Water Quality Restoration Plan
Rogue Basin
Lower Rogue Sub-basin
Rogue River Horseshoe Bend

Bureau of Land Management (BLM), Medford District Office

2003

Rogue River Horseshoe Bend at a Glance

Hydrologic Unit Code (identification #)	1710031004
Watershed area/ownership	Total: 104,224 acres BLM Ownership: 99,563 acres (95.5%) Forest Service Ownership: 639 (<1%) State of Oregon: 795 (<1%) Non-federal Ownership: 3227 (3%)
Stream Miles assessed	Total: 36.4 miles BLM Ownership: 36.4 miles
303(d) listed parameter	Temperature
Key Resources and uses	Salmonid, aesthetic, recreation
Known Impacts (human)	Timber harvest, roads, mining, agriculture, recreation, communication site, utility corridor, inactive airstrip
Natural Factors	Geology: metasedimentary with portions of metavolcanics Soils: various series and complexes; many areas of shallow soils with low water holding capacity, and relatively infertile - depth and fertility typically increases moving from east to west

Statement of Purpose

This water quality restoration plan (WQRP) has been prepared to meet the requirements of Section 303d of the 1972 Federal Clean Water Act.

This plan covers land managed by the Bureau of Land Management (BLM) within the Rogue River Horseshoe Bend watershed from the confluence of Grave Creek to the Mule Creek confluence.

The Oregon Department of Environmental Quality (DEQ) has lead responsibility for creating Total Maximum Daily Loads (TMDLs) and Water Quality Management Plans (WQMP) to address water quality impaired streams for Oregon. This WQRP will be provided to the DEQ for incorporation into an overall WQMP for the Lower Rogue River Subbasin. DEQ has a comprehensive public involvement strategy, which includes informational sessions, mailings, and public hearings. The BLM will provide support and participate in this public outreach.

Legal Authorities to be Used

Clean Water Act Section 303(d)

Section 303(d) of the federal Clean Water Act (CWA) as amended, requires states to develop a list of rivers, streams, and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. Waters that need this additional help are referred to as "water quality limited" (WQL). Water quality limited waterbodies must be identified by the Environmental Protection Agency (EPA) or by a delegated state agency. In Oregon, this responsibility rests with the DEQ. The DEQ updates the list of water quality limited waters every two years. The list is referred to as the 303(d) list. The CWA section 303 further requires that TMDLs be developed for all waters on the 303(d) list. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the TMDL, which will restore the water quality and result in compliance with the water quality standards.

Northwest Forest Plan

Federal land management is guided by the Northwest Forest Plan (NFP) that creates a system of reserves to protect a full range of species and their habitats. Biological objectives of the NFP also include assurances that adequate habitat will be retained to aid in the “recovery” of late-successional forest habitat-associated species and prevention of species from being listed under the Endangered Species Act (ESA). The Aquatic Conservation Strategy (ACS) is an essential component of the NFP which ensures stream, lake, and riparian protection on Federal lands.

ACS Objectives. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within USFS and BLM lands within the range of the northern spotted owl. The strategy seeks to protect salmon and steelhead habitat on lands within the range of Pacific Ocean anadromy.

The ACS strives to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitat. This approach seeks to prevent further degradation and restore habitat over broad landscapes. Because it is based on natural disturbance processes, it is recognized that it may take a decade to accomplish all ACS objectives. Some improvements in aquatic ecosystems, however, can be expected in 10 or 20 years.

Rogue River Horseshoe Bend

Water Quality Restoration Plan 2003

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Rogue River Horseshoe Bend
Watershed Analysis

Summary

MORPHOLOGY	
Geographic Province	Klamath mountains
Watershed size	104,224 acres
Elevation range	~400 - ~4300 feet – mouth of Grave Creek to confluence of Mule Creek
Drainage pattern	dendritic
Total streams	956 miles
Drainage density	5.9 miles/mile^2
Sixth-field watersheds	Rogue-Whisky 15,108 acres Rogue-Howard 15,363 acres Rogue-Big Windy 16,386 acres Jenny 11,388 acres Kelsey 11,546 acres Rogue-Missouri 14,877 acres Mule 19,556 acres Total 104,224 acres
METEOROLOGY	
Annual precipitation	Average annual precipitation ranges from 40 inches in the eastern portion of the watershed to 150 inches in the central western portion.
Precipitation Timing	Western portion of watershed is marine climate with cool, very wet winters and temperate, mild summers. The central and eastern portion is Mediterranean climate with wet winters and dry hot summers.
Temperature range	0-110 degrees F seasonally
SURFACE WATER	
Minimum flow	Mainstem Rogue River is currently regulated through outputs from Lost Creek and Applegate Dams. Lowest flow recorded since filing of the dams was 744cfs near Grants Pass. Historically the Rogue near Grants Pass had a minimum flow of 195cfs. Many tributaries in this region dry up during hot summer months.
Maximum peak flow	Maximum flow on the Rogue near Grants Pass was 290,000 CFS in Dec 1964; before the Lost Creek and Applegate Dams were built.

Reservoirs	No large reservoirs within the watershed. Several small pump changes and heliponds; one constructed helipond. Applegate and Lost Creek Dams regulate flows approximately 50 miles upstream of watershed boundary.
Water quality limited streams	About 30 miles (listed for temperature above 64 degrees) <u>Sixth field water quality limited streams:</u> Whisky Creek West Fork Whisky East Fork Whisky Rogue River: Illinois to Grave Ck.
GEOLOGY	
Geologic Type	Marine volcanic, metamorphic sedimentary and ultra-mafic rock. Primarily Rogue and Dothan Formations.
Soils	Shallow depth, many different series and complexes. Generally very low water holding capacity, relatively infertile.
BIOLOGICAL	
Vegetation	Primarily mixed evergreen; conifers and hardwoods. Vegetative communities differ by slope, aspect, elevation and soils.
Total fish streams	89 miles
Candidate, threatened, or endangered species	Spotted owl: 28 active sites; 13 100-acre core areas in north section; south section protected by other land use allocations Marbled murrelet: potential nesting range, west half of watershed within 50 miles of coast (none found) Bald eagles Fish: Oregon Coast coho salmon steelhead
Survey and Manage species	Fungi, del Norte Salamander, mollusks, bryophytes, lichens and red tree vole, great grey owl
Special Status Plants	Numerous species and locations
HUMAN INFLUENCE	
Counties	Josephine Curry Douglas (small portions along northeast boundary) Coos (very small portions along northwest boundary)
Roads	416 miles
Road density	2.6 mi/ mi^2
Streams within one tree length of roads	137 miles
Fish Streams within one tree length roads	3 miles

Timber production	GFMA 21,935 acres gross (9,255 acres outside all reserves) Major BLM timber component is large merchantable timber		
Utility corridors	fiber optics line		
Communities	No communities, scattered rural residential		
PUBLIC LANDS			
BLM Medford lands	99,563 acres (95.5 %)		
	BLM Medford Land Use	**Acres**	**(Percent)**
	Late-successional Reserves	61,786	(62)
	Connectivity/Diversity Blocks	1,282	(<1)
	General Forest Mgmt. Area -total acres -usable acres after riparian reserves, owl cores, etc	 21,935 (9,255)	 (22)
	Recreation Sites	25	(<1)
	River Corridor & Wilderness	14,535	(14)
	Total	99,563	
State of Oregon lands	795 acres		
Forest Service lands	639 acres		

Introduction

This document is prepared to comply with the Environmental Protection Agency requirements. This WQRP is the overall framework describing the management efforts to protect and enhance water quality on federal lands in the Lower Rogue River Subbasin.

This document will detail the extent that federal actions may contribute to changes in water temperature as well as outline efforts to protect and enhance water quality on federal lands in this watershed.

The WQRP will include the following elements:

1. Condition assessment and problem description
2. Resource Considerations
3. Limiting Factor Analysis
4. Goals and objectives
5. Timeline for implementation, cost, funding
6. Responsible Parties
7. Reasonable Assurance of Implementation
8. Monitoring/Evaluation Plan
9. Public Participation Plan

Element 1: Condition assessment and problem description

Table 1. Land Ownership in the Rogue River Horseshoe Bend watershed.

Ownership/Land Use	Acres	Percent of Rogue River Horseshoe Bend watershed
Medford BLM	99,563	95.5
State of Oregon	795	<1
Forest Service	639	<1
Other non-federal lands	3,227	3
Total	104,224	100

Preliminary data indicate that the streams in the Wild Rogue watershed exhibit some of the best water quality and riparian habitat in the Medford District. The solid block ownership pattern, large unroaded area, along with the rugged nature of the terrain, has largely deterred human access and consequent disturbance activities. A majority of the lower order stream reaches have remained unaltered and continue to function as they have for thousands of years. Higher ordered streams within the Rogue formation have a history of hydraulic and placer mining activity. Placer mining is still ongoing in several locations, particularly along Whisky Creek. Stream channels have been altered and riparian vegetation has been destroyed as a result of mining, primarily along Whisky Creek and Mule Creek. Associated clearing has also altered riparian vegetation on private parcels of land. Streams in the Dothan formation have had little, if any, mining activity since there is little or no gold associated with these rock types.

