_2O quality and quantity and the amount of oxygen!

- Less.

What effect has forest management practices and other human development activities (farming, ranching, home building, etc.,) had on:

Structure and composition of existing plant communities?

- Generally a negative effect on all, especially old growth. However, home building can be allowed in some existing plant communities if it doesn't turn into a mobile home tract site. Perhaps 1 house per 40 acre parcel is OK. Farming and ranching should concentrate in valleys, not forest land.

Health, vigor, and stability of existing forests?

- Healthier.

Amount and distribution of seral stages and stages of stand development?

- Less.

Amount of old growth?

- Very negative effect. Definitely no farming and ranching. Concession could be made for home building if it doesn't intrude so much into removing very much old growth.

- More.

What are the threats to the special status and special emphasis wildlife species existing in the watershed and how should we manage for them?

- Threats are mostly human activity--roads, hunting, logging, etc. We should give them huge buffers and lots of room.

What has been the role of fire and other natural processes in the development and maintenance of wildlife habitats and how has fire suppression affected spatial distribution of habitat types and composition and populations of wildlife species, structure of habitat types (snag, down woody debris, canopy layering, etc.)?

- Again, in its natural state, fire can be a blessing in disguise. But as it is today, we have ravaged so much of nature that fire suppression is so necessary for both spatial distribution and composition and populations of wildlife species and habitat structure.

What effect has settlement and associated human activities (timber harvest, home construction, roading, etc.,) had on spatial distribution of habitat types, composition and populations of wildlife species, and structure of habitat types (snag, down woody debris, canopy layering, etc.)?

- All a general negative effect, although road building and timber harvest are the worst offenders. Home construction needs to be carefully monitored. No small subdivisions. A 40-acre minimum and a home built to blend into nature would be best. Occupants of such homes should be very environmentally conscious. Minimum impact is the key.

What are the special and unique habitats and how should we manage for them?

- All wildlife and old-growth forests are special and unique habitats. We don't need for them to be classified as "endangered" before we show some concern. That would be most unintelligent and immature. Almost like being kindergarten kids! All old growth areas and its wildlife should be protected.

Is there a water quantity problem in the Kerby Watershed?

- Yes.
- Yes.

What are the factors affecting water quantity?

- Logging, road building, ranching, and farming on large scale.
- Ten years of drought.

Is there a water quality problem in the Kerby Watershed?

- Yes.
- No.

What are the factors affecting water quality?

- Logging, road building.
- Amount of water.

How do forest management/timber harvest activities effect water quantity/quality?

- Very negative effect. We note a drastic change in both areas after any timber harvest activity, i.e., muddy water and having less water each year.
- Increase quantity and quality.

How do mining activities effect water quality/quantity?

- Terribly, especially if the tailings are not monitored carefully.

What are the current riparian conditions and how does riparian condition affect fish habitat and populations?

- Current riparian conditions are poor in some areas, usually where there is human activity on a large scale. Riparian conditions affect spawning and water quality in times of rain, storms, and, therefore, affect populations in turn.
- Good riparian conditions. Not enough water.

How does Kerby Watershed affect fisheries in the Illinois River?

- All watersheds affect fisheries in all rivers. The more you pollute upstream, whether it's logging, mining, ranching, it all goes downstream. This is common knowledge. Even illegal use of water resources like pumping out of creeks for horses, ranching, etc., has negative effect.

Does the Kerby Watershed provide high quality habitat for resident and anadromous fish?

- No.

- Yes.

What are the factors affecting stream productivity and habitat for fish populations?

- Logging, road building, ranching, large scale farming, mining, illegal use of water resources, damage of riparian areas upstream by small scale ranching.

What are the fish population trends in the Kerby Watershed?

- Trends are going down. We have less and less today and the year before.

How have rural urbanization and land use activities affected fish habitat?

- Illegal use of water resources and excessive or large scale ranching and farming, ignorant use of riparian areas of small creeks or streams, clearcutting and selective cutting where 25-50 medium sized trees are left per acre--in other words, all unnatural use of the land has negative effects on fish habitats.

