Water Quality Restoration Plan

Southern Oregon Coastal Basin

Elk Creek Watershed

Bureau of Land Management (BLM)

Medford District
Butte Falls Resource Area

July 2009

Elk Creek Watershed at a Glance	
Hydrologic Unit Code Number (Elk Creek)	**1710030705**
WQRP Area/Ownership	Total: 85,418 acres BLM Ownership: 27,044 acres (32 %) USFS Ownership: 23,868 acres (28%) ACOE Ownership: 2,618 acres (3%) Non-federal Ownership: 31,888 acres (37%)
303(d) Stream Miles Assessed	Total: 28 miles BLM Ownership: 6.9 miles
303(d) Listed Parameters	Temperature, DO, E. Coli
Key Resources and Uses	Salmonid, aesthetic, recreation
Known Human Activities	Timber harvest, roads, agriculture, recreation, utility corridor, cattle grazing, partially completed dam site
Natural Factors	Geology: volcanics and intrusive volcanics Soils: various series and complexes; predominately cobbly or gravelly clay loam – moderate to slow permeability

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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A. Introduction

This document describes how the Bureau of Land Management (BLM) will meet Oregon water quality standards for 303(d) listed streams on BLM-administered lands within the Elk Creek Watershed. It contains information that supports the Oregon Department of Environmental Quality's (DEQ) development of the Rogue Basin Total Maximum Daily Load (TMDL). Its organization is designed to be consistent with the DEQ's Rogue Basin Water Quality Management Plan (WQMP) completed 12/22/08. The area covered by this Water Quality Restoration Plan (WQRP) includes all lands managed by the BLM Medford District within the Elk Creek Watershed.

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 2004:5). Seasonal standards may be applied for uses that do not occur year round.

Table 1. Beneficial Uses in the Elk Creek Watershed (ODEQ 2004:5)

Beneficial Use	*Occurring*	*Beneficial Use*	*Occurring*
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	✓

Table 2. Sensitive Beneficial Uses in the Elk Creek Watershed

Sensitive Beneficial Use	*Species*[1]
Salmonid Fish Spawning & Rearing	Coho (t), summer and winter steelhead trout (c), spring chinook
Resident Fish & Aquatic Life	Resident Fish: Rainbow trout, cutthroat trout (c), sucker, sculpin Other Aquatic Life: Pacific giant salamander, western pond turtle (s), beaver, and other species of frogs, salamanders, and snakes

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 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. 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.

This WQRP addresses all stream listings on the 2004/2006 303(d) list for the plan area: one stream listed for exceeding the bacteria (E. coli) criterion, one stream exceeds the Dissolved Oxygen (DO) criterion, and three streams listed for exceeding the temperature criterion (Table 3). In addition to these stream listings, Bitter Lick Creek exceeds the temperature criterion (Table 3). Bitter Lick Creek is located within the Elk Creek Watershed on U.S. Forest Service (USFS)-administered land and will not be addressed in this WQRP for BLM-administered land.

Table 3. 2004/2006 303(d) Listings in the Elk Creek Watershed (ODEQ 2007)

303(d) List Date	Stream Segment	Listed Parameter	Season	Applicable Rule (at time of listing)	Total Miles Affected
2002	Elk Creek	Dissolved Oxygen	Summer	OAR 340-041-0016(1)(a)(c)(2)	11.2
2004	Elk Creek	Bacteria (E. coli)	Summer	OAR 340-041-0009(1)(a)(A,B)	20.7
1998	Elk Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	13.3
1998	West Branch Elk Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	7.4
2004	Sugarpine Creek	Temperature	Oct 15 – June 15	OAR 340-041-0028(4)(a)(b)	6
2004	Sugarpine Creek	Temperature	Year around (non-spawning season)	OAR 340-041-0028(4)(b)	9.1
1998	Bitter Lick Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	8.6
Total Stream Miles listed for Bacteria (E. coli) Criteria (Summer)					20.7
Total Stream Miles listed for DO Criteria (Summer)					11.2
Total Stream Miles listed for Temperature Criteria (Oct 15 – June 15)					6
Total Stream Miles listed for Temperature Criteria (Summer)					29.3
Total Stream Miles listed for Temperature Criteria (Year around (non-spawning season))					9.1

Within the Elk Creek Watershed, there are a total of 45.8 stream miles on the 2004/2006 303(d) list, of which 6.9 miles cross BLM-managed lands. The water quality limited stream reaches on BLM-managed lands are: Elk Creek, 1.2 miles for summer temperature, dissolved oxygen, and E. coli; West Branch Elk Creek, 4.5 miles for summer temperature; and Sugarpine Creek, 1.2 miles for year-around (non-spawning season) temperature and for temperature from October 15 to June 15;

B. Watershed Characterization

The Elk Creek Watershed covers approximately 133-square miles (85,418 acres) in the southern Cascade range in southwestern Oregon (Figure 1). The Elk 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 1,480 feet at the mouth of Elk Creek to 5,775 feet at the top of Whaleback Peak. Major tributaries to Elk Creek include West Branch Elk, Flat, Sugarpine, Bitter Lick, and Button Creeks.

The Elk Watershed lies within Jackson County. The plan area is northeast of the city of Medford and northeast of the town of Trail.

