

Water Quality Restoration Plan

Southern Oregon Coastal Basin

Trail Creek Watershed

Bureau of Land Management (BLM)

Medford District Butte Falls Resource Area

February 2011

Trail Creek Watershed at a Glance	
Hydrologic Unit Code Number (Trail Creek)	1710030706
WQRP Area/Ownership	Total: 35,307 acres BLM: 14,697 acres (42%) U. S. Forest Service: 4,358 acres (12%) Private: 16,176 acres (46%) Oregon Dept. of Forestry: 76 acres (<1%)
303(d) Stream Miles Assessed	Total: 19.2 miles BLM Ownership: 4.8 miles
303(d) Listed Parameters	Dissolved Oxygen, E. Coli
Key Resources and Uses	Salmonids, domestic, aesthetic
Known Human Activities	Agriculture, forestry, roads, recreation, livestock, rural residential development
Natural Factors	Geology: volcanic Soils: various series and complexes, pervasively high clay content (30%-60%) in subsoil horizons (6 to 12 inches)

Statement of Purpose

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

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Element 1. Condition Assessment and Problem Description

A. Introduction

This document describes how the Bureau of Land Management (BLM) will implement and achieve the Oregon Department of Environmental Quality’s (DEQ’s) *Rogue River Basin Total Maximum Daily Load (TMDL)* (ODEQ 2008) for 303(d) listed streams on BLM-administered lands. Its organization is designed to be consistent with the DEQ’s *Rogue River Basin Water Quality Management Plan (WQMP)* (ODEQ 2008). The area covered by this Water Quality Restoration Plan (WQRP) includes all lands managed by the BLM, Medford District within the Trail Creek Watershed. This area is referred to as the analysis or plan area.

Beneficial Uses

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses (Table 1). In practice, water quality standards have been set at a level to protect the most sensitive uses. Cold-water aquatic life such as salmon and trout are the most sensitive beneficial uses (Table 2) in the Rogue Basin (ODEQ 2008). Seasonal standards may be applied for uses that do not occur year round.

Table 1. Beneficial Uses in the Trail Watershed (OAR 340-41-271 (ODEQ 2008))

Public Domestic Water Supply ¹	✓	Fishing	✓
Private Domestic Water Supply ¹	✓	Boating	✓
Industrial Water Supply	✓	Water Contact Recreation	✓
Irrigation	✓	Aesthetic Quality	✓
Livestock Watering	✓	Hydro Power	✓
Fish and Aquatic Life ²	✓	Commercial Navigation & Trans.	
Wildlife and Hunting	✓		

1/ With adequate pre-treatment (filtration and disinfection) and natural quality to meet drinking water standards.

2/ See Figures 271A and 271B for fish use designations for this watershed (<http://www.deq.state.or.us/wq/rules/div041tblsfigs.htm#f1>).

Table 2. Sensitive Beneficial Uses in the Trail Watershed

<i>Sensitive Beneficial Use</i>	<i>Species¹</i>
Salmonid Fish Spawning & Rearing	Coho (t), summer and winter steelhead trout (c).
Resident Fish & Aquatic Life	<p><u>Resident Fish:</u> Rainbow trout, cutthroat trout (c), Pacific lamprey, Klamath smallscale sucker, reticulated sculpin, and reddsider shiner.</p> <p><u>Other Aquatic Life:</u> Clouded salamander, foothill yellow-legged frog, Pacific giant salamander, and western toad.</p>

1/ Status: (t) = threatened under Federal Endangered Species Act (ESA); (c) = candidate; and (s) = sensitive.

Listing Status

Section 303 of the Clean Water Act of 1972, as amended by the Water Quality Act of 1987, provides direction for designation of beneficial uses and limiting discharge of pollutants to waters of the state. The DEQ includes streams that do not meet established water quality criteria for one or more beneficial uses on the state’s 303(d) list, which is revised every two years, and submitted to the Environmental Protection Agency (EPA) for approval. Section 303 of the Clean Water Act further requires that TMDLs be developed for waters included 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 WQRP is developed to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL. The approach is designed to restore the water quality and result in compliance with the water quality standards, thus protecting the designated beneficial uses of waters of the state.

At the time of this writing, the DEQ’s 2004/2006 303(d) list is the most recent release. Surface waters in the plan area do not meet water quality standards for bacteria (*E. coli*), and dissolved oxygen. The Rogue River Basin TMDL set TMDLs to address temperature and bacteria impairments and this WQRP will address those listings on BLM-administered lands. At the time of the writing of the TMDL, there were insufficient data to address the dissolved oxygen listings in the Rogue River Basin. DEQ intends to revisit the Rogue River Basin dissolved oxygen impairments when the temperature and bacteria TMDLs are reviewed, on a 5-year basis. Improvements in dissolved oxygen levels are expected to occur as a result of decreasing stream temperatures (ODEQ 2008). There are two segments within the plan area that were listed in the 2004/2006 303(d) list as dissolved oxygen impaired (Table 3). Trail Creek and West Fork Trail Creek both have dissolved oxygen impaired segments that cross BLM-administered land. These will be addressed in the WQRP after the TMDL is established by DEQ.

This WQRP addresses all stream listings on the 2004/2006 303(d) list for the plan area: one stream is listed for exceeding the bacteria (*E. coli*) criterion, and two streams exceed the Dissolved Oxygen (DO) criterion (Table 3).

Table 3. 2004/2006 303(d) Listings in the Trail Creek Watershed (ODEQ 2008)

303(d) List Date	Stream Segment	Listed Parameter	Season	Applicable Rule (at time of listing)	Total Miles Affected
2002	Trail Creek	Dissolved Oxygen	Summer	OAR 340-041-0016(1)(a)(c)(2)	10.7
2002	West Fork Trail Creek	Dissolved Oxygen	Summer	OAR 340-041-0016(1)(a)(c)(2)	8.4
2004	Trail Creek	Bacteria (<i>E. coli</i>)	Summer	OAR 340-041-0009(1)(a)(A,B)	10.8
Total Stream Miles listed for Bacteria (<i>E. coli</i>) Criteria (Summer)					10.8
Total Stream Miles listed for DO Criteria (Summer)					19.1

Within the plan area, there are a total of 19.2 stream miles on the 2004/2006 303(d) list, of which 4.8 miles cross BLM-managed lands. Of the 19.2 stream miles 303(d) listed, 10.7 miles of the main stem of Trail Creek overlap for both bacteria and DO. The water quality limited stream reaches on BLM-managed lands are: West Fork Trail Creek, 1.1 miles for DO, and Trail Creek, 3.7 for *E. coli*, of which 3.5 miles overlap for DO.

B. Watershed Characterization

The Trail Creek Watershed covers approximately 55-square miles (35,307 acres) in the southern Cascade Range in southwestern Oregon (Figure 1). The Trail Creek Watershed lies within the Upper Rogue Subbasin (Figure 2), which is subdivided into eight watersheds: Upper Rogue River, South Fork Rogue River, Rogue River-Lost Creek, Big Butte Creek, Elk Creek-Rogue River, Trail Creek, Rogue River-Shady Cove, and Little Butte Creek (Figure 3). Elevation ranges from approximately 1,436 feet at the mouth of Trail Creek to 4,698 feet at Threehorn Mountain, located on the watershed’s northern margin. Major tributaries to Trail Creek include Canyon, Chicago, Paradise, Romine, West Fork Trail, Wall, and Walpole Creeks.

Most of the Trail Creek Watershed lies within Jackson County, though the northern portion lies within Douglas County. The plan area is northeast of the city of Medford and north of the nearby town of Shady Cove. The town of Trail is located at the mouth of Trail Creek.