What are the special and unique areas in the Kerby Watershed (i.e., Eight Dollar Mountain, Lime Rock Cave, Illinois Wild and Scenic River, Botanical Emphasis Area, Illinois River State Park, etc.)?

- All of the above would be special and unique areas. Also all the wildlife associated with them. Fish and plants included.

What are the values these special areas are being managed for?

- Mostly for nature to be left at peace. Secondly, for human benefit--we need to regain our connection with our natural world.

What activities should be prohibited to protect those unique values?

- Timber harvesting, road building, over-fishing, over-watering upstream, ranching (large and small scale), large-scale farming. NOTE: Timber harvesting to include "selective" as well as clearcutting.

How does the watershed provide for human/social values?

- Provides home use, gardens to be self-sufficient, clean water and unpolluted air. Spiritual and natural connection with the earth. Feel that this question ought to have been turned around: how do human/social values affect the watershed? Watersheds exist. We're the encroachers so we should take special care and be stewards.

What are the watershed specific conflicts for these values?

- Feel that sometimes human/social values are so low that it's hard to answer this question. If we had high human/social values, there would be no need for all these questions. Everything would be quite clear.

How does the watershed provide for human/economic values?

- Small cottage industries, small scale wood products industry, and pole work and pole furniture and buildings. The watershed provides all our basic physical necessities--air, food, and shelter. Besides it also provides spiritual necessities if we can take care of it. Also, if we expect the watershed to provide for us economically, then we should not overuse it to its end.

What are the watershed specific conflicts for these values?

- Steep terrain, wildlife, lack of surface water, lack of enough old growth or large tracts of forests.

What effects have human development activities had on the social and economic values of the watershed (i.e.,. housing, roads, landfills, etc.)?

- Human activity that demands large scale interference with the forests or water usage affects everyone economically and socially, especially in the long run. Selective cuts that leave 25 trees per acre aren't a forest anymore--increases wildfire danger, destroys water quality/quantity. Roads fragment forest areas. Subdivision housing also fragments it.

What do you know about the Kerby Watershed that we should know?

- People moving in from California/elsewhere get so gung-ho about ranching. Horse paddocks are, therefore, set up next to streams, creeks--small horse paddocks that is, with

4-5 horses. This really damages the riparian areas that all lead to the Illinois River. Illegal use of water to water grasses for horses is another damaging factor.

- I'm involved with IV Community Response Team in long-term planning. Water quantity/quality issues, regrading Kerby Ditch, and long-term watershed rehabilitation are my concerns.

What values are important to you?

- Preservation of what's left of wildlife--from the big-eared bat and spotted owl to the tiny wildflowers. Human values may be increased by enlightening the public with careful use of environment to preserve our way of life both economically and socially.

- Logging, jobs, quality of life.

- Quality of life: conservation of resources, rehabilitation of riparian zones/watershed, mining in waterways, toxic contamination from dumps, preservation of old-growth.

- Better fish and wildlife habitat and responsible harvesting of <u>some</u> timber.

What are your interests?

- Interested in seeing areas around Lime Rock, etc., made into a forest reserve or mini-national park--like status for the use and enjoyment of hikers, sightseers, and rock climbers, naturalists, etc. Interested in seeing an increase in cottage industries, especially in woods and woodcraft. Small mills (one or 2-man operations) could mill oak, madrone, and fir-pine for furniture crafters, poles could be encouraged for use in building/construction.

- Illinois River, wildlife preservation. Long-term mindful development of IV with preservation of quality of life. Water conservation.

- Management of watersheds as a whole.

Other comments?

- There should be a moratorium on all timber sales where private/public land is already so fragmented to the point where it may sustain us all--human and wildlife. We should build up our stocks of "green banks" first and then be able to "harvest" with care (i.e., small very selective cuts) that don't make such a great impact to the natural environment. If one takes a moment to look at nature, it's telling us what is right and what's wrong. Wrong is anything that impacts it greatly--we suffer the consequences of our own doing. Right is anything that is done/accomplished naturally, i.e., it provides little or no impact on us or the environment.

- The BLM should be sued for not, at a minimum, salvage logging dead and dying timber on BLM managed lands. This could be done without impacting the watershed. I think this is just a 2-3 year delay process to not sell timber. You remove the logging and mill workers from this area and you will have a wilderness. If that's your goal--tell us now.