Figure 1. Location of the Elk Creek Watershed

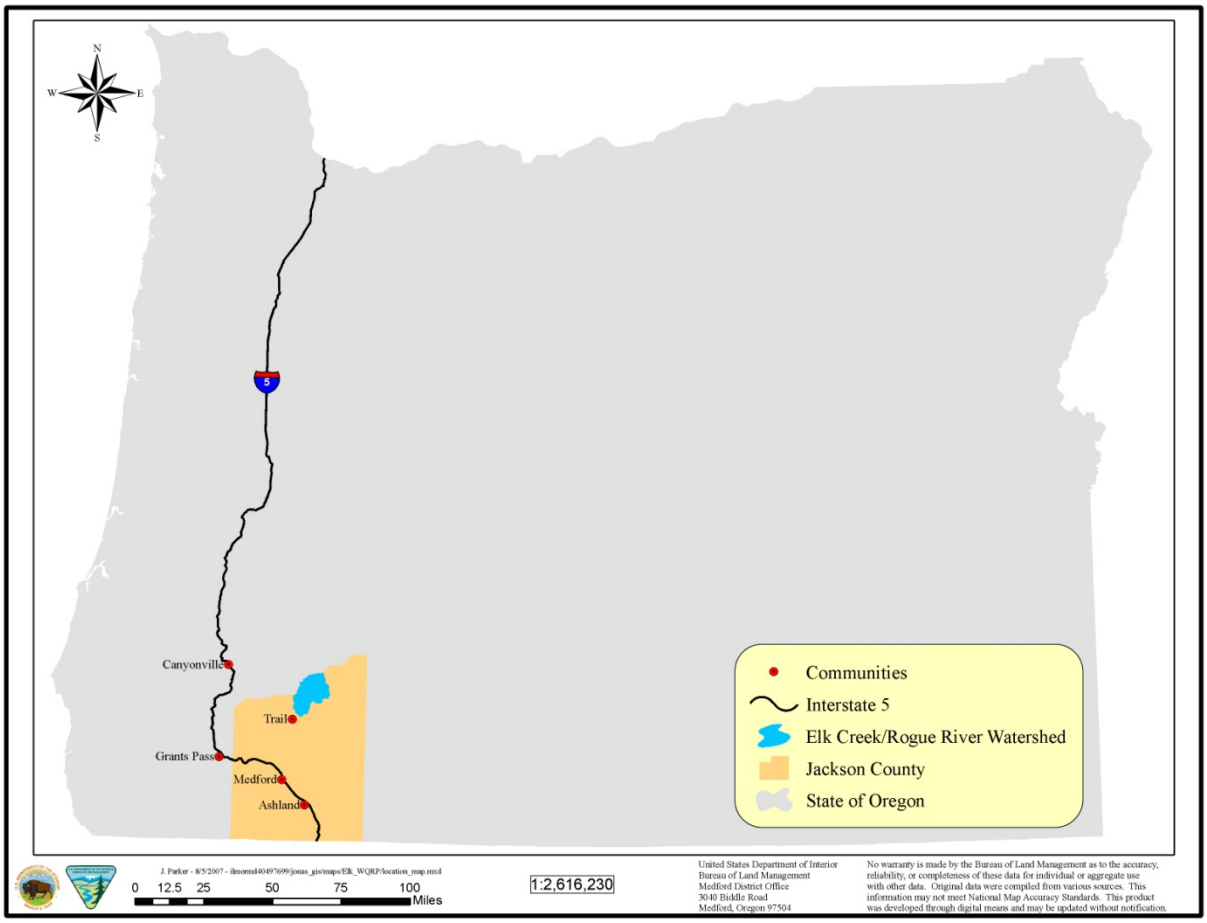


Figure 2. Rogue Basin and the Upper Rogue Subbasin

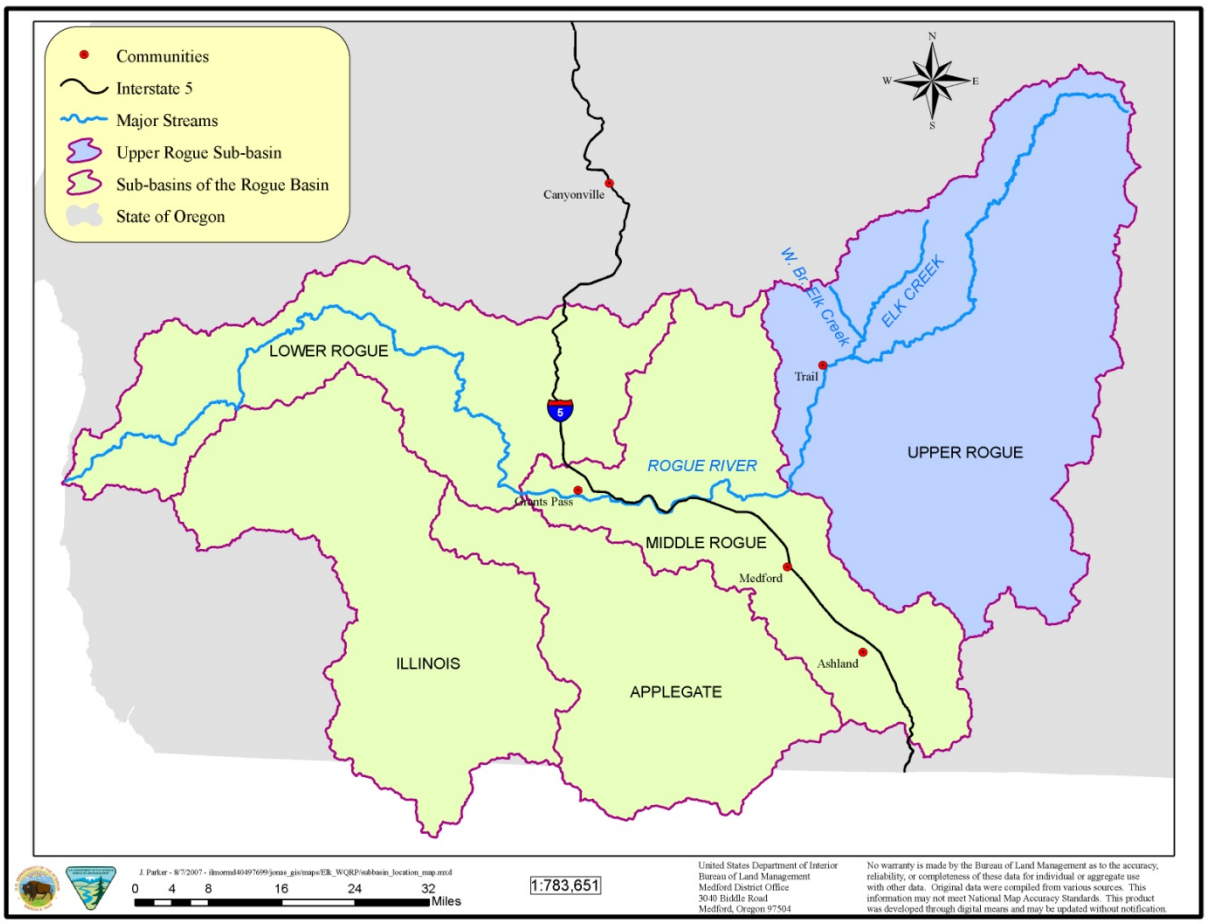
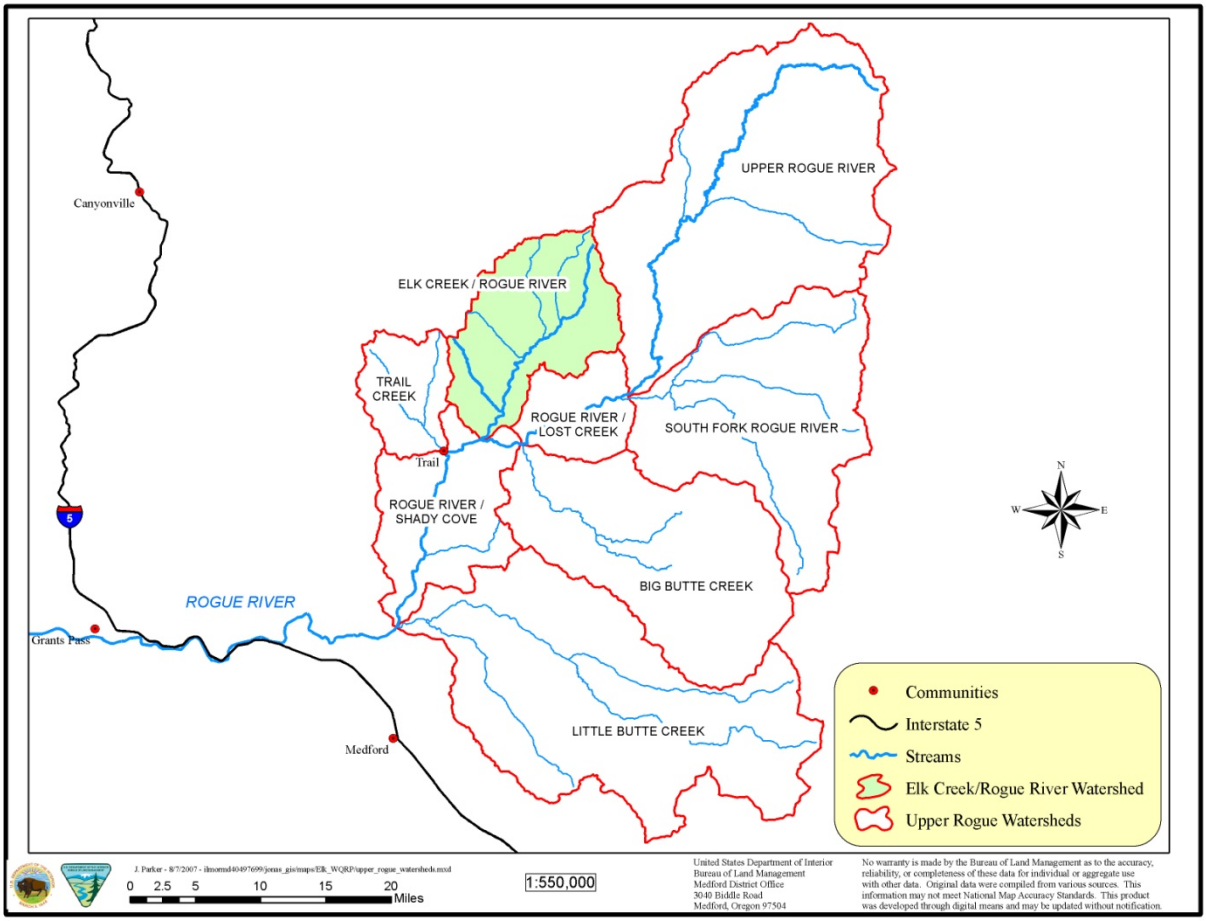