Figure 1. Location of the Trail Creek Watershed

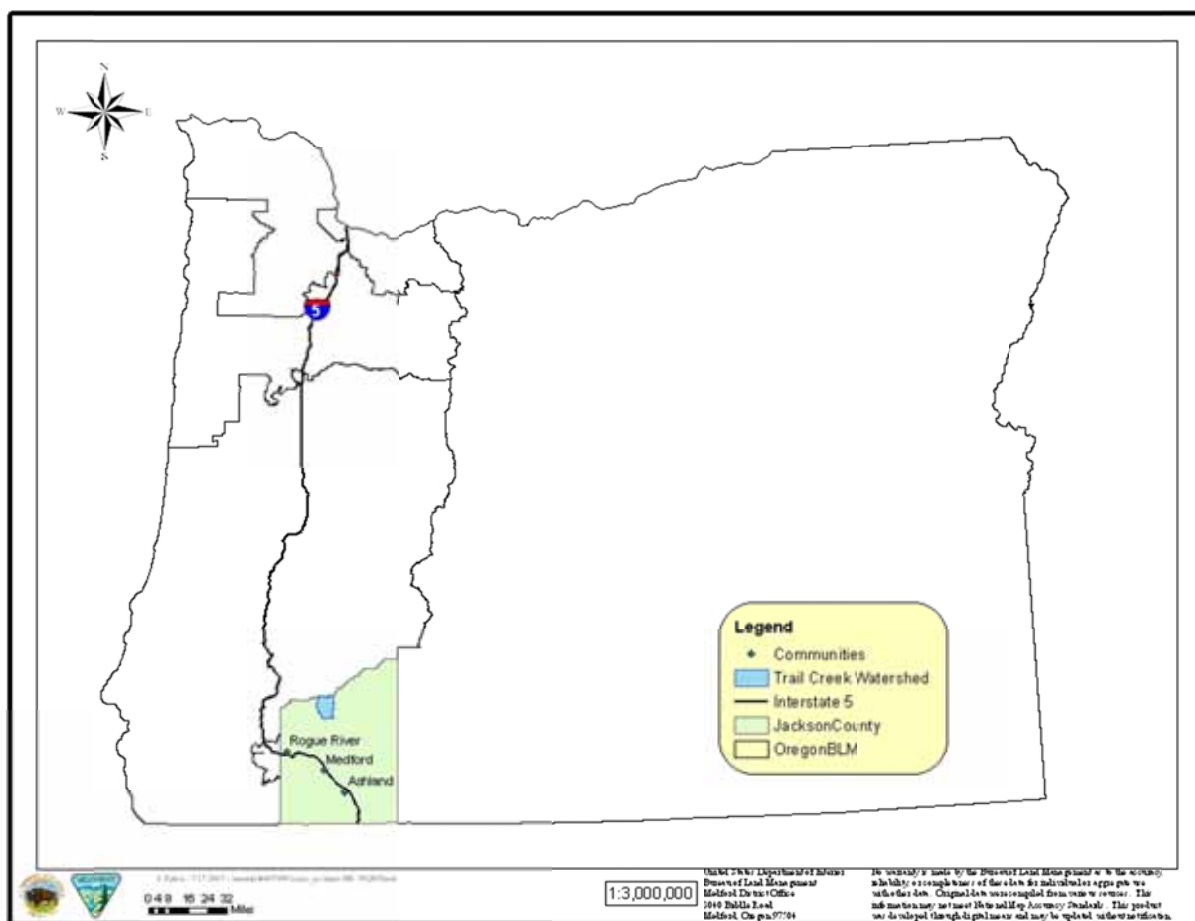


Figure 2. Rogue Basin and the Upper Rogue Subbasin

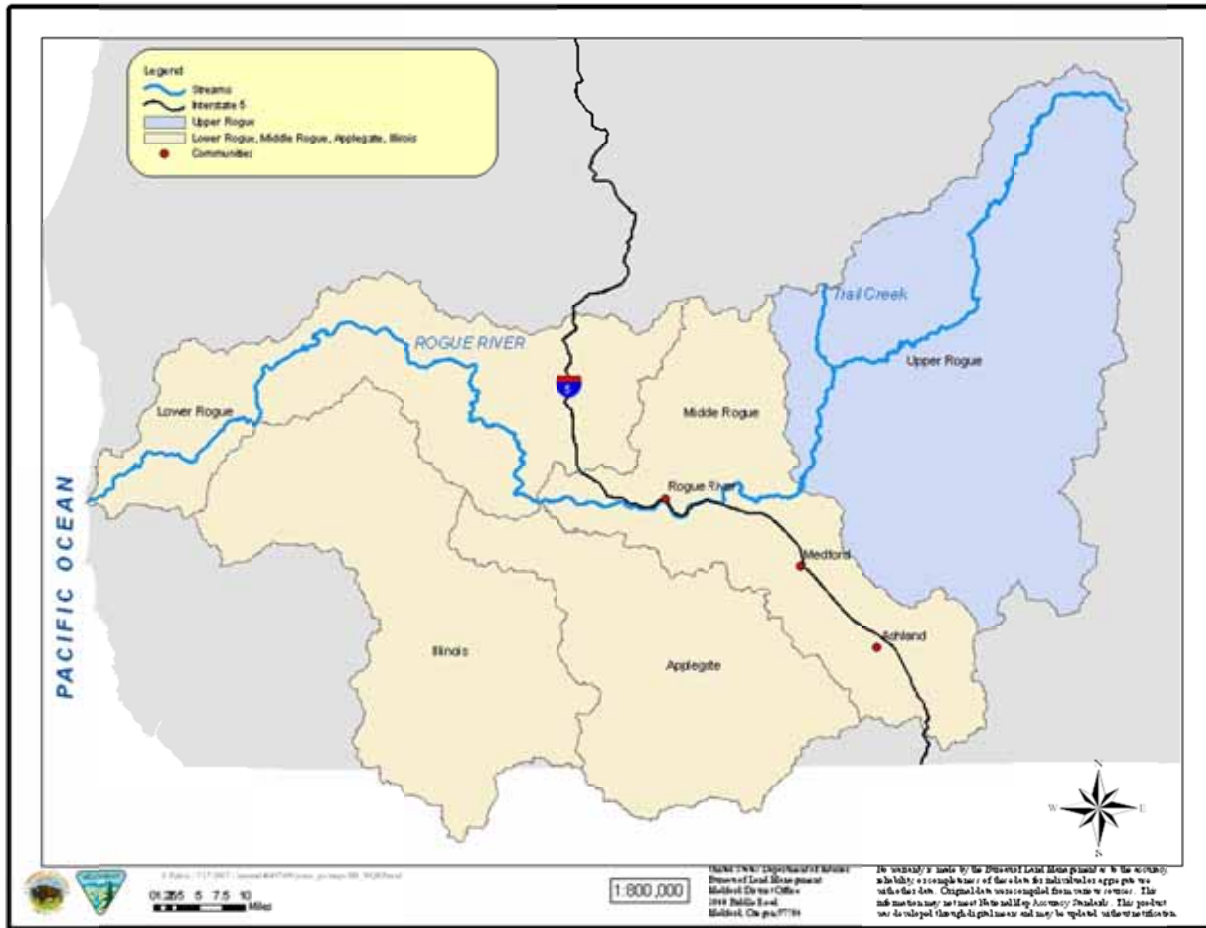
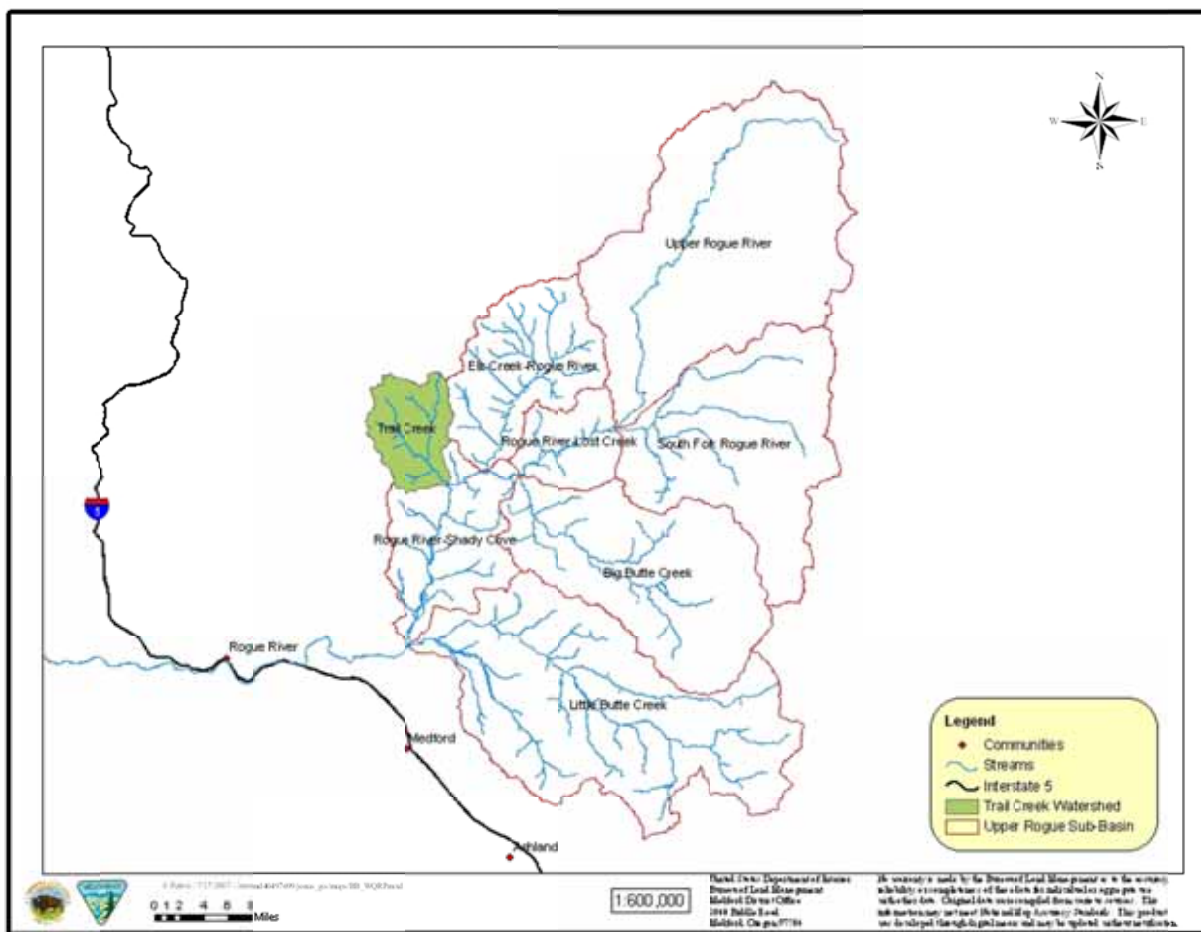