- I'm very interested in increased information base for watershed analysis. I hope you're coordinating with USFS and other agencies in preparing full analyses.

General Comments:

- Would like to see private landowners to start managing their land. Maybe an incentive ($20/acre) to manage it.

- Would like to see salvage operations used as a tool for the management and to recover already burned timber to bolster the community's economy.

- Rough and Ready Lumber Co. would like copy of vegetation overlay.

- Illinois Valley Historical Society would like copies of all GIS overlays and others.

Appendix E: Kerby Watershed Precipitation Data

Appendix F: Historic Mining Activity in the Kerby Watershed

The gold mining currently taking place in the Kerby watershed consists of dredging in the streams and the Illinois River.

Historic gold mining operations within the watershed are as follows:

Illinois River/Josephine Creek - Old Ray Placer Mine.

Owner: Oregon Placers, Inc., Selma, Oregon.

Location: Secs. 19, 29, and 30, T. 38 S., R. 8 W., at mouth of Josephine Creek.

Area: Claims cover 2-1/2 miles along Illinois River.

Equipment: Gasoline electric shovel, washing plant with Pan-American jigs, 2000-yard capacity. Equipment was moved to Rocky Gulch placer, Galice area, July 23, 1940.

Free and Easy Gold Mine

Location: Sec. 7, T. 35 S., R. 8 W.

History: "The Siskiyou Sunset Mining and Developing Company has a deserted mine, generally known as the Free and Easy, in the large serpentine area 2-1/2 miles west of Kerby. Several tunnels and other openings were made in the serpentine on the south slope of the ridge, but they are now caved in. In the valley, a few hundred feet below the mine, there is a small Huntington mill long unused. This company was dissolved January 7, 1911."

The mine produced flaky "greasy" gold.

Roseburg and Fidelity Group Gold Mines.

Location: Sec. 7, T. 39 S., R. 8 W.

History: "The Roseburg group of six claims and the Fidelity group of four claims lie above the head of Tennessee Gulch, 3 miles southwest of Kerby, at an elevation of nearly 2,500 feet. These claims cluster about the southwest end of an area of granular greenstone surrounded by serpentine whose relations were not fully determined."

"Portions of Tennessee Gulch have afforded rich placers. Claims were taken up and a little arrastre built 40 years ago near the head of the gulch. Two tunnels have been run, one N. 70 deg. E. and the other N. 70 deg. W. near the contact of the greenstone and serpentine. The cellular quartz veins containing free gold are in the greenstone and are

approximately parallel to the irregular contact, ranging from N. 50 deg. to 80 deg. E., with nearly vertical dip. Pyrite is the most abundant ore. No distinct trace of copper minerals were observed."

"A large tunnel is being run at a considerable lower level. It is already in 170 feet in greenstone and nearly the supposed horizon of the veins which appear at the surface."

Besides gold, nickel was also mined at various locations in the area. A few of the more important nickel laterite deposits in southwestern Oregon are in Josephine County.

The first nickel exploration in Josephine County was in 1942 by Freeport Sulfur Company at Eight Dollar Mountain. Several other companies explored Josephine County deposits during the 1950s and are doing so currently on a limited basis.

Josephine County nickel laterite deposits occur in the Eight Dollar Mountain arm of the Josephine ultramafic sheet that extends from the California line up to Eight Dollar Mountain. The deposits are found on Eight Dollar Mountain, Free and Easy Ridge, Woodcock Mountain, Josephine Creek, the Rough and Ready Creek Group, and the Cedar Spring deposit along the County line northwest of Oregon Mountain.

Nickel mines of the past and present of note are:

Eight Dollar Mountain Area -

Location: Sec. 20, and N 1/2 sec. 29, T. 38 S., R. 8 W., on Eight Dollar Mountain, 3 miles south of Selma, Oregon; elevation between 3000-4000 feet.

History: About 70 years ago a Mr. Lewis made a map of the group showing two ore zones that intersect N. E. of the summit of Eight Dollar Mountain. It is reported that in 1925-1929, a Mr. Smith had some assays done in Germany by Dr. Phil O. V. Grossman, which showed the presence of chromite and a fraction of one percent nickel. This sample was reported as representing 50 million tons of ore from Eight Dollar Mountain.