Figure 3. Watersheds within the Upper Rogue Subbasin



Land Ownership and Use

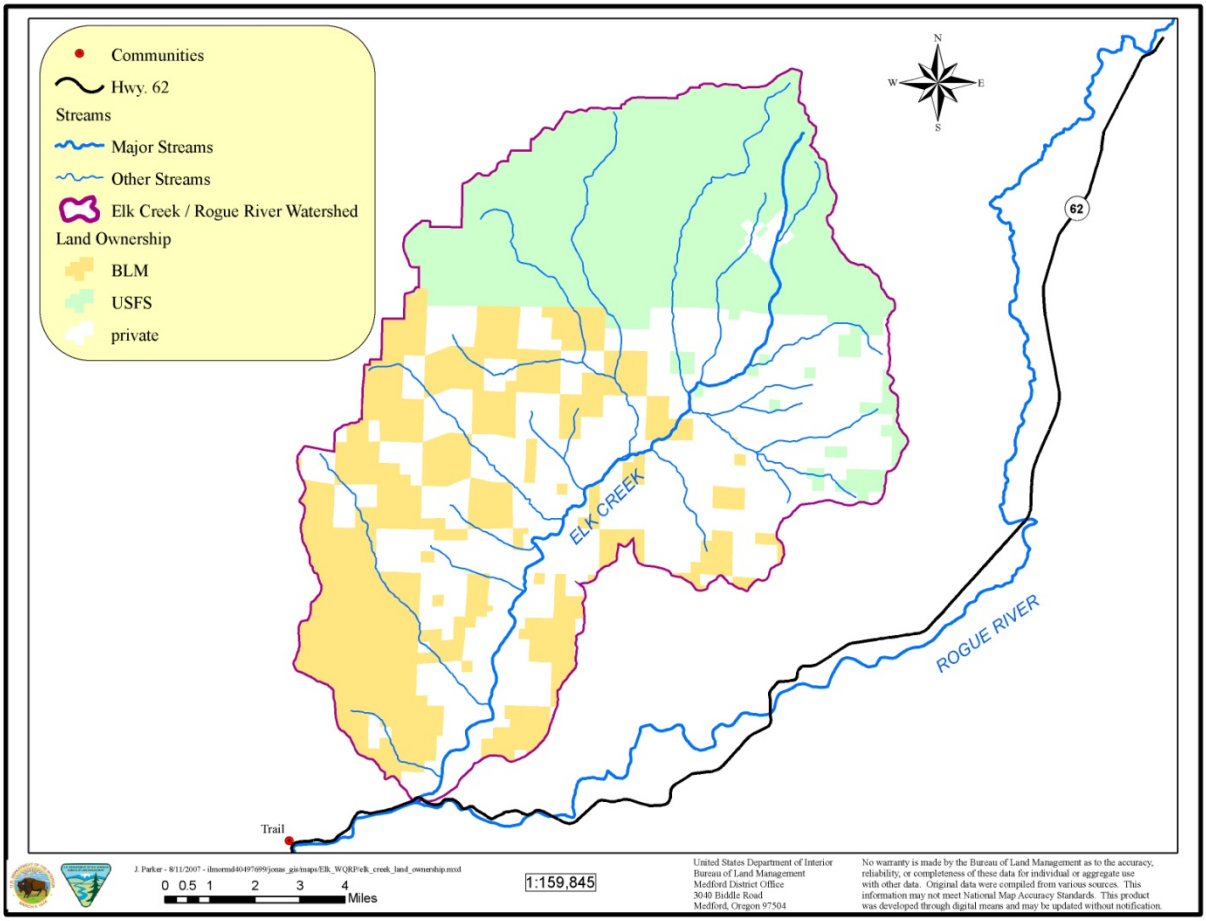
The BLM manages 27,044 acres (32 percent) within the Elk Creek Watershed (Table 4 and Figure 4). The Butte Falls Resource Area is the BLM administrative unit that manages lands for the Medford District. The USFS, Rogue River-Siskiyou National Forest, manages 23,868 acres (28 percent) within the Elk Creek Watershed. The US Army Corps of Engineers manages 2,618 acres (3 percent) and the remaining 37 percent of the plan area consists of private lands.