Figure 3. Watersheds within the Upper Rogue Subbasin



Land Ownership and Use

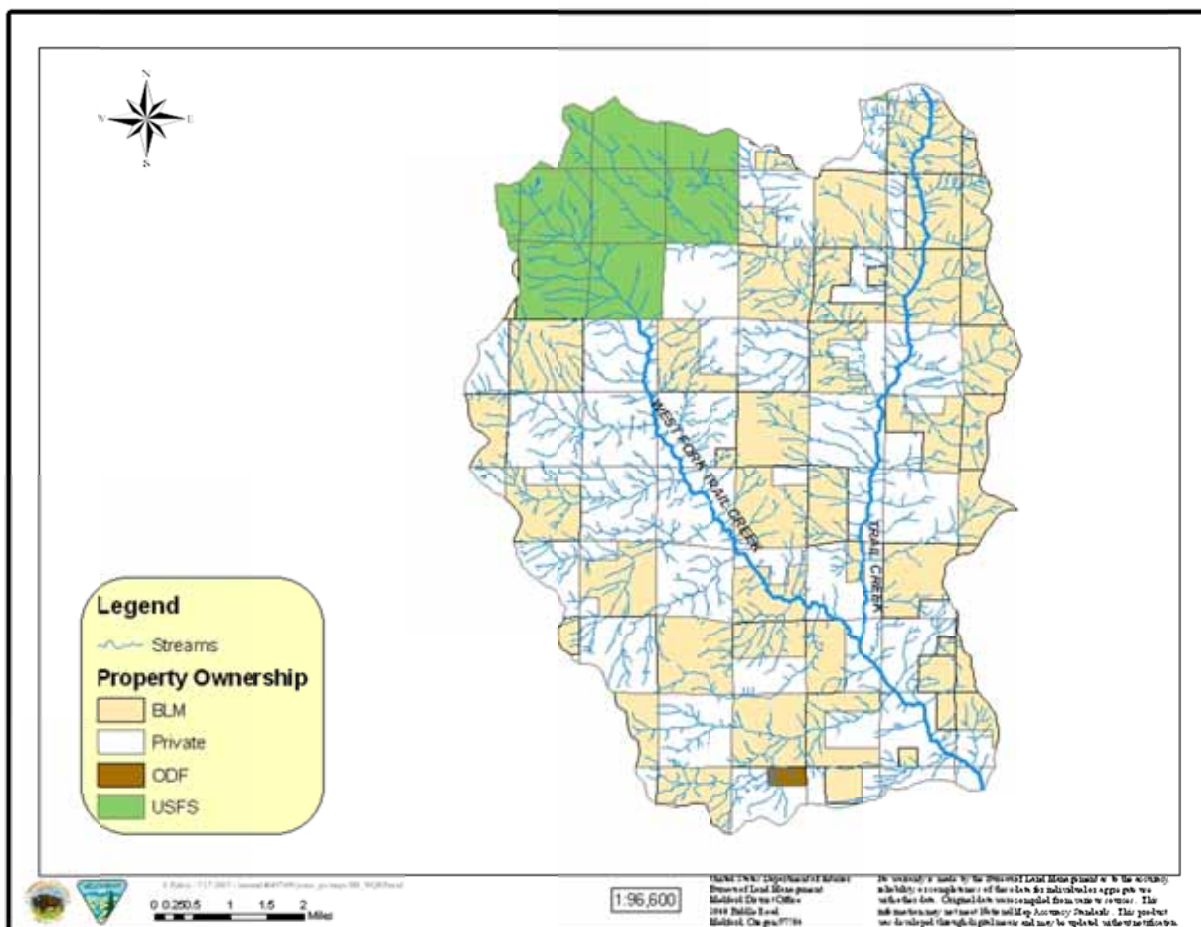
The BLM manages 14,697 acres (42 percent) within the Trail Creek Watershed (Table 4 and Figure 4). The Butte Falls Resource Area is the BLM administrative unit that manages lands for the Medford District. The USFS, Umpqua National Forest – Tiller District, manages 4,358 acres (12 percent) within the northeastern portion of the Trail Creek Watershed. The remaining 46 percent of the plan area consists of private lands with a small inclusion of Oregon Department of Forestry lands.

BLM-administered lands occupy a “checkerboard” pattern with private lands in the lower and middle elevations of the Trail Creek Watershed, and the Forest Service lands are mostly a contiguous block in the higher elevations. Some of the large blocks of private lands are managed as industrial forest and ranches, while ownership of the remaining privately-held land in the watershed is typically held in relatively small parcel holdings.

Table 4. Ownership within the Trail Creek Watershed

Ownership	Acres	Percent
BLM - Butte Falls Resource Area	14,697	42%
USFS	4,358	12%
Private	16,176	46%
Oregon Department of Forestry	76	<.1%
Total	35,307	100%

Figure 4. BLM Land Ownership in the Trail Creek Watershed



BLM land allocations within the plan area include matrix, connectivity blocks, and riparian reserves. Objectives and management actions/directions for these land allocations are found in the *Medford District Record of Decision and Resource Management Plan* (USDI 1995a:24-40; 56-68).

The Northwest Forest Plan (NWFP) (USDA and USDI 1994) Standards and Guidelines incorporate the Aquatic Conservation Strategy (ACS) (amended March 2004, USDA and USDI 2004) to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands.

Major land uses in the Trail Creek Watershed include agriculture, timber, and recreation. Cattle operations are the largest non-forestry agricultural venture. The BLM manages 4 grazing allotments within the Trail Creek watershed, of which 2 are active. The Clear Creek and Sugar Loaf allotments are located in the northeast corner of the watershed and encompass a total of 2,287 acres, or approximately 6.5% of the watershed, encompassing the upper Trail Creek and Wall Creek drainages. Both allotments extend into the Elk Creek Watershed. As of 2010, both allotments had a maximum of 14 cattle grazing

between them. The Clear Creek allotment grazing period runs from mid-May through the end of October, and the Sugar Loaf allotment from mid-April through the end of May.

Studies indicate that settlement by Native Americans in the Trail Creek watershed began 5,000 years ago and intensified 2,000 years ago. The watershed has one of the lowest passes between the Rogue-Umpqua Divide and may have been used as a corridor for movement between basins. Native Americans relied on elk, deer, fish, and forest derived products such as berries, roots, and nuts for sustenance. Native Americans used fire as a tool to trap and expose game, to clear obstructions, and to manage vegetation. The resulting landscapes of the watershed were therefore dependent on ongoing fire management prior to European settlements. Native Americans were largely removed from the area by warfare, disease, and forced relocations during the mid-19th century.

Fur trappers were the first Europeans to arrive in the Rogue Valley in the early 1800's. Streams in the Trail Creek Watershed may have had beaver influenced morphological features prior to this period. In the mid-1850's gold mining brought settlers to the area around Trail Creek, though, there were no mines in the watershed itself. The mines likely contributed to development of roads in the area. Between the 1850's and early 1900's, most of the watershed was used for timber harvest. The land was homesteaded for agriculture, and by some, to turn around and sell to timber companies. When prices decreased in the 1920's for timber, more of the watershed became used for agriculture. Sheep and cattle grazing on the Forest Service lands in the watershed became fairly prevalent from 1910 into the early 1930's.

Passage of the Oregon and California (O&C) Act in 1937 provided direction for Federal lands managed by the BLM in this area. The O&C Act was intended to contribute to the local economy by providing for federal timberlands to be managed for permanent timber production on a sustained yield basis. One of the purposes of the O&C Act was to increase timber harvest on these lands to their timber producing capacity. Timber harvest revenues were to provide a consistent level of income to the counties that contain O&C lands. Under the O&C Act, these counties are entitled to 50 percent of the timber receipts.

Intensive tractor harvesting on private land in the watershed began in the 1940's and 1950's. All the downed woody material from previous harvest was sold in the 1970's and 80's to the chip market. BLM employed tractor yarding methods but began using cable yarding in the 1960's on steeper slopes. BLM used shelterwood techniques for harvesting, helping to maintain most of the mid to late seral stands in the watershed. Under the 1995 Medford District RMP, the watershed was listed as a low priority harvest area, and 29% of the BLM administered land was designated as riparian reserve.

Land ownership patterns, past timber harvest, wildfires, and fire exclusion have contributed to the existing conditions in the watershed. Fire exclusion and harvest methods have contributed to the current high density and multiple-layered stand conditions in many of the proposed harvest units. Past harvest methods also influenced the locations and conditions of the roads within this watershed. Use of the mainstem streams to transport wood during historic timber harvest contributed to removal of large woody debris from streams, and harvest of streams in the watershed providing no riparian buffer has contributed to a reduction of shade provided by riparian canopy to streams, especially on private land, where this form of timber harvest was most common.

Recreation in the Trail Creek Watershed is generally limited due to unavailability of developed facilities such as trails, picnic areas, and camp grounds. Trail Creek is closed to fishing. The Rattlesnake Crags-Main Cliffs area of the watershed is used for rock climbing and has established routes. Dumping of trash in the watershed is a known issue.

Roads distributed throughout the plan area provide vehicle access to managed forestlands, residences, and recreational areas. There are approximately 275 road miles within the Trail Creek Watershed, with a road

density of 5 miles per square mile, of which 39 percent are controlled by the BLM and 12 percent by the Forest Service (USDI 2010). The June 1999 BLM Trail Creek Watershed Analysis listed only 190 miles of active roads with a density of 4.1 miles per square mile. The recent update of road mileage is based on air photo analysis, and part of the increase in road mileage is due to inventory of previously unknown roads, of which an undetermined amount is actively used by motorized vehicles.