A large portion of the Rogue River Horseshoe Bend watershed is located in the transient snow zone, making it prone to flood events that often occur as a result of rain on snow events. Loss of forest vegetation resulting from events such as large fires and logging operations increases the magnitude of these events. Much of the upper portion of this watershed consists of steep, confined channels. High scour marks within these channels indicate that large volumes of fast moving water have occurred during flood events. Consequently streambanks that have been striped of vegetation and soils below the high water mark are common in the upper portions of this watershed. In lower portions of the watershed large flood events such as those that occurred in 1861, 1890, 1927, 1955, 1964, 1974, and 1997, have had devastating consequences on the anthropologic environment, and have altered stream courses. The Rogue River is now controlled by Lost Creek and Applegate dams which will likely assist in reducing flood water levels.

Road density is important since roads result in more rapid runoff, decreased groundwater interception, can cause channel confinement at crossings, and can increase sediment to streams. According to the Kelsey Whisky EIS (Mar 03), most portions of this watershed have road densities that are below the 3 miles of road per square mile threshold set by NMFS for properly functioning systems. The exception to this is in the northern portions of the Kelsey Creek and Mule Creek HUC 6 watersheds, where road densities near four miles/mile^2 exist. Within these areas natural systems have been heavily impacted by timber harvest. These high road densities have likely altered the duration and timing of localized runoff rates during storm events. However, road densities in these two HUC 6s are not evenly distributed. The southern portions of these sub-basins are largely unroaded and include a portion of wilderness area. According to current GIS road and stream data, about 33 percent of roads within the Rogue River Horseshoe Bend watershed are within 200’of streams, but few cross streams. Fish are not present in areas where crossings do occur as a result of natural barriers downstream.

APPLICABLE WATER QUALITY STANDARDS

Beneficial Uses

Oregon Administration Rules (OAR 340–41–322) list the designated beneficial uses for Rogue River waters. The specific beneficial uses occurring in the Rogue River Horseshoe Bend watershed are presented in Table 2.

Table 2. Beneficial uses in the Rogue River Horseshoe Bend Watershed

Beneficial Use		***Beneficial Use***	
Public Domestic Water Supply	✓	Anadromous Fish Passage	✓
Private Domestic Water Supply	✓	Salmonid Fish Spawning	✓
Industrial Water Supply	✓	Salmonid Fish Rearing	✓
Irrigation	✓	Resident Fish and Aquatic Life	✓
Livestock Watering	✓	Wildlife and Hunting	✓
Boating	✓	Fishing	✓
Aesthetic Quality	✓	Water Contact Recreation	✓
Commercial Navigation & Trans.	✓	Hydro Power	

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated *beneficial use*s. In practice water quality standards have been set at a level to protect the most sensitive uses. Seasonal standards may be applied for uses that do not occur year round. Cold-water aquatic life, such as salmon, and aesthetic quality are the most sensitive *beneficial uses* in the Rogue River Horseshoe Bend watershed.

The Clean Water Act of 1972 as amended by the Water Quality Act of 1987, provides direction for designated beneficial uses. DEQ is responsible for developing a list of streams that fail to meet established water quality criteria for one or more beneficial uses. These designated streams are often referred to on the state's 303(d) list. Water quality monitoring throughout the Rogue River Horseshoe Bend watershed has resulted in 303d listings for about 30 miles of streams that have failed to meet established criteria for one or more beneficial uses. (See Table 3 and Map 1).

Table 3. Water quality limited streams in the Rogue River Horseshoe Bend watershed (2002)

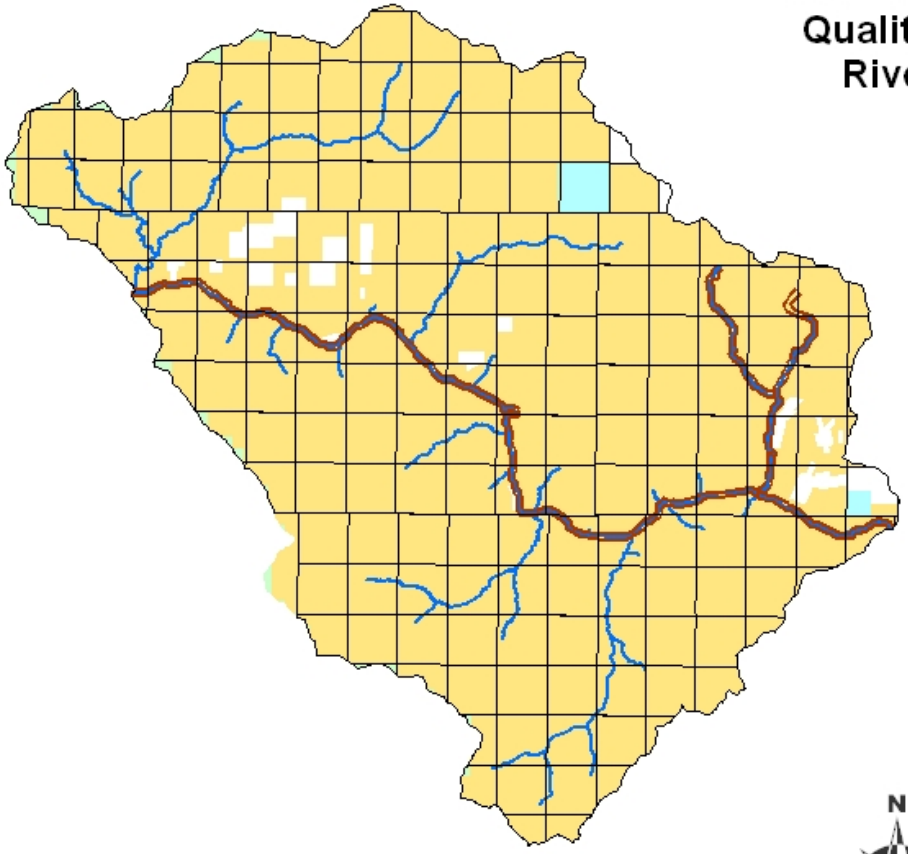
Stream	Water Quality Parameter	Miles
Whisky Creek	Temperature	2.4
West Fork Whisky Creek	Temperature	4.2
East Fork Whisky Creek	Temperature	3.7
Rogue River (Mule Creek to Grave Creek)	Temperature	20

* Mule Creek is listed as a potential concern for temperature

Streams listed for temperature do not meet the criteria (e.g. the rolling 7 day average of the daily maximum temperature) for anadromous fish rearing (e.g. temperature exceeds 64 degrees). This also applies to the resident fish and other aquatic life, particularly resident cutthroat, which are present in these streams (Map 1).

The Rogue River is a major migration corridor for anadromous fish. Chinook and coho salmon as well as summer and winter steelhead are known to spawn in the larger creeks within this watershed during moderate to high flow periods, but are not found in the low order tributaries. Resident cutthroat trout are believed to inhabit a large portion of the Rogue River and the higher ordered streams in this watershed. Some streams within the southern portion of this watershed may have less than optimal conditions for fish habitat as a result of mining, timber harvest, road building, and fire suppression. In most areas in the northern section of the Rogue River Horseshoe Bend watershed, it is believed that habitat and spawning conditions are likely near their historic potential. High channel gradients, lack of spawning gravel, and relatively frequent landslides on low order side channels are natural barriers that are potentially limiting fish distribution in this watershed. There are currently no known artificial barriers within this watershed that are inhibiting fish distribution.

MAP 1: Fish Distribution & ODEQ Water Quality Limited Streams in the Rogue River Horseshoe Bend Watershed



LEGEND

- wr_sections polygon
- 303d Listed Streams
- Fish Bearing Streams

OWNERSHIP

- SISKIYOU NF
- CONGRESSIONAL RESERVE
- OREGON DEPT OF FORESTRY
- MEDFORD BLM
- OTHER

N
W E
S

0 3 6 Miles

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Table 4 lists historic and present condition information about elements that may affect temperature on the Rogue River.

Table 4. Historic and current conditions of selected elements.