BLM-administered lands occupy a "checkerboard" pattern with private lands in the lower and middle elevations of the Elk 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 Elk Creek Watershed

Ownership	Acres	Percent
BLM - Butte Falls Resource Area	27,044	32%
USFS	23,868	28%
US Army Corps of Engineers	2,618	3%
Private	31,888	37%
Total	**85,418**	100%

Figure 4. BLM Land Ownership in the Elk 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 1995:24-40; 56-68). Elk Creek is designated in the Medford District RMP as a Tier 1 Key Watershed. Tier 1 Key Watersheds were selected for directly contributing to anadromous salmonid and resident fish species conservation (USDI 1995, 22-23).

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 Elk Creek Watershed include agriculture, timber, and recreation. Cattle operations are the largest non-forestry agricultural venture. The BLM manages 4 grazing allotments within the plan area, all of which (approximately 19,100 acres) are currently in use.

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.

Land ownership patterns, past timber harvest, wild fires, and fire exclusion have contributed to the existing conditions in the Elk Creek 5th field watershed. Fire exclusion and harvest methods have contributed to the current high density and multiple-layered stand conditions in many of the timber stands. Past harvest methods also influenced the locations and conditions of the roads within this watershed.

Logging continued through the 1980s, however, silvicultural prescriptions changed from clearcut to shelterwood harvests. Since the implementation of the Medford District RMP in 1995 and the designation of the Elk Creek watershed as a Late Successional Reserve (LSR), there have been no timber sales that have occurred on BLM-administered lands in the Elk Creek 5th field watershed. There are no scheduled timber sales in the Elk Creek Watershed to be offered in the near future.

The construction of the Elk Creek Dam began in the mid-1980's. A Federal court injunction order halted the work in 1988 resulting in a partially completed dam. The partially completed Elk Creek Dam acted as a fish barrier and Oregon Department of Fish and Wildlife (ODFW) have been trapping and hauling fish around the site since the mid 90's. The partially completed dam was notched during the summer of 2008 to allow for fish passage and fish will no longer be trapped and hauled around the dam.

The Elk Creek Watershed is not used intensively for recreational purposes, outside of deer hunting. Summer use is dominated by camping (at dispersed sites), hiking, but includes other activities such as mountain biking, horseback riding, off-highway vehicle (OHV) use, and pleasure driving. Fall use is primarily big game hunting. There are no developed facilities managed by BLM within the plan area.

Roads distributed throughout the plan area provide vehicle access to managed forestlands, residences, and recreational areas. There are approximately 599 road miles within the Elk Creek Watershed, of which 26 percent are controlled by the BLM and 20 percent by the Forest Service.

Timbered Rock fire

On July 12, 2002 the Timbered Rock fire started in the Elk Creek watershed. This fire grew to approximately 27,000 acres before it was controlled. The fire left areas burned at severities ranging from unburned to high throughout the watershed creating a mosaic typical of large wildfires. The fire burned through many streams and Riparian Reserves creating many openings along streams. These openings have reduced stream shade to, in some cases, zero percent. This natural event will delay attainment of shade related water quality standards. Prior to this event, water quality as well as shading in the watershed varied both spatially and temporally.

Geology

The Elk Creek watershed lies in the Western Cascades geologic province, a volcanic province. The predominant bedrock types are basalt, andesite, tuffs and sedimentary volcanic rock and intrusive volcanic rocks. The volcanic bedrock weathers into small-grained material with a tendency to erode easily.

The Western Cascades are deeply dissected and have a well-developed dendritic drainage pattern in response to landsliding and surface erosion. A majority of the Western Cascades are dominated by lava flows of basaltic andesite, basalt, and andesite. These lavas are interlayered with softer pyroclastic flows of andesitic tuff, basaltic breccia, ash flow tuff, dacite tuff, and andesitic breccia. Western Cascade soils have a higher clay content than the High Cascades soils and, consequently, have much lower infiltration rates.

In this watershed, soils are derived from volcanic rock types. Soils developed from volcanic rock types tend to be shallow and have less soil nutrients and soil development than sedimentary. Organic matter plays an increasing role in the productivity of the volcanic sites.

The most prevalent soils in the watershed are McNull, Medco, Straight, Shippa and Freezener, and Geppert soils and associated complexes. The parent material is andesite, tuff, and breccia bedrock. The soils are predominately cobbly or gravelly clay loam, of moderate to slow permeability. The soil classification, per Unified Soil Classification System, is silty or clayey gravels.

The southern portion of Elk Creek watershed is like most federal lands in Western Oregon which are intermingled with non-federal lands in a alternating "checkerboard" pattern that is characteristic of much of the Oregon and California (O & C) railroad lands (Table 1 and Map 4). The northern 1/3 of the watershed is typical of US Forest Service lands in that it is in block ownership.

Climate

Mild, wet winters and hot, dry summers characterize the Elk 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 35 inches at the mouth of Elk Creek to approximately 60 inches on the upper elevations of the watershed (USDA and USDI 1996). Winter precipitation in the higher elevations (generally above 5,000 feet) usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. 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 26 percent of the Elk Creek Watershed, while the rain and snow-dominated precipitation zones occupy 72 and 2 percent, respectively.

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

Streamflows in the Elk Creek Watershed fluctuate with seasonal variation of precipitation. Moderate to high flows generally occur from mid-November through May. Streamflows during the months of April and May and part of June are augmented by melting snowpack in the high elevations.

Low flows for Elk Creek normally coincide with the period of low precipitation from July through September or October.