Geology

The Trail Creek Watershed is located in the Cascades Physiographic Province, which is composed of two volcanic sub-provinces: the Western and High Cascades. Lands within the Trail Creek Watershed are primarily found in the Western Cascades Province. The Western Cascade geology is composed of older, softer volcanic materials. High Cascade rock types are much younger and are composed mainly of harder lava flows.

The Trail Creek basin is formed from Tertiary (1.6 to 66 million years before present) Western Cascade volcanoclastic rocks originally deposited as flows and ash deposits on a gently sloping landscape. The watershed is dominated by andesitic lava flows, flow breccias, and ash flow tuff, found in the central portion of the West Fork Trail subwatershed. The Trail Creek watershed has not been glaciated and there has been little structural deformation other than minor faulting. The watershed has therefore developed a classic dendritic form with high gradient tributaries and progressively lower gradient, higher order channels.

The watershed has rugged topography with deep narrow valleys, but with alluvial floodplain deposits forming the last 1.6 million years in the lower reaches of the Trail and West Fork Trail mainstems.

Soils on steep slopes tend to be deep, cobbly to gravelly clay loam soil. High clay contents in the subsoil horizons, 35-60 percent below 6-12 inches, results in localized poor drainage manifesting in seasonally perched water tables.

A soil erodibility “K” factor for some areas in the Trail Creek Watershed reached the criteria for moderate to high for subsoil horizons. The soil is subject to erosion where exposed and compacted on tracts such as unsurfaced roads and skid trails, especially on steep slopes. There is currently no 303(d) listing for sediment in the watershed and it is assumed that logging has not been contributing to high sedimentation because there has been little commercial logging in the area over the last 15 years on BLM and Forest Service Lands.

Climate

Mild, wet winters and hot, dry summers characterize the Trail Creek Watershed. During the winter months, the moist, westerly flow of air from the Pacific Ocean results in frequent storms of varied intensities. Average annual precipitation ranges from approximately 34 inches at the mouth of Trail Creek to approximately 52 inches at the northwestern watershed divide (USDI 1999) with a mean of 40 inches. Approximately 70% of annual precipitation falls from November through March. Rain predominates in the lower elevations (generally less than 3,500 feet) with the majority occurring in the late fall, winter, and early spring. A mixture of snow and rain occurs between approximately 3,500 feet and 5,000 feet and this area is referred to as either the rain-on-snow zone or transient snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. The transient snow zone occupies approximately 14 percent of the Trail Creek watershed with the remaining 86 percent rain dominant. No snow dominant area exists in the watershed since the entire watershed is below 5,000 feet elevation.

During the summer months, the plan area is dominated by the Pacific high pressure system, which results in hot, dry summers. Summer rainstorms occur occasionally and are usually of short duration and limited area coverage. Air temperatures can display wide variations daily, seasonally, and by elevation.

Streamflows

Stream flows in the Trail Creek Watershed fluctuate with seasonal variation of precipitation. Moderate to high flows generally occur from mid-November through May. Stream flows during the months of April and May and part of June are augmented by melting snowpack in the high elevations. Peak flows generally result from rain-on-snow events during the winter months where rains melt some or all of the existing snowpack in the transient snow zone. Peak flows as high as 7,940 cfs have been recorded at the mouth of Trail Creek.¹

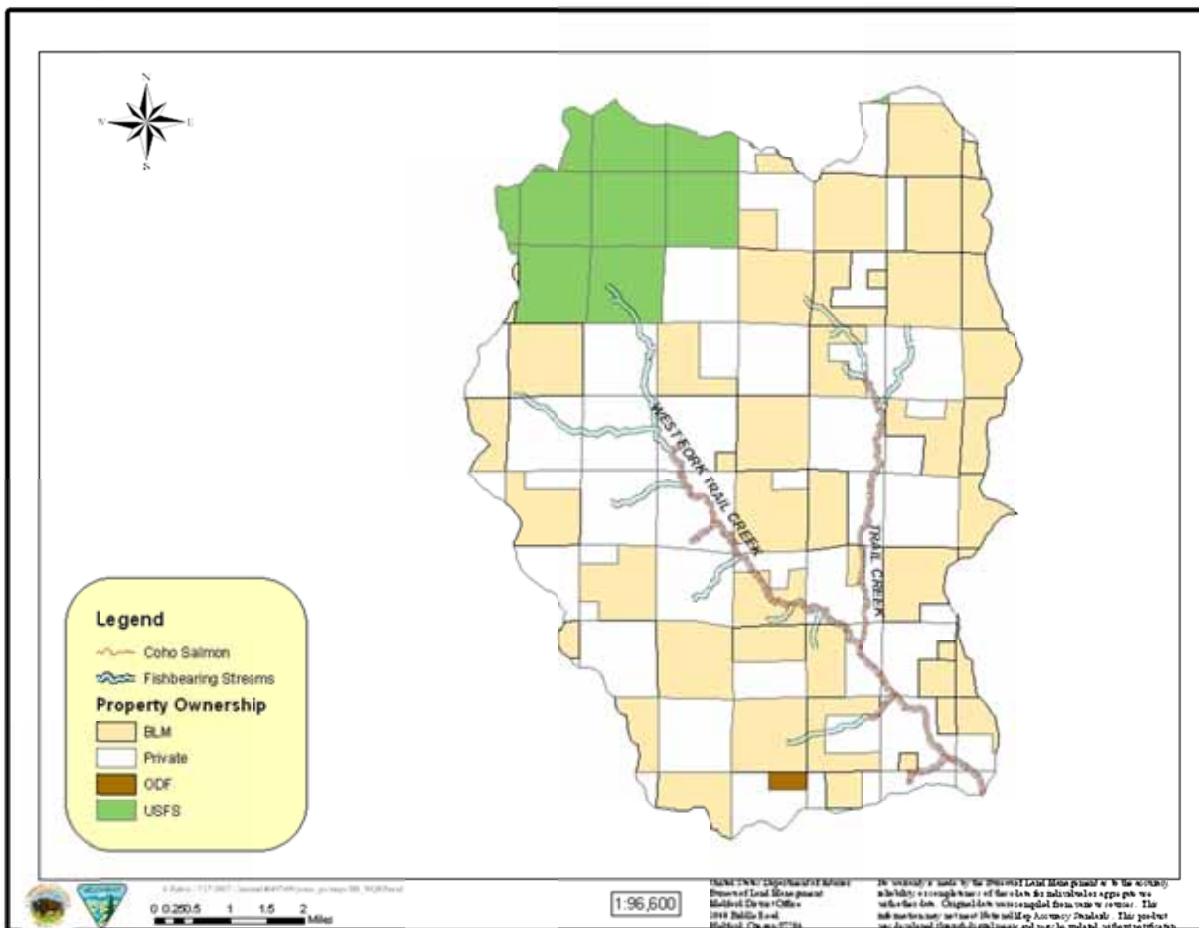
Low flows for Trail Creek normally coincide with the period of low precipitation from July through September or October. Flows will drop as low as 1 cfs in the driest years.

Aquatic Wildlife Species

There are two native anadromous species that spawn and rear in the Trail Creek Watershed: coho salmon and steelhead trout (summer and winter runs). The BLM manages only 3.4 miles of 19.7 miles of anadromous fishbearing stream (17%). Most of the lower elevation reaches and mainstem streams which support these two species are located in small rural tracts (3 to 10 acres) used for agricultural and residential purposes.

¹ The highest peak flow of record occurred during the 1964 flood.

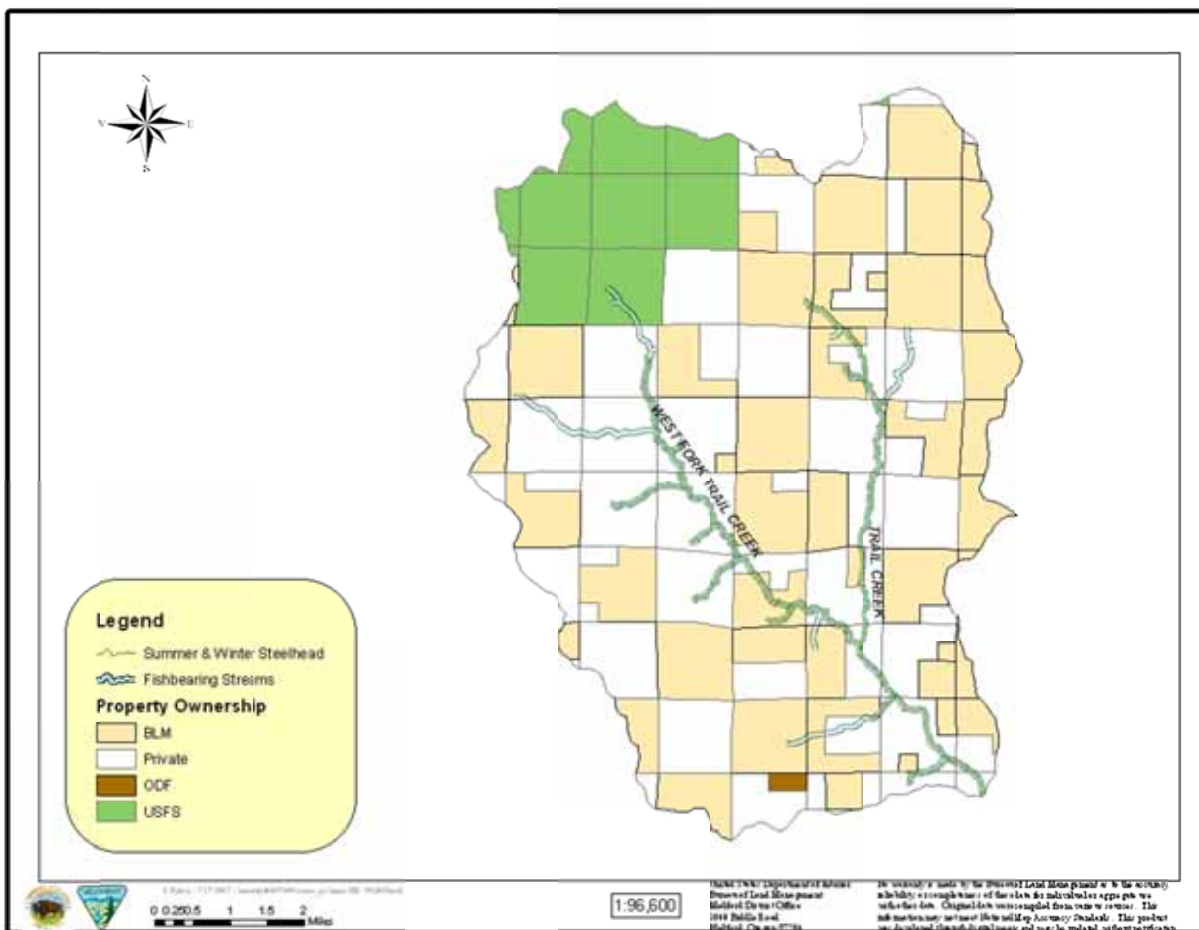
Figure 5. Coho Distribution in the Trail Creek Watershed