Development: Principal development work in the past was in the nature of cuts and trenches; several small adits have been run with the object of developing chrome ore.

Recent Activity: In 1992 the current claimants proposed a test mine totalling two acres on Eight Dollar Mountain. The actual mining did not occur due to primarily economic and environmental reasons.

Limestone was also mined in Josephine County. Limestone is one of the most widely used mineral commodities and is essential to a modern industrial society.

The largest and best known of the limestone masses in the County is about 25 miles east of Cave

Junction and is the host for the Oregon Caves. This limestone feature extends to the northwest to include the Lime Rock area and the cave on Lime Rock. That parcel, in T. 39 S., R. 8 W., section 11, was acquired by the BLM in a land exchange in 1994, and was originally public land that was acquired by Portland Cement through a mineral patent in which limestone was the valuable mineral.

Limestone mining history is noted below:

Holton Creek Limestone.

Owner: W. C. Smith, Grants Pass, Oregon.

Location: 3 miles south of Kerby by road and trail from Chapman Creek in NE 1/4 NE 1\4 sec. 14, T. 39. S., R. 8 W. The locality is usually designated as Lime Rock Peak.

Area: 40 acres (two unpatented mining claims).

History: The property was discovered and located by J. E. Verdin in 1910. It was sold to the present owner in 1912.

General: The outcrop is about 200 feet long and 185 feet high. The stone is fine-grained and is said to run over 98 percent $CaCo_3$. A sample returned 0.96 percent insoluble. Elevation is about 2,800 feet and about 1,000 feet above the end of the road. Maximum snowfall is 6 feet. There is a spring with sufficient water for domestic purposes.

Update: This area was recently acquired by the BLM through a land exchange. In 1959 the land was patented through the mining laws to Portland Cement.

Chromite occurs in southwestern Oregon in ultramafic intrusives such as peridotite and dunite, which in many places have been altered to serpentine. The chromite is found as thin stringer, pods or kidneys, disseminated deposits, and beach sand deposits. The pods or kidneys, are irregular in shape and vary in size from a few ton to more than 1,000 tons. Chromite in this type of deposit is often massive enough to be mined, sorted, and shipped as lump ore.

Shipments of chrome ore from Josephine County properties to the Grants Pass purchasing depot during World War II, from April 1942 through December 1945, amounted to approximately 13,600 short tons. The Oregon Chrome Mines, Inc., was the largest and most consistent producer in the County. This company produced almost 9,000 tons of the above total.

Appendix G: McKelvey Class Rating Definitions

Class I - Meets all life requirements (optimal). Nesting, foraging, roosting, and dispersal. Canopy closure greater than 60 percent. Canopy structure usually multi-layered and diverse and includes snags, mixed species, and large "wolf trees."

Class II - Meets foraging, dispersal, and roosting. Canopy closure greater than 60 percent. Open enough below canopy to permit flight. Canopies can be single layered.

Class III - Meets no known requirements for spotted owls. Doesn't provide nesting, foraging, roosting, or dispersal. Canopy closure 40 percent or less. Doesn't meet requirements due to some kind of disturbance but has the biological potential to develop into class I or II.

Class IV - Meets no known requirements for spotted owls. Doesn't provide nesting, foraging, roosting, or dispersal. Canopy closure 40 percent or less. Doesn't meet requirements due to site limitations and would not likely have the potential to develop into class I or II. Examples could include oak woodlands, serpentine areas, etc.

Class V - Provides for spotted owl dispersal habitat only. Canopy closure between 40 and 60 percent. Needs to be open enough below canopy to allow for flight and avoidance of predators. Has the biological potential to develop into nesting, foraging, or roosting habitat.

Class VI - Provides for spotted owl dispersal habitat only. Canopy closure between 40 and 60 percent. Needs to be open enough below canopy to allow for flight and avoidance of predators. Not currently meeting nesting, roosting, or foraging requirements due to site limitations and would not likely have the potential to develop into class I or II. Examples could include low site lands, woodlands, serpentine areas, etc.