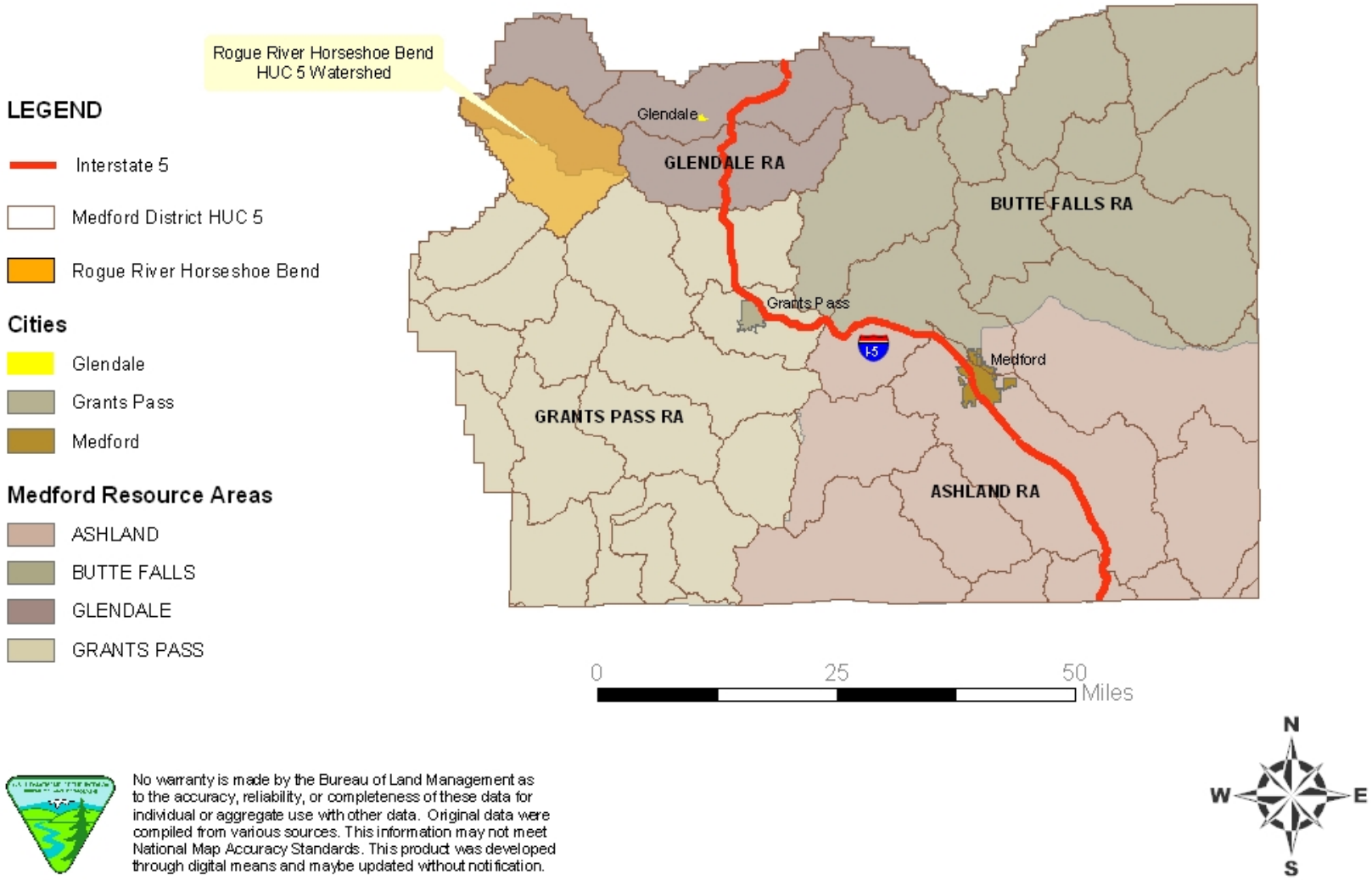
Riparian Vegetation	
Historical Condition	• Hardwood dominated early to late seral conditions resulting from regular large scale fire events in this watershed. Though streams flowed through a mosaic of stand ages due to fire activity, riparian areas of lower ordered streams were generally well shaded by the large brush and shrub component along these narrow channels.
Present Condition	• Most riparian areas in this watershed, with the exception of the northern portions of Kelsey and Mule Creek subwatersheds, exhibit conditions that are within the range of natural variability due to limited human influence. Some areas along Whisky, Mule, and Missouri Creeks may be outside this range due to current mining activities and changes in peak flows resulting from upland timber harvest.
Forest Health & Productivity	
Historical Condition	• Frequent, large scale fires of varying intensity maintained a mosaic of stand ages and densities.
Present Condition	• Many areas of this watershed still exhibit historical conditions. Portions of harvested areas have densely planted and overstocked (increased competition) stands. Soil compaction has altered small scale hydrologic patterns in areas where tractor harvest was used.
Roads	
Historic Condition	• Few roads before industrial timber harvesting began in the early 1950's. Several ridgetop trails and the streamside trail along the Rogue River were used by local Indians prior to early settlers. Trails began to be converted into roads in the 1930's.
Present Condition	• Most roads in this watershed are presently in fair to good condition. There is currently a total of about 416 miles of road with varying distribution. Maintenance on some non-arterial roads has been reduced as a result of decreased funding. These roads are in various stages of deterioration from being overgrown to, in some cases, having sections that have slid. Many of these deteriorating roads have been inventoried for decommission. • Road density averages 2.6 mi/mi^2
Flow Regime	
Historic Condition	Prior to the building of Applegate and Lost Creek Dams low flows of 195 cfs have been recorded on the Rogue River by a USGS gaging station near Grants Pass.
Present Condition	Mainstem flows are now augmented by releases from Lost Creek and Applegate dams upstream. The lowest recorded flow since the dams began operation was 744 cfs at the USGS gaging station near Grants Pass.

Element 2: Resource Considerations

Rogue River Horseshoe Bend is an approximately 104,224 acre watershed that contains mainstem river corridor for migrating anadromous fish in Southwest Oregon. The Rogue National Wild and Scenic River and the Wild Rogue Wilderness in this watershed provide numerous recreational opportunities to the public. A majority of this watershed is managed by Medford BLM.

The Rogue River Horseshoe Bend Watershed is a fifth-field watershed in the Klamath Mountains province, located in southwest Oregon, approximately 26 miles north of Grants Pass (Map 2)

MAP 2: Rogue River Horseshoe Bend Vicinity Map



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BLM administers about 99,563 acres (95.5 percent) of the watershed. Within the Rogue River Horseshoe Bend watershed, there are no major communities. There are scattered rural residences throughout this watershed. In addition there are also two cultural sites, the Rogue River Ranch and Whisky Creek Cabin.

Major tributaries of the Rogue River in Rogue River Horseshoe Bend include Grave Creek (enters at watershed boundary), Whisky Creek, Mule Creek, Missouri Creek, Big Windy, Jenny Creek, Howard Creek and Rum Creek. The watershed has been divided into seven sixth-field watersheds (Table 5) and 60 seventh-field watersheds ranging from about 3.4 acres to about 4485 acres (Map 3). Annual precipitation in the watershed averages about 40-150 inches, moving east to west. Extended summer drought is common.

Table 5. Sub-watersheds within the Rogue River Horseshoe Bend watershed

Sixth-field watershed	Acres	Percent of Rogue River Horseshoe Bend watershed
Rogue-Whisky	15,108	14%
Rogue- Howard	15,363	15%
Rogue Big Windy	16,386	16%
Jenny	11,388	11%
Kelsey	11,546	11%
Rogue- Missouri	14,877	14%
Mule	19,556	19%
Total	104,224	100%

MAP 3: Rogue River Horseshoe Bend 6th Field Watersheds and ODEQ Water Quality Limited Streams (Temperature)

LEGEND

Ownership

- Forest Service
- Dept of Forestry
- BLM
- Other
- Water Quality Limited Streams