Northern California/Southern Oregon Coho salmon (*Oncorhynchus kisutch*), a species listed as threatened under the Endangered Species Act (May 1997) is present in Trail and West Fork Trail Creek, and lower reaches of Canyon, Romine, and Wall Creeks for 13.4 miles (Figure 5).

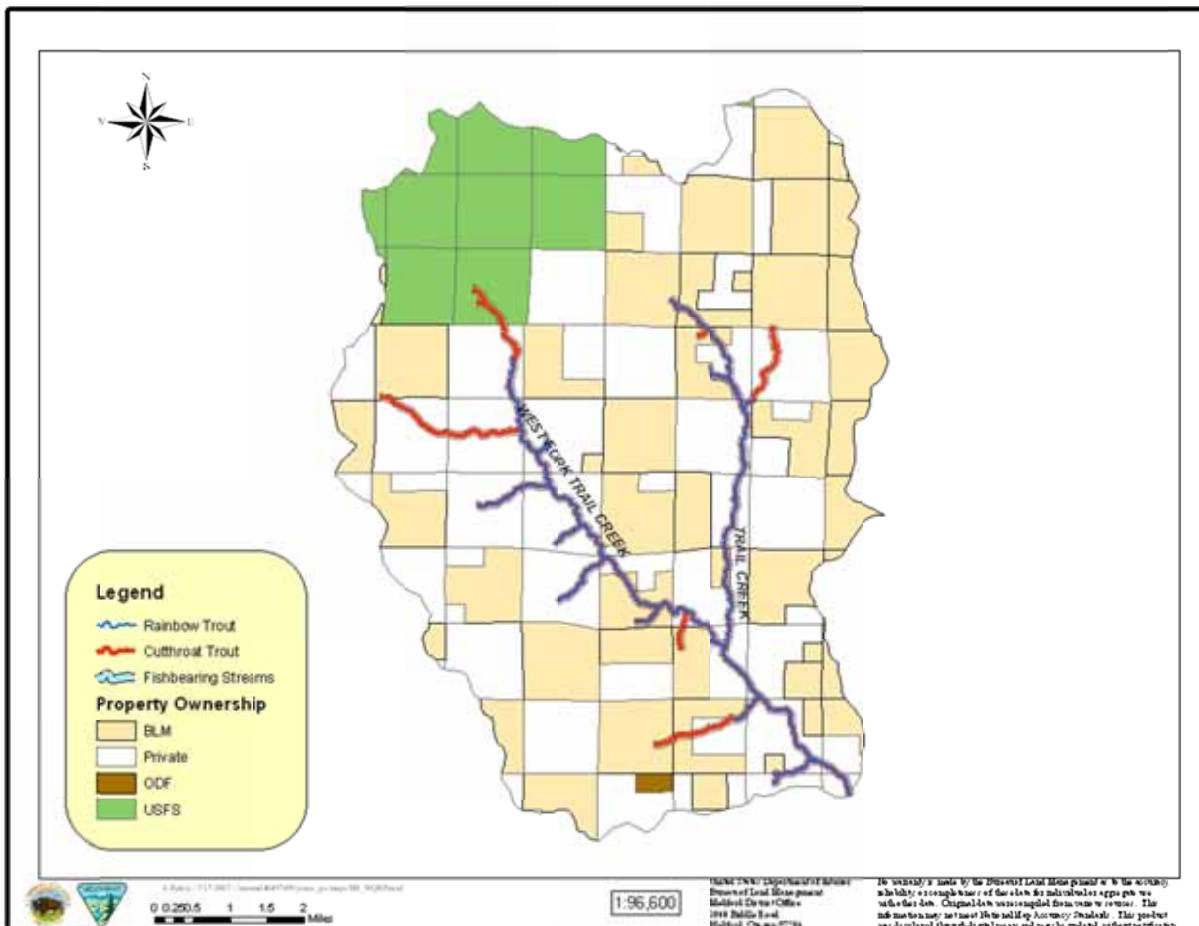
Summer and winter steelhead (*O. mykiss*) use a total of 19.7 miles of habitat in Trail and West Fork Trail Creek, and lower reaches of Canyon, Paradise, Romine, Toothcatcher, Wall and Walpole Creeks (Figure 6). Summer and winter steelhead trout spawn from January to May.

Figure 6. Summer and Winter Steelhead Distribution in the Trail Creek Watershed



Native resident fish species in the Trail Creek Watershed (Figure 7) include Rainbow trout, cutthroat trout (c), Pacific lamprey, Klamath smallscale sucker, reticulated sculpin, and reddsideshiner. Resident trout are found in Canyon, Paradise, Romine, Toothcatcher, Trail, West Fork Trail, Wall, and Wallpole Creeks for a total of 26.6 stream miles.

Figure 7. Resident Trout Distribution in the Trail Creek Watershed (overlap of rainbow and cutthroat trout occurs in purple)



The major limiting factors influencing aquatic species distribution and instream habitat condition are: high summer stream temperatures, sedimentation of pools and spawning gravels, and lack of large woody debris. Other limiting factors include: riparian degradation, instream degradation, fish passage barriers, and wetland and floodplain losses (USDI 1995, 1999).

Trail Creek watershed response reaches contain very little wood and coarse sediment critical for the formation of quality rearing and spawning habitat. The major stream reaches, Trail, West Trail, and Wall Creeks, are defined by shallow, straight bedrock channels, in locations, confined by bedrock. The larger stream reaches in previous decades had most adjacent forests removed and few mature trees remain to provide potential wood structure for streams. Some wood and sediment removal can be contributed to the 1964 flood, which affected much of the Rogue River basin, scouring many stream reaches to bedrock.

Watershed Analysis

NWFP Standards and Guidelines (USDA and USDI 1994) incorporate the ACS (amended March 2004, USDA and USDI 2004) to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. Watershed analyses are a required component of the ACS under the NWFP. The *Trail Creek Watershed Analysis (June, 1999)* is a complete analysis of the Trail Creek Watershed. This WQRP tiers to and appends the watershed analysis. A summary of

historical and present watershed conditions in the Trail Creek Watershed has been compiled from watershed analysis (Table 5). The analysis and recommendations found in this WQRP use data from the watershed analysis. Additional analysis and recommendations have been included in this WQRP where the watershed analysis data was incomplete or new information was available.

Table 5. Summary of Watershed Conditions on BLM-Administered Lands in the Trail Creek Watershed

Shading	
Historical Condition	<ul style="list-style-type: none"> • Shading was higher, at least in the upper forks of Trail Creek, prior to heavy timber harvesting
Present Condition	<ul style="list-style-type: none"> • Less than 25% of all fishbearing streams provide greater than 80% stream shading.
Forest Health & Productivity	
Historical Condition	<ul style="list-style-type: none"> • Frequent, low intensity fires maintained low fuel levels and open under-story. • Forest stands had fewer trees per acre with trees of larger diameter. • Forest stands had diverse age classes. • Forests predominately composed of Douglas-fir, pine, and hardwood mixtures. • Areas of open mature oak forest.
Present Condition	<ul style="list-style-type: none"> • Fire exclusion resulting in high fuel loads. • High vegetation densities resulting in low vigor and/or poor growth. • Forest stands lack resiliency.
Large Wood	
Historical Condition	<ul style="list-style-type: none"> • Adequate supply of large wood in the stream channels, at least for the upper reaches of the watershed.
Present Condition	<ul style="list-style-type: none"> • Near term large wood recruitment potential is low for 80% of private lands, but only low for approximately 20% of public lands in the watershed • Road stream crossings disrupt transport of wood and sediment. • Large wood in the higher order channels of the watershed was likely somewhat depleted by removal for log “booming” during timber harvest, and by the 1964 flood. • Placement by BLM of some boulder clusters, woody debris jams, and rock weirs to promote sediment retention. Several sites developed over the last 10 years.
Roads	
Historic Condition	<ul style="list-style-type: none"> • Few roads before industrial timber harvesting began in the early 1950s.
Present Condition	<ul style="list-style-type: none"> • Areas with high road density. • Roads in riparian areas. • High number of stream crossings with many culverts undersized for 100-year flood (a study in 1986 showed at 17 locations, 100-year flows would be 3.5 times greater than the average culvert capacity). • Stream network extension (due to road ditch lines) increases winter peak flows. • Road systems are likely the predominant source of management-related fine sediment in the watershed. • 5 miles per square mile of roads.
Flow Regime	
Historic Condition	<ul style="list-style-type: none"> • Channel morphology developed in response to climatic conditions and natural ranges of streamflows. • Most likely, peak flows were lower in magnitude and frequency. • Summer low flows were directly related to the amount and timing of precipitation events.
Present Condition	<ul style="list-style-type: none"> • Winter peak flows possibly increased by roads and harvest. • Summer low flows reduced by water withdrawals.