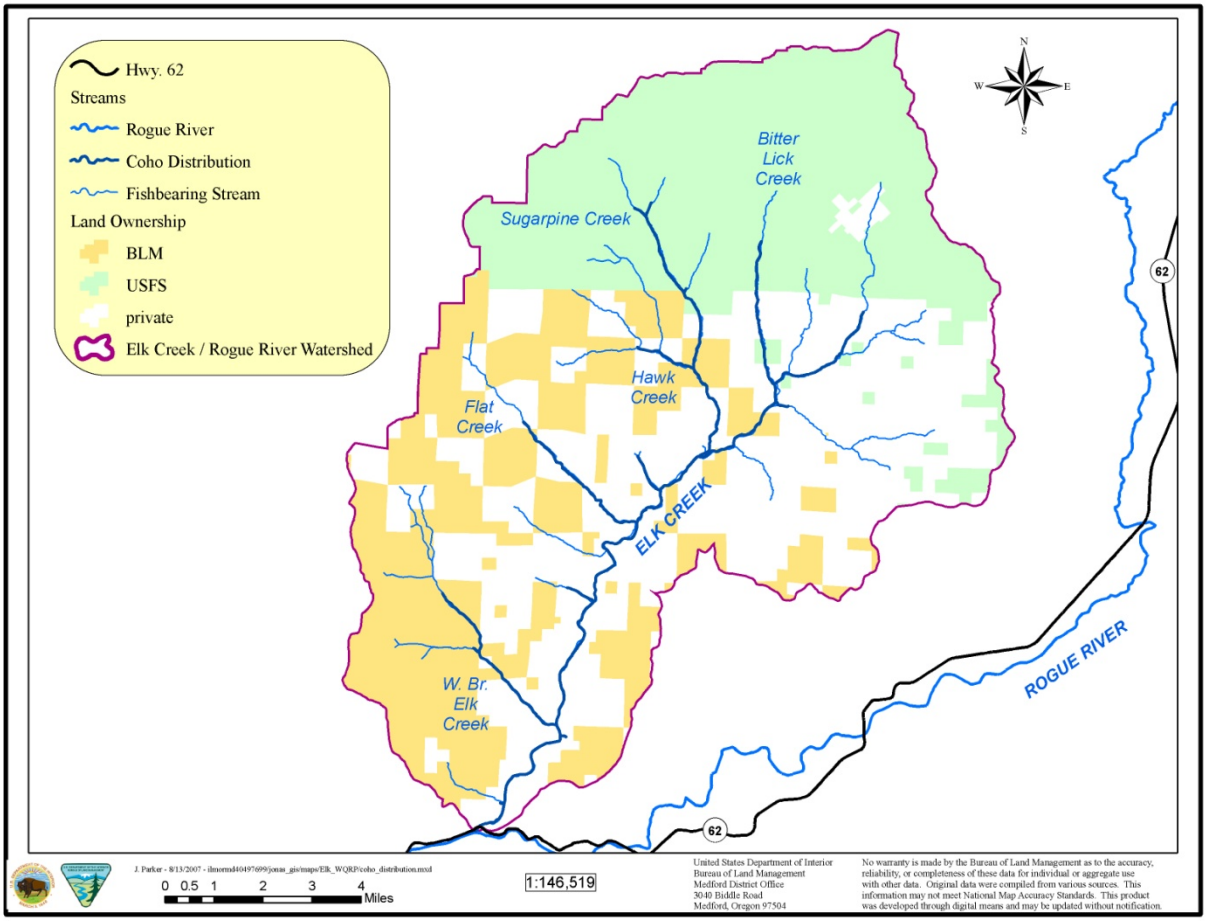
Aquatic Wildlife Species

There are three native anadromous salmonids that spawn and rear in the Elk Creek Watershed: coho salmon, chinook salmon (spring runs), and steelhead trout (summer and winter runs). The BLM manages

32 percent of the land within the Watershed and 16 percent of the anadromous salmonid habitat crosses BLM-administered land.

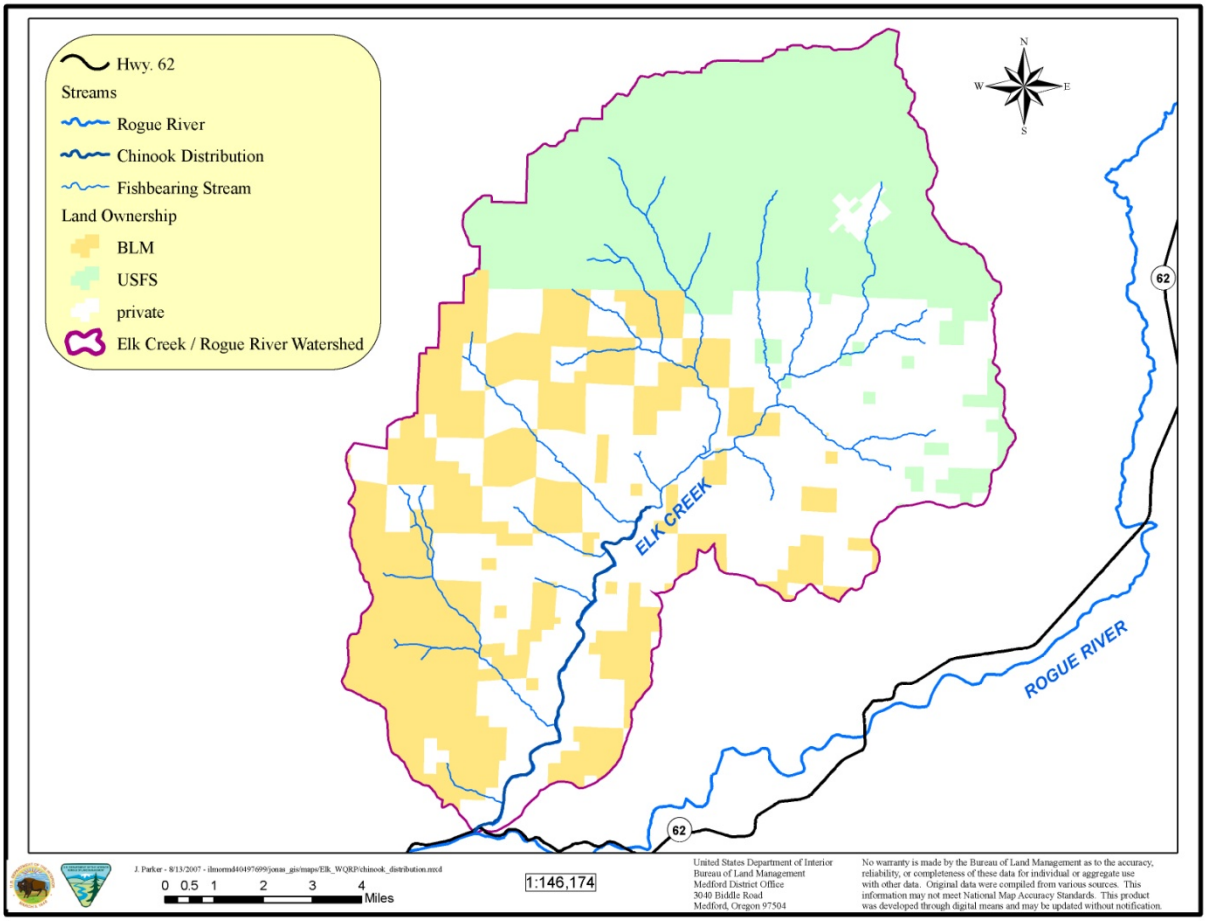
Northern California/Southern Oregon Coho salmon (*Oncorhynchus kisutch*), a species listed as threatened under the Endangered Species Act (May 1997) are present in Elk, West Branch Elk, Flat, Sugarpine, Hawk, and Bitter Lick Creeks for a total of 36 miles (Figure 5).