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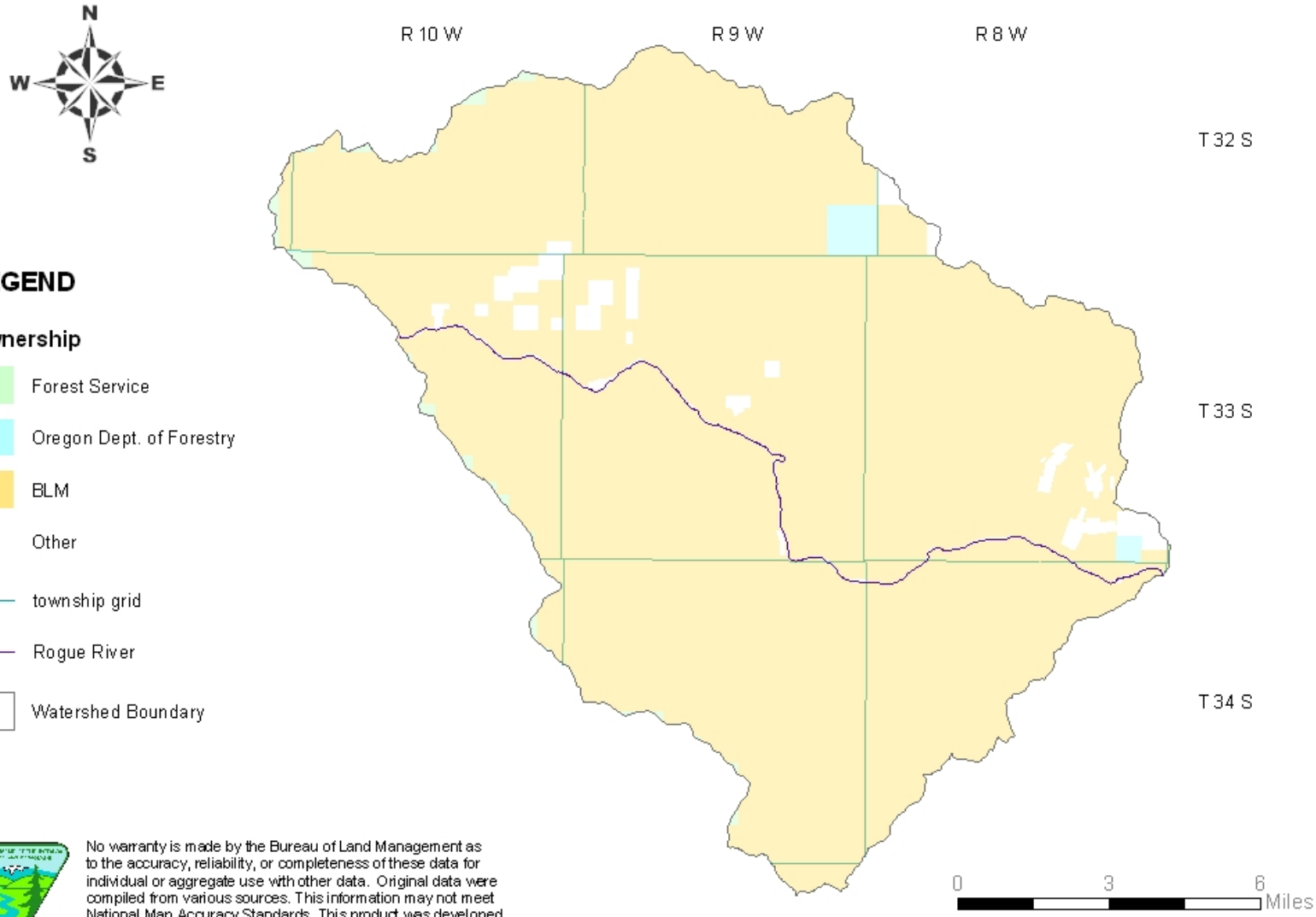
In this watershed, soils are derived from metasedimentary, ultramafic, and metavolcanic rock types. Soils resulting from sedimentary rock types tend to be deeper and have more nutrients available. Soils developed from volcanic rock types tend to be shallow and have less soil nutrients and soil development than the sedimentary. Organic matter plays an increasing role in the productivity of the metavolcanic sites. Portions of this watershed are dominated by serpentine-derived soils which are low in calcium and high in magnesium and other minerals, which produce unique vegetative communities, and preclude many plant species which are adapted to calcium-based soils.

The Rogue River Horseshoe Bend watershed is somewhat unique in that, unlike most federal lands in Western Oregon which are intermingled with non-federal lands in an alternating "checkerboard" pattern that is characteristic of much of the Oregon and California (O & C) railroad lands, this watershed has minimal non-federal ownership (Table 1 and Map 4).

Land Use Allocations

The Medford District Resource Management Plan (RMP) designated several land use allocations for federal lands within the watershed. These allocations provide overall management direction and varying levels of resource protection (Map 5).

MAP 4: Rogue River Horseshoe Bend Ownership



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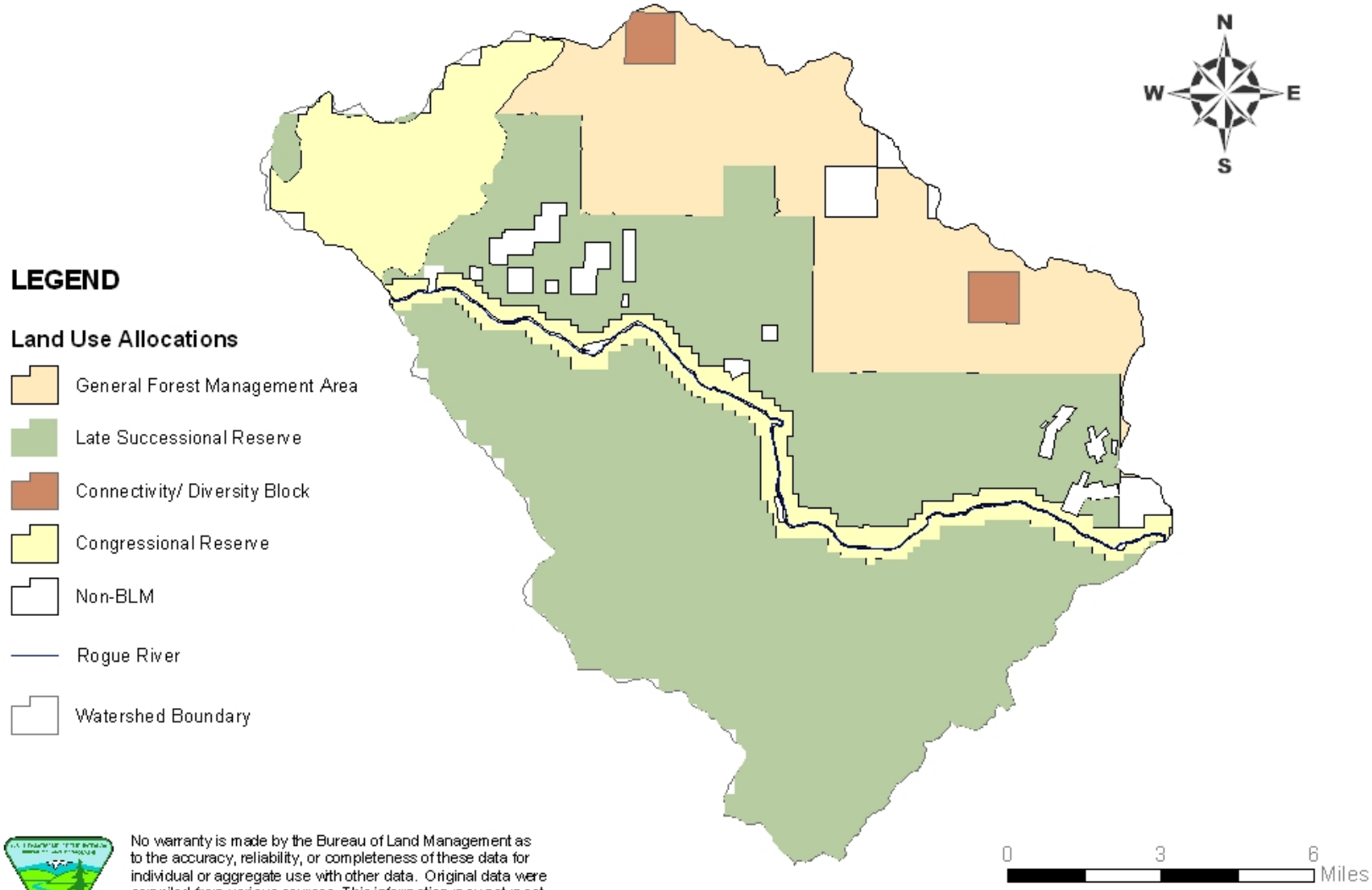
MAP 5: Rogue River Horseshoe Bend Land Use Allocations



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Late-successional reserves (LSRs) are areas designated in the RMP where the major management objective is to protect and enhance the conditions of late-successional and old growth forest ecosystems which serve as habitat for late-successional and old growth forest related species, including the spotted owl and marbled murrelet. This watershed has a large percentage of land allocated as LSR and contains 13 approximately100-acre spotted owl core areas which surround 28 active spotted owl sites.

Connectivity/Diversity blocks are generally square mile sections in which at least 25 to 30 percent of each block will be maintained in late-successional conditions. They are designed to promote movement of species associated with late-successional habitat across the landscape and add richness and diversity to the land outside LSRs. There are portions of two of these Connectivity/Diversity blocks in the watershed.

The General Forest Management Area (GFMA) is the allocation where timber harvest is a primary objective. GFMA areas only occur in the northeast portion of the Rogue River Horseshoe Bend watershed, where the RMP calls for retaining at least 6-8 large trees per acre in regeneration harvests.

Congressionally Reserved Areas are areas that require enactment for their establishment, such as wild and scenic rivers and wilderness areas. There is one of each of these congressionally established areas within this watershed.

Table 6. Federal Land Use Allocations within the Rogue River Horseshoe Bend Watershed.