C. E. Coli

Introduction

Water contact recreation is the most sensitive beneficial use addressed in the Rogue River Basin Bacteria TMDL.

The current Oregon water quality bacteria standard is found in chapter 340, division 41, section 9 of the Oregon Administrative Rules (OAR) (ODEQ 2010). The following is an excerpt from the standard that applies to nonpoint sources in the Trail Creek Watershed.

(1) Numeric Criteria: Organisms of the coliform group commonly associated with fecal sources (MPN or equivalent membrane filtration using a representative number of samples) may not exceed the criteria described in paragraphs (a) and (b) of this paragraph:

(a) Freshwaters and Estuarine Waters Other than Shellfish Growing Waters:

(A) A 30-day log mean of 126 E. coli organisms per 100 milliliters, based on a minimum of five (5) samples;

(B) No single sample may exceed 406 E. coli organisms per 100 milliliters.

(3) Animal Waste: Runoff contaminated with domesticated animal wastes must be minimized and treated to the maximum extent practicable before it is allowed to enter waters of the State.

(4) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or otherwise injurious to public health may not be allowed.

(10) Water Quality Limited for Bacteria: In those water bodies, or segments of water bodies identified by the Department as exceeding the relevant numeric criteria for bacteria in the basin standards and designated as water-quality limited under section 303(d) of the Clean Water Act, the requirements specified in section 11 of this rule and in OAR 340-041-0061 (12) must apply.

(11) In water bodies designated by the Department as water-quality limited for bacteria, and in accordance with priorities established by the Department, development and implementation of a bacteria management plan may be required of those sources that the Department determines to be contributing to the problem. The Department may determine that a plan is not necessary for a particular stream segment or segments within a water-quality limited basin based on the contribution of the segment(s) to the problem. The bacteria management plans will identify the technologies, best management practices and/or measures and approaches to be implemented by point and nonpoint sources to limit bacterial contamination. For nonpoint sources, the bacteria management plan will be developed by designated management agencies (DMAs) which will identify the appropriate best management practices or measures and approaches.

The 2004/2006 303(d) list includes one stream within the Trail Creek Watershed that is listed for exceeding E. coli standards which is Trail Creek (Table 6 and Figure 8). There are 3.7 miles of E. coli-listed streams on BLM-administered lands within the Trail Creek Watershed.

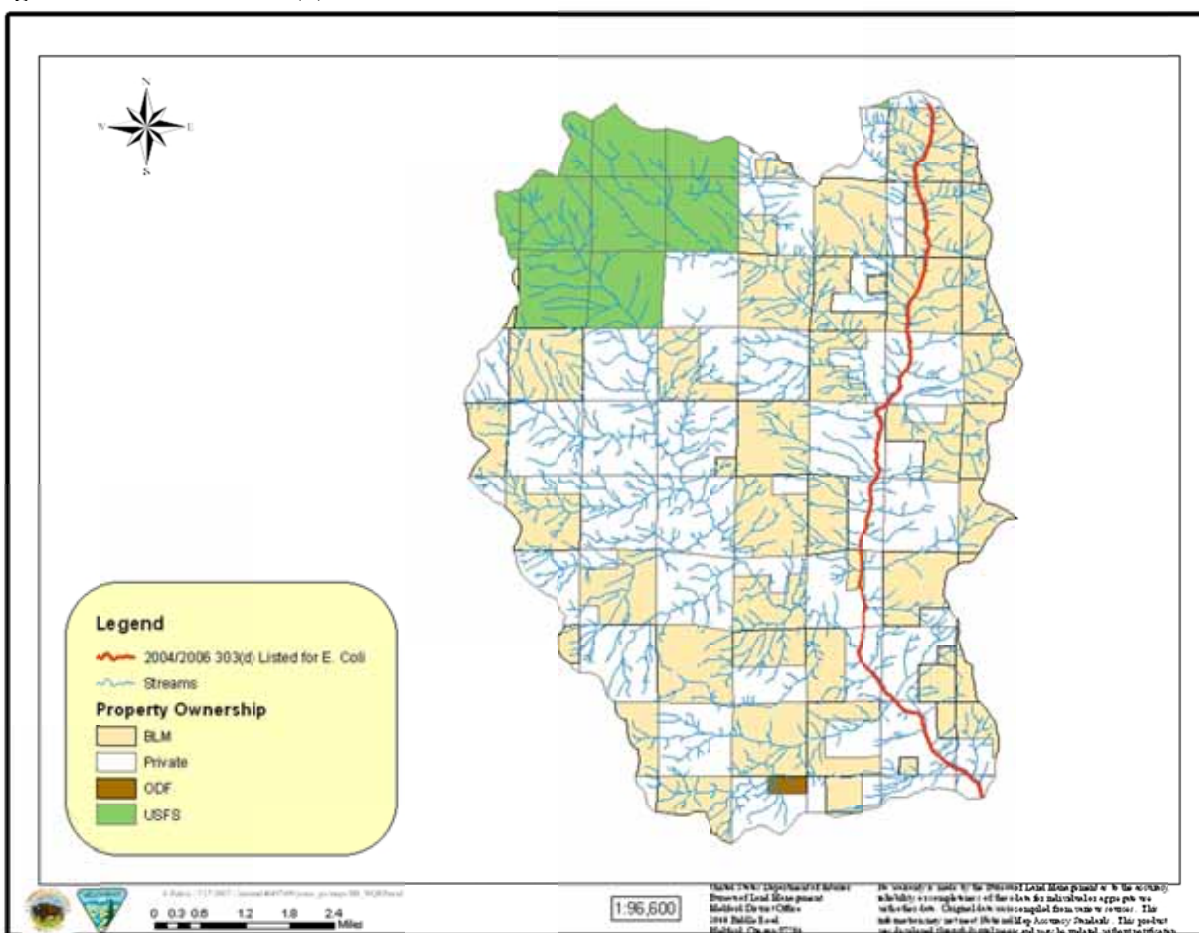
Trail Creek had one sample site located at the mouth of the creek (LASAR # 24477). E. coli data for Trail Creek were limited to 10 samples taken in 1998 over a two month period (7/27 – 9/23). The log mean of

the available *E. coli* concentration data was 10.3 organisms/100mL. The water contact recreation standard was exceeded once with an *E. coli* concentration of 1414.0 organisms /100mL. All other sample concentrations were less than 16 organisms/100mL (ODEQ 2008).

Table 6. 303(d) E. Coli-Listed Reaches in the Trail Creek Watershed (ODEQ 2008)

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Trail Creek	Summer	OAR 340-041-0009(1)(a)(A,B)	10.7	3.7
Total Stream Miles listed for E. Coli Criteria (Summer)				10.7	3.7

Figure 8. 2004/2006 303(d) E. Coli-Listed Streams for the Trail Creek Watershed



E. Coli Sources

Fecal coliform bacteria are produced in the guts of warm-blooded vertebrate animals, and indicate the presence of pathogens that cause illness in humans. *E. coli* is a species of fecal coliform bacteria. A variety of everyday activities cause bacterial contamination in surface waters (ODEQ 2004:9). Fecal bacteria sources include wildlife, livestock waste, failing septic systems, and agricultural, rural residential and urban runoff (ODEQ 2008). Potential nonpoint sources of bacteria from BLM-administered lands

may include animal feces (wild and domestic, including livestock such as cattle) and inadequate waste disposal by dispersed recreational users.

In the case of *E. coli*, research in other Oregon watersheds indicates that the management of federal forest lands does not typically contribute to elevated levels of *E. coli* that are the basis for the listings (ODEQ 2008).

***E. Coli* TMDL Loading Capacity and Allocations**

Load Allocations: Nonpoint Sources

OAR 340-042-0040(4)(h), 40 CFR 130.2(h)

This element determines the portion of the receiving water's loading capacity that is allocated to existing nonpoint sources of pollution. The criteria that apply to these areas are a log mean of 126 *E. coli* / 100 ml in 30 days and 406 *E. coli* / 100 ml as a daily maximum. The surrogate measure is the percent reduction target.

Because management agencies are generally designated by land use, the following is a discussion of bacteria sources by land use also naming the management agency with land use authority. See the Water Quality Management Plan (Chapter 4) for more information and details.