Figure 5. Coho Distribution in the Elk Creek Watershed



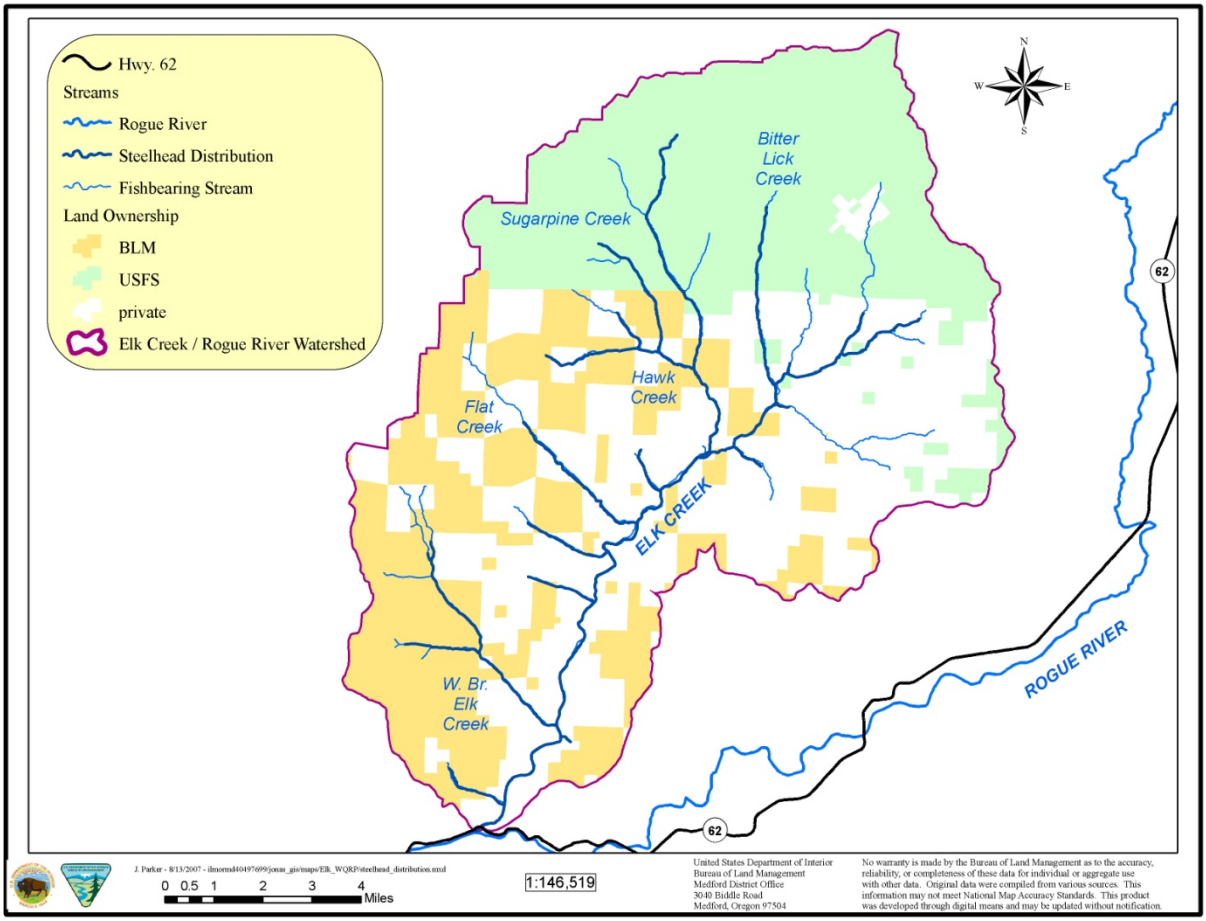
Spring chinook salmon (*O. tshawytscha*) spawn in Elk Creek for approximately 9.2 miles (Figure 6). Coho and chinook salmon spawn in the fall.