Land Use Allocation	Acres	(Percent)
Late-successional Reserves*	61,786	(59.5)
Connectivity/Diversity Blocks	1,282	(1)
General Forest Mgmt.**	21,935	(21)
Congressional Reserves	14,535	(14)
Total	99,538	(95.5)

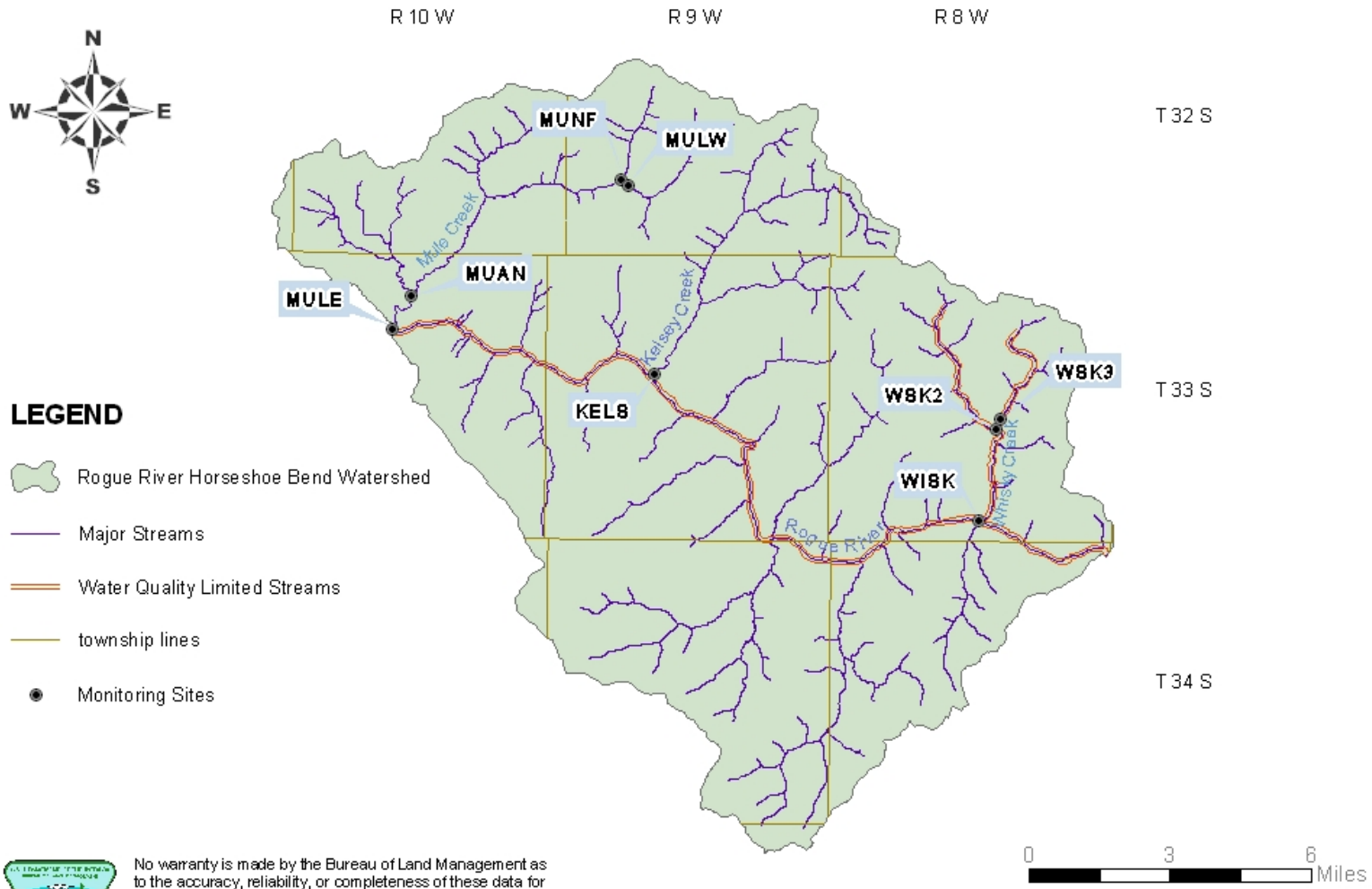
* Late-successional reserves include portions of large LSR and 100 acre spotted owl core areas.
** General forest management area includes acres of riparian zones that are withdrawn from entry (see map 5). These areas constitute about 42 percent of the total GFMA.

Section 303(d)(1) of the Clean Water Act requires that TMDL "be established at a level necessary to implement the applicable water quality standard with seasonal variations." Both stream temperature and flow vary seasonally and from year to year. Water temperatures are cool during the winter months, and only exceed the State standard between the summer months of June and September when stream flows are lowest and solar radiation is the highest. Table 7 lists the site locations where BLM monitoring has occurred. Stream temperatures exceed the standard in the Rogue River Horseshoe Bend watershed during some periods between June and September.

Table 7. Temperature Monitoring Locations and years monitored

Site ID	Site Location Description	Highest 7 day temp for period of record	1994	1995	1996	1997	1998	1999	2000	2001	2002
KELS	Kelsey Creek @ Rogue River Trail	65.3									X
MUAN	Mule Creek above North Fork Mule Creek	58.6				X					
MULE	Mule Creek above Rogue River confluence	68.4	X	X	X	X					
MUNF	North Fork Mule Creek @ confluence with Mule Creek	60.0				X					
MULW	West Fork Mule Creek above confluence with Mule Creek	66.5			X	X					
WISK	Whisky Creek @ Rogue River confluence	69.9	X	X	X	X	X	X			
WSK2	West Fork Whisky Creek @ road 33-8-26 crossing	67.3					X	X			
WSK3	East Fork Whisky Creek about 200' downstream of road 33-8-26 crossing	68.0					X	X			

MAP 6: Rogue River Horseshoe Bend Temperature Monitoring Sites



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Element 3: Limiting Factor Analysis

Within GFMA lands there are acres which have been withdrawn from intensive timber harvest. The majority of these acres were withdrawn due to rocky soils which preclude successful replanting. In addition to these land allocations, there are also several other important designations that occur within the watershed. BLM manages approximately 95.5 percent of the watershed. With the exception of about a ½ mile of Whisky Creek, all streams including 303d listed streams in this watershed occur on BLM lands. Most of the streams are listed for temperature from the mouth to the headwaters, but in many cases the location of the monitoring site was near the mouth.

Analysis of water quality limited streams in the Rogue River Horseshoe Bend Watershed

Maximum summer water temperatures in the Rogue River Horseshoe Bend watershed have probably always exceeded the current DEQ standard because the geology and soils of this watershed do not allow for a great degree of water storage. Uplands are steep and soils are relatively shallow. Recharge of streams by ground water is very limited during summer months. In addition, bedrock, which is a major component of the substrate, absorbs heat during the day and radiates it to the stream at night. With RMP allocations and management directions, the acreage harvested in this watershed is relatively small. Consequently, it is not believed that over-cutting in the riparian area is responsible for limiting water quality in this watershed. There are some highly managed and cut areas in the Mule, Kelsey, and Whisky Creek drainages that have caused localized sedimentation and removal of riparian vegetation. In Mule Creek, recovery has been rapid and many riparian areas are beginning to recover, due to higher site class in this area. Private mining operations on Whisky Creek have also resulted in loss of riparian vegetation. Summer water flow in the Rogue River is now augmented by Lost Creek Dam and Applegate Dam.

There are many factors that may contribute to elevated temperature in these streams. In many cases there is more than one factor operating on streams and may include:

- Several tributary streams have segments that have no surface flow during summer periods;
- Low summer discharge;
- Riparian cover is absent or reduced due to land practices adjacent to streams; past salvage logging within riparian zones; logging has removed shade over streams;
- Wide streams and stream orientation allow for direct solar heating;
- Wide, shallow gravel/bedrock channels;
- Relatively low gradient channels result in slower velocities therefore longer water retention time;
- High percentage of roads in or adjacent to riparian zones; and
- Placer mining.

Stream channel widths on most 1st through 4th tributary streams are narrow enough for stream-side vegetation to provide adequate shade. The stream side vegetation consists of brush,

hardwood and conifer species.

Stream Flow

The lowest 7-day low flow for the Rogue River, measured at the U.S. Geological Survey gage near Grants Pass, was 195cfs. This flow was recorded before the installation of Lost Creek and Applegate Dams. Low flows generally reflect annual precipitation levels with higher low flows in wetter years and lower summer flows in drier years. Variation in low flow from year to year is typical for this stream system. Since the dams began regulating flow, the lowest recorded discharge recorded at the Grants Pass station was 744cfs. Historic data for the gaging station is available at web site address: http://www.wrd.state.or.us/cgi-bin/choose-gage.pl Gaging station data is not included in this document due to volume of data on that web site.

Disturbance of the riparian area and stream channel from wildfires and floods can also lead to increases in summer stream temperatures. These disturbances are considered part of the natural processes, and are expected change agents considered by the ACS (FEMAT, 1993). Rogue River Horseshoe Bend watershed has a frequent fire history with return intervals averaging between 30-80 years depending on the stand characteristics, weather, and topography. In this watershed, it appears that fires are probably more frequent and intense in the hot, low elevation areas along the Rogue River than in the upper ridges where conditions are cooler and wetter. The eastern portion of this watershed also experiences a greater risk of fire due to the lower amounts of precipitation and higher summer temperatures. Recovery of riparian vegetation in areas disturbed by fire and flood will most likely experience fire and floods again in the future. The gain and loss of riparian vegetation by natural processes will fluctuate within the range of natural variability for this watershed and is outside the scope of this assessment. This Water Quality Restoration Plan (WQRP) focuses on areas where BLM management activities may exacerbate natural disturbance and result in impacts to water quality and quantity.

Factors Affecting Stream Temperature

The Rogue River Horseshoe Bend Water Quality Restoration Plan addresses stream shade, changes in channel form, and flow as the three management factors that may contribute to water temperature problems.

Temperature Factor 1. - Stream Shade

For the listed parameter, i.e., stream temperature, the beneficial uses affected are: resident fish and aquatic life, and salmonid fish spawning and rearing. The state standard for Rogue River Horseshoe Bend watershed requires that the seven (7) day moving average of the daily maximum shall not exceed 64 degrees Fahrenheit. A stream is listed as water quality limited when the rolling seven (7) day maximum average exceeds the standard.