Forest Managed Lands

Management Agency: ODF, BLM, USFS

The Oregon Department of Forestry (ODF) is the DMA, by statute, for water quality protection from nonpoint source discharges or pollutants resulting from forest operations on non-federal forestlands in the Rogue River Basin, as well as statewide. Water protection rules are applied per OAR 629-635-0000 through 629-660-0060. Forest operators conducting operations in accordance with the Forest Practices Act (FPA) are considered to be in compliance with water quality standards.

In July 2003, the Bureau of Land Management (BLM) signed a memorandum of agreement (MOA) with DEQ establishing a process by which the BLM and DEQ will help ensure compliance with State and Federal point and non-point source rules and regulations requirements on BLM lands. This agreement recognizes the BLM as the DMA on BLM-administered lands in Oregon. The agreement, which expired in 2007, was extended by mutual consent of the agencies until December 31, 2008.

Pursuant to the MOA, as resources allow, BLM will coordinate with DEQ to develop WQRPs for BLM-administered lands and will revise or adapt WQRPs to be consistent with and applicable to the final TMDL and associated Water Quality Management Plan (WQMP) (the TMDL subbasin implementation strategy). The WQRP will be the TMDL implementation plan for BLM-administered lands.

BLM will conduct management activities on BLM administered lands consistent with WQRPs and provide updates and reports on restoration progress according to DEQ's implementation schedule. Where necessary and appropriate, WQRPs propose a set of actions and timeline for achieving nonpoint source load allocations and meeting water quality standards. In the case of *E. coli*, research in other Oregon watersheds indicates that the management of federal forest lands does not typically contribute to elevated levels of *E. coli* that are the basis for the listings.

Element 2. Goals and Objectives

The long-term goal of this WQRP is to achieve compliance with water quality standards for the 303(d) listed streams in the Trail Creek Watershed. The WQRP identifies TMDL implementation strategies to achieve this goal. Recovery goals will focus on protecting areas where water quality meets standards and avoiding future impairments of these areas, and restoring areas that do not currently meet water quality standards.

The recovery of water quality conditions on BLM-administered land in the Trail Creek Watershed will be dependent upon implementation of the BLM Medford District Resource Management Plan (RMP) (USDI 1995) based upon the NWFP (USDA and USDI 1994). The RMP includes best management practices (BMPs) that are intended to prevent or reduce water pollution to meet the goals of the Clean Water Act.

Paramount to recovery is adherence to the Standards and Guidelines of the NWFP (as amended, USDA and USDI 2004) to meet the ACS. This includes protection of riparian areas and necessary silvicultural treatments to achieve vegetative potential as rapidly as possible. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The NWFP requires federal decision makers to ensure that proposed management activities are consistent with ACS objectives. The NWFP amendment in March 2004 clarified provisions relating to the ACS. It explains that the ACS objectives were intended to be applied and achieved at the fifth-field watershed and larger scales, and over a period of decades or longer rather than in the short-term. ACS objectives are listed on page B-11 of the NWFP Record of Decision (ROD) (USDA and USDI 1994). Together these objectives are intended to enhance biodiversity and ecosystem function for fish, wildlife, and vegetation, enhance soil productivity and water quality, and reduce hazardous fuel loads and risk to uncharacteristic disturbance (USDA and USDI 2005:46). ACS objectives 3-8 contain guidance related to maintaining and restoring water quality. In general, the objectives are long range (10 to 100 years) and strive to maintain and restore ecosystem health at the watershed scale.

Recovery goals for E. coli and restoration techniques for achieving these goals on BLM-administered land are specified in Table 8.

Table 8. Recovery Goals for BLM-Administered Land in the Trail Creek Watershed

Element	Goal	Passive Restoration	Active Restoration
E. Coli	<ul style="list-style-type: none"> Decrease E. coli contamination caused by livestock. 		<ul style="list-style-type: none"> Manage livestock to prevent concentrations in streams or riparian zones.

Element 3. Proposed Management Measures

The NWFP ACS describes general guidance for managing Riparian Reserves to meet the ACS objectives. The Riparian Reserves, Key Watersheds, watershed analysis, and watershed restoration components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems.

Specific NWFP Standards and Guidelines (USDA and USDI 1994: C-31-C-38) direct the types of activities that may occur within Riparian Reserves and how they will be accomplished. These Standards and Guidelines effectively serve as general BMPs to prevent or reduce water pollution in order to meet the goals of Clean Water Act compliance. As a general rule, the Standards and Guidelines for Riparian

Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserve widths are determined from the Standards and Guidelines (USDA and USDI 1994, p. C-30). The minimum reserve width for fish-bearing streams, lakes, and natural ponds is 300 feet slope distance on each side of the stream or waterbody. Perennial non-fish bearing streams, constructed ponds and reservoirs, and wetlands greater than 1 acre receive a minimum reserve width of 150 feet slope distance on each side of the stream or waterbody. Intermittent streams receive a minimum reserve width of 100 feet slope distance on each side of the stream and Riparian Reserves for wetlands less than 1 acre include the wetland and extend to the outer edges of the riparian vegetation.

The Medford District RMP includes BMPs that are important for preventing and controlling nonpoint source pollution to the “maximum extent practicable” (USDI 1995, pp. 149-177). BMPs are developed on a site-specific basis and presented for public comment during the National Environmental Policy Act (NEPA) process. One element of BMP implementation includes effectiveness monitoring and modification of BMPs when water quality goals are not being achieved.

Grazing allotment assessments and evaluations will identify specific grazing problems that are contributing to bacteria. Corrective management measures will be implemented according to site-specific NEPA analysis.

Element 4. Time Line for Implementation

The major provisions of this plan have already been implemented. Protection of riparian areas along all streams has been ongoing since the NWFP became effective in 1994. Inherent in the NWFP implementation is the passive restoration of riparian areas that ensued as a result of the Riparian Reserves. Implementation of active restoration activities beyond the inherent passive riparian restoration occurs in the context of watershed analysis and through site-specific projects. Restoration projects require analysis under the NEPA. The timing for implementation of those activities is dependent on funding availability.

The problems leading to water quality limitations and 303(d) listing have accumulated over many decades. Natural recovery and restorative management actions to address these problems will occur over an extended period of time. Implementation will continue until the restoration goals, objectives, and management measures as described in this WQRP are achieved. While active restoration may provide immediate, localized improvement, recovery at the watershed scale is long term in nature. The ACS contained in the NWFP (as amended, USDA and USDI 2004) describes restoration timeframes. ACS seeks to “prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century to achieve objectives.”

Stream temperature and habitat recovery is largely dependent on vegetation recovery. Actions implemented now will not begin to show returns in terms of reduced stream temperatures or improved aquatic habitat for a number of years. Full recovery of these conditions will not occur for many decades. Stream temperatures will begin to decline and recover before the riparian areas reach their maximum potentials. Growth of the future system potential vegetation was modeled with the assumption that there will be no management activities such as thinning to enhance growth. If silvicultural activities were to occur, the vegetation would grow more quickly and recovery could be accelerated.

It will take a longer time for aquatic habitat recovery than for shade recovery. Instream conditions will recover only after mature conifers begin to enter the waterways through one of several delivery mechanisms, e.g. blowdown, wildfire, debris flows down tributary streams and into fish-bearing reaches,

and flooding. Tree growth from the current condition of young conifers to mature age conifers will take approximately 200 to 250 years. This will represent full biological recovery of these stream channels, while temperature recovery and stabilization of streambanks will occur earlier.

Element 5. Responsible Parties

The BLM is recognized by Oregon DEQ as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM has signed a Memorandum of Agreement (MOA) with the DEQ that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations. The Director of DEQ and the BLM State Director are responsible for ensuring implementation of the agency's MOA.

The BLM's Butte Falls Field Manager is responsible for ensuring this WQRP is implemented, reviewed, and amended as needed. These officials are responsible for all WQRPs for lands under their jurisdiction. The field manager will ensure coordination and consistency in plan development, implementation, monitoring, review, and revision. The manager will also ensure priorities are monitored and revised as needed and review and consider funding needs for this and other WQRPs in annual budget planning.

Element 6. Reasonable Assurance of Implementation

This WQRP will be submitted to the DEQ and it will be incorporated in the Rogue Basin WQMP, which was completed in December 2008. The WQMP will cover all land within the Trail Creek Watershed regardless of jurisdiction or ownership.

The BLM is committed to working cooperatively with all interested parties in the plan area. While partnerships with private, local, and state organizations will be pursued, the BLM can only control the implementation of this WQRP on BLM-administered lands. It must be noted that only 25 percent of the 303(d) listed stream miles in the plan area are located on lands under BLM jurisdiction. Other organizations or groups that are (or will be) involved in partnerships for implementing, monitoring, and maintaining the Rogue Basin WQMP in the Trail Creek watershed include the Upper Rogue Watershed Association, Jackson County, Oregon Department of Forestry (ODF), Oregon Department of Agriculture (ODA), Oregon Department of Transportation (ODOT), Oregon Department of Fish and Wildlife (ODFW), Oregon Water Resources Department (WRD), Oregon DEQ, and the U.S. Forest Service. The problems affecting water quality are widespread; coordination and innovative partnerships are key ingredients to successful restoration efforts.

The BLM, Medford District intends to implement this plan within current and future funding constraints. Implementation and adoption of the MOA with the DEQ also provide assurances that water quality protection and restoration on lands administered by the BLM will progress in an effective manner.

Element 7. Monitoring and Evaluation

Monitoring and evaluation have two basic components: 1) monitoring the implementation and effectiveness of this WQRP and 2) monitoring the physical, chemical, and biological parameters for water quality. Monitoring information will provide a check on progress being made toward achieving the TMDL allocations and meeting water quality standards, and will be used as part of the Adaptive Management process.