Figure 6. Chinook Distribution in the Elk Creek Watershed



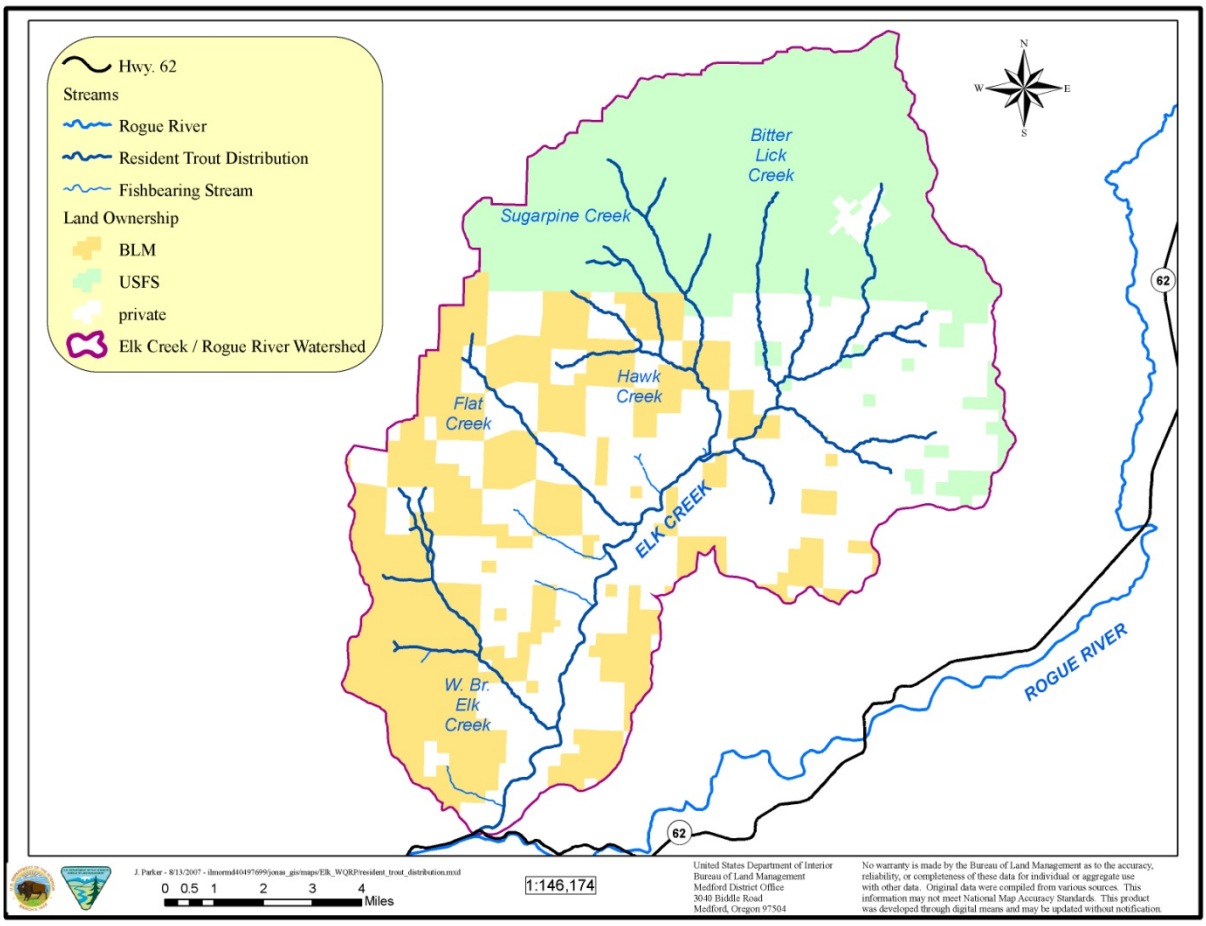
Summer and winter steelhead (*O. mykiss*) use a total of 53.8 miles of habitat in Elk, West Branch Elk, Middle, Flat, Sugarpine, Hawk, Timber, Elkhorn, and the lower reaches of Dodes, Button, and Swanson Creeks (Figure 7). Summer and winter steelhead trout spawn from January to May.

Figure 7. Summer and Winter Steelhead Distribution in the Elk Creek Watershed



Native resident fish species in the Elk Creek Watershed (Figure 8) include cutthroat trout (*O. clarki*), rainbow trout (*O. mykiss*), and reticulate sculpin (*Cottus perplexus*). Resident trout are found in Elk, West Branch Elk, Middle, Flat, Sugarpine, Hawk, Timber, Elkhorn, Button, and Bitter Lick Creeks as well as several other tributaries for a total of 72.1 miles.

Figure 8. Resident Trout Distribution in the Elk Creek Watershed



Pacific giant salamanders have been observed throughout the plan area, although little is known about their status.

The major limiting factors influencing aquatic species distribution and instream habitat condition are: high summer stream temperatures and 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).

Watershed Analysis

The Northwest Forest Plan (NWFP) Standards and Guidelines (USDA and USDI 1994) 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. Watershed analyses are a required component of the ACS under the NWFP. The *Elk Creek Watershed Analysis* includes the lands administered by the BLM in the Elk Creek Watershed. This WQRP tiers to and appends the watershed analysis. A summary of historical and present watershed conditions in the Elk Creek Watershed has been compiled from the 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 were incomplete or new information was available.

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

Riparian Vegetation	
Historical Condition	• Late seral vegetation dominant. • Diverse mix of species and age classes.
Present Condition	• Mature hardwoods and small-diameter conifers with dense understory. • Non-native blackberries along lower elevation stream corridors.
Forest Health & Productivity	
Historical Condition	• 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	• Fire exclusion resulting in high fuel loads. • High vegetation densities resulting in low vigor and/or poor growth. • Forest stands lack resiliency. • Forests experiencing mortality due to beetle infestations.
Large Wood	
Historical Condition	• Probably an adequate supply of large wood in the stream channels.
Present Condition	• Some stream reaches lack adequate large wood. • Road stream crossings disrupt transport of wood and sediment.
Roads	
Historic Condition	• Few roads before industrial timber harvesting began in the early 1950s.
Present Condition	• Areas with high road density. • Roads in riparian areas. • High number of stream crossings with many culverts undersized for 100-year flood. • Stream network extension (due to road ditch lines) increases winter peak flows.
Flow Regime	
Historic Condition	• 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	• Winter peak flows possibly increased by roads and harvest. • Summer low flows reduced by water withdrawals.

C. Temperature

Introduction

The most sensitive beneficial uses affected by excessive temperatures include resident fish and aquatic life, salmonid fish spawning, and rearing (ODEQ 2004:5).

The Oregon water quality temperature standard that applies to the Elk Creek Watershed was approved by EPA on March 2, 2004 and is found in OAR 340-041-0028 (4) (a-c) (ODEQ 2006). Excerpts of the 2004 standard read as follows:

> *(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:*
>
> *(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;*
>
> *(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to OAR 340-041-340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);*
>
> *(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to OAR 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);*

Fish Use maps 271A and 271B for the Rogue Basin temperature water quality standards can be found at: www.deq.state.or.us. Salmon and steelhead spawning use designations (map 271B) vary by stream. The seven-day average maximum temperature for these streams may not exceed 13.0°C (55.4°F) during the stated period of spawning use. Perennial streams in the Elk Creek Watershed are designated as core cold-water habitat on fish use map 271A, therefore the seven-day-average maximum for these streams may not exceed 16.0°C (60.8°F) outside the salmon and steelhead period of spawning use.

A stream is listed as water quality limited for temperature if there is documentation that the seven-day moving average of the daily maximums (7-day statistic) exceeds the appropriate standard listed above. This represents the warmest seven-day period and is calculated by a moving average of the daily maximums.