Stream temperature is driven by the interaction of many variables. Energy exchange may involve radiation, longwave radiation, evaporative heat transfer, conduction and advection (e.g., Lee 1980, Beschta 1984). While interaction of these variables is complex, certain variables have a greater affect than others (Beschta 1987). For a stream with a given surface area and stream flow, any increase in the amount of heat entering a stream from solar radiation will have a

proportional increase in stream temperature. Solar radiation is the singularly most important radiant energy source for the heating of streams during daytime conditions (Beschta 1987).

Without riparian shade trees, most incoming solar energy would be available to heat the stream. Riparian vegetation can effectively reduce the total daily solar heat load. The stream shade assessment determined where the stream shade has been reduced by management activities and placer mining and calculated the resulting increase in total daily solar heat loading. To determine where shade problems exist and the magnitude of the problem, the stream network of Rogue River Horseshoe Bend was broken down into sections consisting of the main stem and its tributaries.
Management activities such as harvesting trees in the riparian area can increase the amount of solar radiation entering a stream. Similarly increased bedload sediment that results in increases in the stream's surface area can also lead to increases in solar radiation. Water withdrawals during summer months (Jun-Aug) may exacerbate maximum temperatures.

The BLM monitored several 303(d) listed streams between 1996 and 2002 (Table 7) to determine which portion of the streams are water quality limited. Definitive information on where stream temperatures meet the standard on stream reaches has not been analyzed. It will take several years of monitoring to determine the reaches that have temperature limiting problems.

Temperature Factor 2. - Channel Form

Changes in bedload that alter channel morphology result from sediment input that exceeds transport capability of the stream. Sediment deposition can result in channel filling, thereby increasing the width-depth ratio. An increase in channel width can increase the amount of solar radiation entering a stream. A wide, shallow stream will heat up faster than a narrow, deeper stream with the same discharge. Input of sediments associated with storm events, and management related sources of sedimentation can increase sediment over natural background and contribute to channel widening and subsequent stream temperature increases.

Temperature Factor 3. - Flow

The temperature change produced by a given amount of heat is inversely proportional to the volume of water heated or, in other words, the discharge of the stream. A stream with less flow will heat up faster than a stream with more flow given that all other channel and riparian characteristics are the same. Routing of surface and subsurface waters via interception by road cuts can result in more rapid runoff during storm events and has precluded infiltration and subsequent slower release of stored water in this watershed.

Element 4: Goals & Objectives

Temperature Findings

Assessing the impact of BLM management on temperature will be based on shade and channel form. The BLM's goal is to contribute to reduction of stream temperature through shade recovery on areas of historic timber harvest. These areas are expected to take approximately 30

years after harvest to recuperate on the smaller tributaries on BLM lands. This is based on current age class of harvest units adjacent to streams on BLM lands taken from operations inventories (see Table 8). Riparian zones on larger tributaries and mainstem Rogue River may take considerably longer (100 years) to recover.

Table 8. Acres of Riparian Reserve in Northern Rogue River Horseshoe Bend by age class on Medford BLM lands*.

***BLM lands in the southern portion of the Rogue River Horseshoe Bend watershed do not have a Riparian Reserve designation because all land in this part of the watershed is protected as LSR.**

North Rogue River Horseshoe Bend		HUC 6						
Age	**Total**	**Whisky**	**Howard**	**Windy**	**Jenny**	**Kelsey**	**Missouri**	**Mule**
Non Forest	297	76	4	2	3	1	3	208
0-10 years	754	120	13	0	0	354	101	166
11-20	814	64	0	0	0	97	48	605
21-30	779	40	0	0	0	158	152	429
31-40	1,353	56	1	93	0	590	13	600
41-50	367	0	0	164	22	146	5	30
51-60	46	18	0	0	22	8	0	0
61-70	265	42	0	2	27	105	6	83
71-80	368	231	0	0	0	60	0	77
81-150	10,825	1,683	548	1,015	1,508	1,820	1,384	2,867
151-200	2,734	1,189	433	627	39	215	71	160
201+	6,588	1,455	114	924	115	1,142	362	2,476
81+ Modified	1,674	475	28	0	0	300	45	826
Unknown	19	17	0	0	0	1	1	0
Total Acres:	**26,883**	**5,466**	**1,141**	**2,825**	**1,736**	**4,997**	**2,191**	**8,527**
% Over 30 yrs	90%	95%	98%	>99%	>99%	88%	86%	83%
% Over 80 yrs	81%	88%	98%	91%	96%	70%	85%	74%

An assumption was made that smaller order streams would be shaded by brush, hardwood and conifer species at an earlier age than the larger order streams. Most of the smaller order streams are hillslope constrained and narrow. When the data in Table 8 are compared to the data presented in the Rogue shade assessment (Appendix A of Appendix 1) there was found to be a very strong correlation between modeled existing shade percentage and percentage of seral stages over 30 years of age. The recovery period in the TMDL is based on site potential and time required to reach maturity for conifer species and disregards hardwoods and brush species.

Within the Rogue River Horseshoe Bend watershed, the only sub-basin that contains streams listed on the ODEQ 303d list, other than the Rogue River, is the Whisky Creek HUC 6. Riparian reserves in this basin have a high percentage of mature trees, and as a result are well shaded. Over 88% of trees within riparian reserves in Whisky Creek are over 80 years of age, and approximately 95% are over 30 years. Of the three streams on the 303d list in this sub-watershed, East Fork and West Fork Whisky Creek are both 4th order streams, and mainstem Whisky Creek is a 5th order stream. These streams are all in narrow, steep, north-south facing canyons and therefore receive additional shade protection from abundant streamside brush and hardwoods.

OBJECTIVES

All recovery goals and plans are linked to maintaining ecosystem components currently functioning, and improving those sites that show the greatest potential for recovery. This approach will maximize recovery while minimizing expensive, extensive and risky treatments.

The objective of this plan is to eventually meet water quality standards through appropriate management practices. Anthropogenic causes of water quality degradation within this watershed will receive the majority of effort through time for restoration activities. Those standards, when met, will protect the beneficial uses identified for the Rogue Basin under the Oregon Administrative Rules (OAR) 340-41-362.

The recovery of water temperature conditions in the Rogue River Horseshoe Bend watershed on federal lands will be dependent upon implementation of the BLM Medford District Resource Management Plan (RMP). Paramount to recovery is adherence to the Standard and Guidelines of the NFP to meet the ACS. This includes protection of riparian areas as reserves and may include some silvicultural work to reach vegetative potential as rapidly as possible.

Additional actions are identified in Step 4; Goals for Managed Lands created by DEQ and presented on page 11 of Appendix 1. Many of these actions are not consistent with BLM's management Standards and Guidelines, or the directives of BLM. Table 9 presents the management techniques that are being implemented on BLM lands to promote the recovery of water quality limited streams, and those intended to protect those streams that are currently properly functioning.

Table 9. Goals for Federal Lands

Element	***Goal***	***Passive restoration***	**Active Restoration**
Temperature Shade Component	Achieve coolest water temperatures possible through achievement of shaded riparian reserves.	Allow vegetation to grow naturally in riparian reserves as described in the NFP Aquatic Conservation Strategy	Silvicultural projects designed to promote achievement of site potential hardwood and conifers in a more rapid manner.
Temperature Channel Form Component	Maintain channel configuration of 1st through 4th order streams on BLM lands which are currently hydrologically properly functioning at this point.	Allow natural hydrologic processes to occur within the riparian reserves. Follow standards and guidelines of NFP Aquatic Conservation Strategy	Maintain roads to reduce sediment delivery to streams. Install drainage structures capable of passing 100 year flood events. Decommission roads to minimize potential sediment sources.
Temperature Stream Flow Component	Maintain natural flow conditions. Maintain flow needed for aquatic life.	Minimize consumptive use in management of BLM lands	Work with state Watermaster to identify unauthorized diversions. Reduce road densities by decommissioning roads which are no longer needed for management.

The shade model ran by DEQ utilized 1996 aerial photos. It is believed that some canopy closure has occurred since 1996 and therefore more shade is already on streams than is indicated in the TMDL portion of DEQ Water Quality Management Plan.

Element 5: Timeline for Implementation and Attainment

It is difficult to set an exact recovery time for channel form when the recovery process is storm dependent. There is still active placer mining taking place within the basin so channel condition and storage of ground water surrounding these sites will likely slow recovery of the system.

The goal of the Clean Water Act and associated Oregon Administrative Rules (OARs) is that water quality standards shall be met or that all feasible steps will be taken towards achieving the highest quality water attainable. This is a long-term goal in many watersheds, particularly where non-point sources are the main concern.
DEQ recognizes that TMDLs are values calculated from mathematical models and other analytical techniques designed to simulate and/or predict very complex physical, chemical and biological processes. Models and techniques are simplifications of complex processes, and, as such, are unlikely to produce an exact prediction of how stream surveys will respond to the application of various management measures.