The objectives of this monitoring effort are to demonstrate long-term recovery, better understand natural variability, track implementation of projects and BMPs, and evaluate effectiveness of TMDL implementation. This monitoring and feedback mechanism is a major component of the “reasonable assurance of implementation” for this WQRP.

The NWFP and the BLM Medford District RMP are ongoing federal land management plans. The NWFP, effective in 1994, requires that if results of monitoring indicate management is not achieving ACS objectives, among them water quality, plan amendments may be required. These plan amendments could, in part, redirect management toward attainment of state water quality standards.

The current plan contains requirements for implementation, effectiveness, and validation monitoring of BMPs for water resources. The Medford District annual program summaries provide feedback and assess the progress of RMP implementation.

RMP monitoring will be conducted as identified in the approved BLM Medford District plans. Monitoring will be used to ensure that decisions and priorities conveyed by BLM management plans are being implemented, to document progress toward attainment of state water quality standards, to identify whether resource management objectives are being attained, and to document whether mitigating measures and other management direction are effective.

DEQ will evaluate progress of actions to attain water quality standards after TMDLs are developed and implemented. If DEQ determines that implementation is not proceeding or if implementation measures are in place, but water quality standards or load allocations are not or will not be attained, then DEQ will work with the BLM to assess the situation and to take appropriate action. Such action may include additional implementation measures, modifications to the TMDL, and/or placing the water body on the 303(d) list when the list is next submitted to EPA.

WQRP Implementation and Effectiveness Monitoring

Restoration activities that benefit aquatic resources will be provided annually to the Interagency Restoration Database (IRDA). This database was developed by the Regional Ecosystem Office (REO) to track all restoration accomplishments by federal agencies in the areas covered by the NWFP. It is an ArcView-based application and is available via the Internet at the REO website (www.reo.gov). It also contains data from the state of Oregon. The IRDA is intended to provide for consistent and universal reporting and accountability among federal agencies and to provide a common approach to meeting federal agency commitments made in monitoring and reporting restoration efforts in the Oregon Coastal Salmon Restoration Initiative. Activities that are tracked include in-stream structure and passage, riparian treatments, upland treatments, road decommissioning and improvements, and wetland treatments.

In addition, implementation and effectiveness monitoring will be accomplished for restoration projects according to project level specifications and requirements.

Water Quality Monitoring

Water quality monitoring is critical for assessing the success of this WQRP. This data will be used to evaluate the success of plan implementation and effectiveness. Ongoing monitoring will detect improvements in water quality conditions as well as the progress toward attaining water quality standards.

The base water quality monitoring program will include continued stream temperature monitoring on streams that are water quality limited for temperature on BLM-administered land. Additional core indicators of water quality and stream health including stream temperature for non-303(d)-listed reaches,

stream shade, and stream channel condition will be monitored on BLM-administered land if funds and personnel are available.

Monitoring results associated with compliance with this WQRP will be submitted to the DEQ upon request.

Stream Temperature Monitoring

The BLM collected stream temperature data in the Trail Creek Watershed at two sites between 1997 and 1999 between the months of June and October. If stream temperature data collection were to occur, monitoring would be conducted to meet a variety of objectives, thus long-term monitoring sites as well as project-specific, short-term sites will be used. If funding were available, annual monitoring data would be collected on sites above the confluence of Trail and West Fork Trail Creeks on both of these tributaries, upstream on BLM lands. These streams are not currently 303(d) listed for temperature, so would be considered low priority for temperature monitoring.

Sampling methods and quality control for any future temperature monitoring will follow DEQ protocol. Generally, stream temperatures will be monitored from June 1 to September 30 to ensure that critical high temperature periods are covered. Measurements will be made with sensors programmed to record samples at least hourly. Qualified personnel will review raw data and delete erroneous data due to unit malfunction or other factors. Valid data will be processed to compute the 7-day rolling average of daily maximum temperature at each site. The resulting files will be stored in the BLM's database.

Stream Shade Monitoring

Guidelines in the Northwest Forest Plan specify that vegetation management activities that occur within the Riparian Reserves must have a goal of improving riparian conditions. The existing level of stream shade provided by the adjacent riparian stand will be determined prior to Riparian Reserve treatments that have the potential to influence water temperature. Measurement of angular canopy density (the measure of canopy closure as projected in a straight line from the stream surface to the sun) will be made in a manner that can be repeated within the portion of the adjacent stand within one tree height of the streambank at bankfull width. The measurement will occur within the stand, and not be influenced by the opening over the actual stream channel. Immediately after treatment, the shade measurement procedure will be repeated to verify that the treatment met the prescribed goals.

Stream Channel Condition and Sedimentation Monitoring

Restoration activities designed to improve stream channel conditions and reduce sediment delivery (i.e. road surface and drainage improvements, road decommissioning, and unstable area protection) will be included in the IRDA.

Monitoring Data and Adaptive Management

This WQRP is intended to be adaptive in nature. Sampling methodology, timing, frequency, and location will be refined as appropriate based on lessons learned, new information and techniques, and data analysis. A formal review involving BLM and DEQ will take place every five years, starting in 2013, to review the collected data and activity accomplishment. This ensures a formal mechanism for reviewing accomplishments, monitoring results, and new information. The evaluations will be used to determine whether management actions are having the desired effects or if changes in management actions and/or TMDLs are needed.

Element 8. Public Involvement

The Federal Land Policy Management Act (FLPMA) and the NEPA require public participation for any activities proposed for federal lands. The NWFP and the Medford District RMP went through an extensive public involvement process. Many of the elements contained in this WQRP are derived from these existing land use planning documents.

Public involvement was also included in the development of the *Trail Creek Watershed Analysis*. Additionally, the NEPA process requires public involvement prior to land management actions, providing another opportunity for public participation. During this process, the BLM sends scoping letters and schedules meetings with the public. The public comment period ensures that public participation is incorporated into the decision-making process.

The DEQ has lead responsibility for creating Total Maximum Daily Loads (TMDLs) and WQMPs to address water quality impaired streams for Oregon. This WQRP will be provided to the DEQ for incorporation into the completed Rogue Basin WQMP.

Element 9. Costs and Funding

Funding for project implementation and monitoring is derived from a number of sources. Implementation of the proposed actions discussed in this document will be contingent on securing adequate funding. Funds for project implementation originate from grants, cost-share projects, specific budget requests, appropriated funds, revenue generating activities (such as timber sales), or other sources. Potential sources of funding to implement restoration projects on federal lands include special BLM restoration funds.

Active restoration can be quite costly, especially for road upgrades and major culvert replacements. The cost varies with the level of restoration. The cost of riparian silvicultural treatments on forested lands is generally covered with appropriated funds and will vary depending on treatment type. The cost of WQRP monitoring will depend on the level of water quality monitoring. The maximum that would be expended is estimated to be \$4,000 per year and would include data collection, database management, data analysis, and report preparation.

It is important to note that many of the specific management practices contained in this WQRP are the implementation of BMPs during ongoing management activities such as timber harvest, silvicultural treatments, fuels management, etc. These practices are not dependent on specific restoration funding.

Work on federal lands will be accomplished to improve water quality as quickly as possible by addressing the highest existing and at-risk management-related contributors to water quality problems. Every attempt will be made to secure funding for restoration activity accomplishment but it must be recognized that the federal agencies are subject to political and economic realities. Currently, timber harvest is minimal due to lawsuits and the requirements of the clearances needed to proceed. If this situation continues, a major source of funding is lost. Historically, budget line items for restoration are a fraction of the total requirement. Therefore, it must be recognized that restoration actions are subject to the availability of funding.

Another important factor for implementation time lines and funding is that managers must consider the Trail Creek Watershed along with all other watersheds under their jurisdiction when determining budget allocations.

Element 10. Citation to Legal Authorities

The Endangered Species Act (ESA) and the Clean Water Act (CWA) are two federal laws which guide public land management. These laws are meant to provide for the recovery and preservation of endangered and threatened species and the quality of the nation's waters. The BLM is required to assist in implementing these two laws. The NWFP and RMP are mechanisms for the BLM to implement the ESA and CWA. They provide the overall planning framework for the development and implementation of this WQRP.

Clean Water Act Section 303(d)

Section 303(d) of the 1972 federal 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. Section 303 of the CWA 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 load allocations and waste load allocations prescribed in the TMDL, which is designed to restore the water quality and result in compliance with the water quality standards. In this way, the designated beneficial uses of the water will be protected for all citizens.

Northwest Forest Plan

In response to environmental concerns and litigation related to timber harvest and other operations on federal lands, the BLM commissioned the Forest Ecosystem Management Assessment Team (FEMAT 1993) to formulate and assess the consequences of management options. The assessment emphasizes producing management alternatives that comply with existing laws and maintaining the highest contribution of economic and social well being. The "backbone" of ecosystem management is recognized as constructing a network of late-successional forests and an interim and long-term scheme that protects aquatic and associated riparian habitats adequate to provide for threatened and at-risk species. Biological objectives of the Northwest Forest Plan include assuring adequate habitat on federal lands to aid the "recovery" of late-successional forest habitat-associated species listed as threatened under the ESA and preventing species from being listed under the ESA.

The RMP for the BLM Medford District provides for water quality and riparian management and is written to ensure attainment of ACS objectives and compliance with the CWA.

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