WQMPs are plans designed to reduce pollutant loads to meet TMDLs. DEQ recognizes that it may take several decades – after full implementation- before management practices identified in a WQMP become fully effective in reducing and controlling pollution. In addition, DEQ recognizes that technology for controlling nonpoint source pollution is, in many cases, in the development stages and will likely take one or more iterations to develop effective techniques. It is possible that after application of all reasonable best management practices, some TMDLs or their associated surrogates cannot be achieved.

DEQ also recognizes that despite the best and most sincere efforts, natural events beyond the control of humans may interfere with or delay attainment of the TMDL and/or its associated surrogates. Such events could be, but are not limited to, floods, fire, insect infestations, and drought.

The WQRP addresses how human activities will be managed. It recognizes that full attainment of target load reduction at all locations may not be feasible due to physical, legal or other regulatory constraints. To the extent possible, NFP identifies potential constraints, and provides the ability to mitigate those constraints should the opportunity arise.

Where nonpoint sources are given a zero load allocation, it does not necessarily mean that human-related activities on the land are prohibited or that human activity must be removed from riparian or other areas that might impact water quality. It does mean that anthropogenic activities that might increase heat discharge to the water body must be managed to prevent, to the maximum practicable extent, further warming. Specified management will allow riparian vegetative communities to grow and propagate, and natural fluvial processes such a flood plain formation and bank stabilization to occur.

In employing an adaptive management approach BLM understands DEQ expectations:

- the progress of the TMDLs and the WQMP on a five year basis
- evaluate the progress towards achieving the TMDLs
- Designated Management Agency (DMA) will monitor and document its progress in implementing the provisions of its WQRP implementation plan
- that DMAs will develop benchmarks for attainment which can be used to measure progress; for management agencies to revise the components of their WQRPs to address deficiencies
- to consult with DMAs on attainment of water quality standards, and revise it as appropriate.

Stream shade recovery will be realized more quickly than habitat recovery with the growth of hardwoods, e.g., alder, maple, ash and cottonwood. Habitat recovery and associated sediment storage/routing in the channel will only recover to an optimum range of conditions with the recovery of riparian conifers to mature size. This will afford some added shade as these trees reach more height. Lower summer water temperatures and creation of quality habitat conditions for trout and salmon are anticipated with maturation of riparian forests in these watersheds, addressing road-related problems in the watershed, and reduced timber harvest under the NFP. Harvest related slope failure issues will be addressed through the adaptive management measures within the NFP.

BLM proposes to accomplish reduction or maintenance of stream temperature through the following during the immediate and near future:
-Renovate roads (outslope, gravel surface, water dip)
-Make emergency repairs as problems are discovered
-Maintain the BLM road network according to the State BLM Transportation Management Plan
-Utilize passive restoration such as protecting Riparian Zones so that natural recovery is realized.

Restoration Prioritization and Funding

Funding for instream restoration will likely be very limited for BLM. Activity plans include decommissioning of roads, road renovation projects and possible density management projects.

Much of the restoration activity that may occur will likely be funded indirectly through projects (timber sales and silvicultural projects). Other funding sources would be utilized on a project by project basis depending on the criteria set forth in the funding source.

As part of the Clean Water Action Plan, Oregon has begun an interagency effort that identifies high priority watersheds in need of restoration and protection as part of the Unified Watershed Assessment. It is possible that funding associated with the Clean Water Action Plan could be accessed to carry out protection and restoration actions in the Rogue River Horseshoe Bend Watershed.

Element 6: Responsible Parties

Federal Lands - Participants in this plan for lands include DEQ and BLM. The BLM is the major federal land manager in this watershed and is responsible for completion and implementation of the WQRP for federal lands.

Nonfederal Lands - A subsequent WQMP for the remainder of the watershed is expected to be developed by DEQ and other Oregon Departments responsible for lands within this watershed. That WQMP will deal with state and local government lands as well as private lands, including private forest lands within the Rogue River Horseshoe Bend Watershed.

The Oregon Department of Forestry (ODF) is the Designated Management Agency for regulation of water quality on nonfederal forest lands. The Oregon Board of Forestry in consultation and with the participation and support of DEQ has adopted water protection rules in the form of BMP's for forest operation. These rules are implemented and enforced by ODF and

monitored to assure their effectiveness. ODF and DEQ will jointly demonstrate how the Oregon Forest Practices Act, forest protection rules (including the rule amendment process) and Best Management Practices (BMPs) are adequate protection for water quality.

Oregon Water Resources Division (WRD) is a participant within the implementation and monitoring components of this plan. WRD will be doing flow measurements, and will also assist in identifying opportunities for converting consumptive uses to instream rights.

The Oregon Department of Geology and Mineral Industries (DOGAMI) is also a participant with respect to mining impact assessment and permit modifications. DOGAMI covers mining operations that exceed one (1) acre of disturbance or 5000 cubic yards of production within a 12-month period. Operators are required to obtain an operating permit if they are located above the 2-year floodplain of creeks and rivers.

Oregon Department of Agriculture via statute of SB 1010 which established Soil and Water Conservation Districts has jurisdiction over grazing and other farming activities. Active outreach to local farmers and ranchers will continue to occur helping to ensure water quality standards are realized.

Element 7: Reasonable Assurance of Implementation

The following table lists instream and other improvements for restoration of watershed function and water quality.

Table 10. Past Rogue River Horseshoe Bend Watershed Improvement Projects

Rogue Basin			
Repair Whisky Creek Cabin Road T. 33 S., R. 8 W., Sec. 27, 34 Add rock, cross drains	1996	2.0	ST, CT
Install gates on Mule Creek basin roads T. 32 S., R. 9 W	1994	10.0	ST, CT
Stabilize Mule Creek Road T. 32 S., R. 9 W., Sec. 20	1997	1.0	CO, ST, CT, CH
Marial Road Improvement (#32-9-14.2)	1997 and 1999	16.25	N/A
Bruin Spur Road Renovation (#32-9-31 and #33-10-2)	1999 and 2000	8.96	
Decommission Mule Creek Road T. 32 S., R. 9 W, Sec. 20. Includes culvert removal for fish passage	1998	1.5	CO, ST, CT, CH

* CH = chinook, CO = coho, ST = steelhead, CT = cutthroat N/A= Not Applicable

The following standards and guidelines from the NFP will be used to attain the goals of the Rogue River Horseshoe Bend Water Quality Restoration Plan:

Stream Temperature – Shade

Aquatic Conservation Strategy: B-9 to B-11, C-30 (denotes section and page # of NFP)
Standard and Guidelines for Key Watersheds: C-7
Riparian Vegetation: B-31
Riparian Reserves: B-12 to B-17 and ROD 9
Watershed Restoration: B-30

Stream Temperature - Channel Form

Aquatic Conservation Strategy: B-9 to B-11, C-30
Standard and Guidelines for Key Watersheds: C-7
Riparian Vegetation: B-31
Riparian Reserves: B-12 to B-17 and ROD 9
Watershed Restoration: B
Roads: B-19, B-31 to B-33

BLM is currently upgrading its transportation objectives within each watershed. Part of the plan is to identify roads that need surfacing, pipe replacement or that could be decommissioned. All the sub-watersheds have high road densities and all are above the two miles per square mile target established by the National Marine Fisheries Service for proper functioning condition. Above 3 miles per square mile is considered not functioning properly by NMFS. Road densities would be decreased where possible.

Aside from elements covered under this heading, there is a general idea that restrictions within the Forest Plan have greatly contributed to reducing impacts on the aquatic system. These include, but are not limited to, wide riparian buffers on all streams, including intermittent channels; green-tree retention on harvest units; restrictions on new road construction and requirements for 100 year flood capacity for road crossing structures. Best management practices that were designed for implementation under the NFP would help reduce impacts and in some cases, actually restore conditions to “Properly Functioning”.

BLM has followed the standards and guidelines of the NFP aquatic conservation strategy and will continue to do so. Until the Plan is revised or replaced BLM is responsible for implementation of the Plan.

Temperature - Shade Component

It is unlikely that over the next few years that the Glendale Resource Area will prescribe riparian stand treatments in stands located adjacent to perennially flowing water (active restoration). Pre-commercial thinning (PCT) may occur in conjunction with normal stand maintenance in units having a stream flowing through or adjacent to them. BLM will continue to adhere to the ACS of the NFP by providing riparian reserves along streams.

Temperature - Channel Form Component

Through management activities such as timber sales, Title II and routine maintenance, BLM will endeavor to reduce road generated sediment. Monitoring of actions will take place periodically to ensure desired reduction of sediment is achieved.

Temperature – Flow

BLM will continue to maintain or improve flow conditions on federal lands. Passive management will be stressed as there are no current identified opportunities for flow augmentation within the federal managed lands of this basin.

Element 8: Monitoring/Evaluation Plan

Assessing Potential for Recovery - Properly Functioning Condition Methodology

Recovery of riparian areas, stream channels, and aquatic habitat requires a base condition with adequate vegetation, channel form, and large woody debris to dissipate stream energy associated with high water flows. The BLM/USFS methodology known as Properly Functioning Condition (PFC) assesses the capability of streams to withstand 30-year interval storm events. This quick, interdisciplinary method is the first step in determining the feasibility of restoration and recovery (Riparian Area Management TR 1737-15 1998).

BLM will continue to monitor stream temperatures at selected sites in cooperation with DEQ.

Since streams in this watershed are water quality limited solely as a result of high temperatures, sediment monitoring in the Rogue River Horseshoe Bend watershed is limited to effectiveness monitoring of actions associated with road use, construction, decommissioning, or maintenance. In addition to regular effectiveness monitoring, all activities on BLM lands adhere to the Medford RMP Best Management Practices as well as the Aquatic Conservation Strategy of the Northwest Forest Plan.

Assessing Potential for recovery – ODFW Methodology

Restoration in the Rogue River Horseshoe Bend watershed will be both active and passive. Growth of vegetation on floodplains is integral to recovery. The overall goal is to move the attributes considered in this assessment: pool/riffle ratio, pool frequency, large wood, and riparian forest conditions from the present “poor” and “fair” ratings to “good” and “fair”, per ODFW benchmarks. These attributes are used to measure if and when the stream is nearing its biological potential for supporting dependent aquatic and riparian species, including anadromous fish. Natural variation will cause changes in stream and floodplain conditions and make allowance for some attributes as being rated “fair”. These attributes and benchmarks should be validated with subsequent inventory and monitoring work in the watershed, refining them to suit the range of conditions expected in the watershed as we learn more.

Monitoring will provide information as to whether standards and guidelines are being followed,

and if actions prescribed in the WQRP are achieving the desired results. In addition to the monitoring identified in the WQRP, RMP/Forest Plan monitoring occurs annually to assess implementation of standards and guidelines. Information obtained from both sources of monitoring will ascertain whether management actions need to be changed. Continued monitoring would be prioritized upon review of findings.

The monitoring plan itself will not remain static and will be periodically adjusted, as appropriate, to assure the monitoring remains relevant. See Table 11.

Temperature

The BLM, with cooperators, will continue to monitor stream temperatures in portions of the Rogue River Horseshoe Bend watershed. We monitor to meet a variety of objectives, so site locations will vary over time. Monitoring activities for BLM will try to determine the source area of temperature increase within reaches of streams that are listed for temperature. Through monitoring, BLM's goal is to determine the upper extent of the problem area and delist the reaches or streams that through time meet the water quality standard for temperature. Our objectives are to monitor long-term temperature recovery, better understand the natural temperature variability, and to track potential project effects. There are several locations that are monitored annually during the summer months to establish temperature ranges within the basin.

Table 11. Interim Benchmarks and monitoring strategy for Rogue River Horseshoe Bend

Element	**Management measure**	**Interim benchmark**	**Monitoring parameter**	**Monitoring frequency**
Temperature Shade component	Passive treatment of riparian vegetation. Implement standards and guides of NWFP. Some PCT may occur in conjunction with units that have streams flowing through or adjacent to them.	Allow stands to grow toward shade target.	Shade, canopy closure over stream focusing first on hardwood species.	Review of selected reaches every 5 to 10 years using aerial photos, field check condition of riparian vegetation. Within one year complete PFC surveys for selected streams within basin.
Temperature Channel form component	Maintain integrity of stream channels on land under BLM control.	Assess roads and culvert conditions within the watershed within the next 2 years.	Sedimentation resulting from roads by miles of road surfaced or decommissioned.	Review yearly miles of road decommissioned, renovated or maintained.
Temperature Flow component	Road management objectives	Yearly evaluation	Proper drainage and routing	Miles of road decommissioned, out sloped, rocked, number of culverts replaced.

Element 9: Public Participation Plan

This WQRP is a procedural step that focuses on water quality using elements of the NFP. Watershed analyses are a recommended component of the ACS under the NFP and RMP. The Record of Decision (ROD) for the RMP was signed in June of 1995, following extensive public review.

Public involvement was integrated into the development of both the Rogue River Horseshoe Bend (Wild Rogue) North and South Watershed Analysis, as well as the Kelsey Whisky EIS (Mar 03). Public meetings were held in Glendale several times during the analysis process. Public involvement for the WQRP will be coordinated by DEQ in conjunction with the effort addressing state, county and private lands within this watershed.

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Appendix1: Weighted Stream Recovery Time

Rogue Assessment		Existing	Potential			Existing	Potential		Existing	Potential
	Stream	% Shade		Years to	Stream	% Shade		Years to	% Shade	
	Miles	BLM		Recovery	Miles	PVT		Recovery	BLM & PVT	
Rogue River	30	2	18	65	91	8	26	65	6	20
Middle and										
Lower Rogue										
Foot	0				3.7	81	82	25		
Kane	0.6	93	93	0	4.9	86	86	0	87	87
Sams	1.3	88	88	0	6.2	84	89	15	85	88
Sardine	0				3.4	76	85	45		
Galls	0				5.2	89	89	0		
Bee	1.1	99	99	0	0.5	91	91	0	96	96
Birdseye	0.2	95	95	0	3.9	88	90	5	92	93
Savage	0.6	97	97	0	4.5	75	80	15	88	90
Whiskey	2.4	83	83	0	0					
Louse	2.2	90	90	0	10.9	76	80	30	79	84
Quartz	0.7	95	95	0	6.8	89	89	0	90	90
Jump Off Joe	4.3	80	82	45	20.2	64	74	80	67	75
Galice	1.4	80	83	70	0.4	63	80	70	76	82
SF Galice	0.4	92	92	0	0					
Mule	14	90	91	5	0					
Dutcher	0.08	94	94	0	2.6	79	85	28	80	85
Hog	2.3	91	91	0	2.4	86	88	8	86	89
Pickett	3	87	88	10	2	74	82	23	81	86
Shan	0.6	92	92	0	1.3	81	83	10	85	86
Taylor	0.5	88	88	0	2.1	80	82	35	81	83
Foster	0				0.6	82	82			
Evans Creek										
Evans below W.F					19.3	29	54	80		
Evans above W.F	3.2	88	90	15	12.7	85	88	35	85	88
WF Evans	7	75	81	55	8	63	78	55	69	79
Battle	2.5	94	94	0	1.4	90	90	0	93	93
Cold	1.5	84	85	8	2.8	67	81	25	73	83
Pleasant	2.3				11.1					
Ramsey	1.5	84	90	5	1.9	85	91	8	84	90
Rock	3.7	90	90	0	4.1	84	86	55	87	87
Salt	2	92	92	0	4.4	82	84	5	85	86
RF Salt	2.6	93	93	0	0					

Rogue Assessment	Stream Miles	% Shade BLM Existing	% Shade BLM Potential	Years to Recovery	Stream Miles	% Shade PVT Existing	% Shade PVT Potential	Years to Recovery	BLM and PVT % Shade Existing	BLM and PVT % Shade Potential
Upper Rogue										
Elk	0.3	55	80	50	14	47	74	80	48	74
SF Little Butte	1.6	62	74	40	8.6	33	70	80	38	71
NF Little Butte	1	95	95	0	6.6	79	83	80	81	85
Little Butte	0				16.1	31	61	80		
Jackass	2.3	89	89	0	2.4	82	99	12	84	96
Dog	0.8	88	88	0	3.9	64	80	15	68	82
NF Big Butte	6	72	83	45	6.9	65	82	45	68	83
Big Butte	2.1	52	80	80	10.1	49	80	80	49	80
Clark	2.1	93	93	0	3.1	84	88	25	88	90
Twincheria	1.7	90	90	0	3	73	87	35	79	88
Willow	0				4.5	80	84	15		
Hawk	0.2	87	87	0	0.7	77	80	10	82	85
WB Elk	5.4	85	85	0	2.6	86	86	0	86	86
Bitterlick	0				1.6	89	89	0		
Sugarpine	0				2.4	72	76	80		
Deer	2.2	95	95	0	0.7	99	99	0	96	96
Soda	4.9	78	89	30	0.3	90	90	0	79	89
Lost	4.6	92	92	0	4.1	71	83	40	82	88
Lake	1	97	97	0	3.7	75	81	25	79	84
WF Dead Indian	1	33	33	0	1.5	6	6	0	17	17
Dead Indian	0.4	87	87	0	6.4	48	53	63	50	55
Conde	1.2	88	88	0	3.9	20	20	0	28	28
Antelope	1.2	81	87	55	21.3	71	84	80	75	86
Burnt Canyon	2	95	95	0	1.8	78	84	10	87	90
Trail	4.1	84	92	65	6.5	52	81	65	65	85
WF Trail	1.2	90	90	0	7.9	82	83	35	86	88

1. Average Potential Percent Shade value comes from averaging reach distances using the following shade values: 1.) If system potential is below 80% use the system potential value, 2.) If current vegetation is less than 80% and system is capable of achieving 80% or greater, 80% is used, 3.) If existing shade greater than 80% that value is used.

2. Average years to recovery is time estimated for percent effective shade to reach system potentials or 80%. If current shade is greater than 80% system is considered recovered and time to recovery is zero. Time to recovery is estimated as time from 2003 in the absence of natural disturbance.