Sugarpine Creek is listed for temperature based on a 2004 list date while the rest of the streams, Elk, West Branch Elk, and Bitterlick Creeks are listed based on a 1998 list date (Table 3). This listing uses the State of Oregon water quality standards adopted in 1996. Excerpts of the 1996 standard (OAR 340-041-0365(2)(b)) read as follows:

> *A) To accomplish the goals identified in OAR 340-041-0120(11), unless specifically allowed under a Department-approved surface water temperature management plan as required under OAR*

340-041-0026(3)(a)(D), no measurable surface water temperature increase resulting from anthropogenic activities is allowed:

(i) In a basin for which salmonid fish rearing is a designated beneficial use, and in which surface water temperatures exceed 64.0°F (17.8°C);

(ii) In waters and periods of the year determined by DEQ to support native salmonid spawning, egg incubation, and fry emergence from the egg and from the gravels in a basin which exceeds 55.0°F (12.8°C);

(iii) In waters determined by DEQ to support or to be necessary to maintain the viability of native Oregon bull trout, when surface water temperatures exceed 50.0°F (10.0°C);

(iv) In waters determined by DEQ to be ecologically significant cold-water refugia;

(v) In stream segments containing federally listed Threatened and Endangered species if the increase would impair the biological integrity of the Threatened and Endangered population;

(vi) In Oregon waters when the dissolved oxygen (DO) levels are within 0.5 mg/l or 10 percent saturation of the water column or intergravel DO criterion for a given stream reach or subbasin;

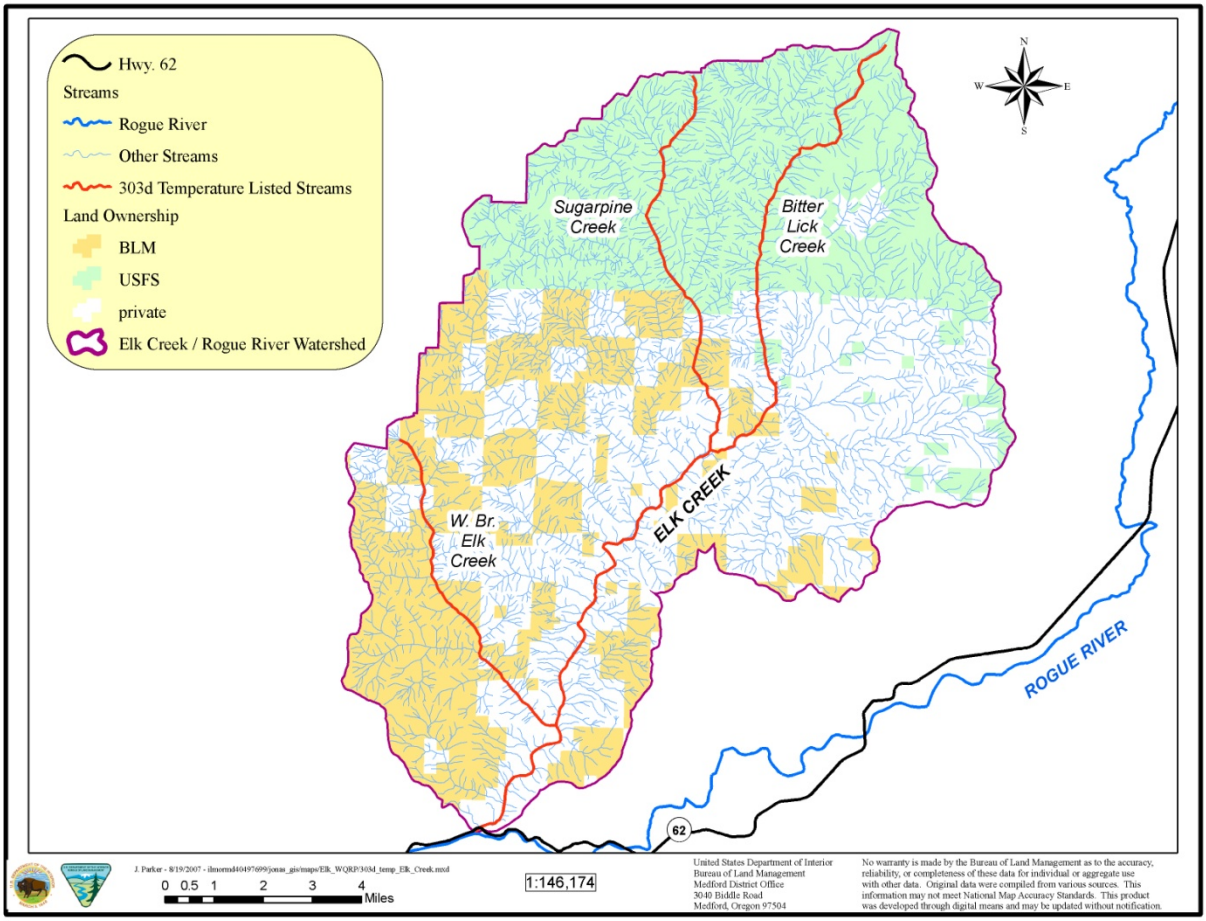
(vii)In natural lakes.

There are a total of 38.4 stream miles listed for temperature in the Elk Creek Watershed of which 6.9 miles are on BLM-administered lands (Table 6 and Figure 9).

Table 6. 303(d) Temperature-Listed Reaches in the Elk Creek Watershed.

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
1998	Elk Creek	Summer	OAR 340-041-0365(2)(b)(A)	13.3	1.2
1998	West Branch Elk Creek	Summer	OAR 340-041-0365(2)(b)(A)	7.4	4.5
1998	Bitter Lick Creek	Summer	OAR 340-041-0365(2)(b)(A)	8.6	0
Total Stream Miles listed for Temperature Criteria (Year around (non-spawning season))				**29.3**	**6.9**
2004	Sugarpine Creek	Year around (non-spawning season)	OAR 340-041-0028(4)(b)	9.1	1.2
Total Stream Miles listed for Temperature Criteria (Summer)				**9.1**	**1.2**
2004	Sugarpine Creek	Oct 15-June 15	OAR 340-041-0028(4)(a)(b)	6	1.2
Total Stream Miles listed for Temperature Criteria (Oct 15-June 15)				**6**	**1.2**

Figure 9. 2004/2006 303(d) Temperature-Listed Streams for the Elk Creek Watershed



The BLM collected summertime stream temperature data at several locations within the Elk Creek Watershed between 1994 and 2007 (Table 7). The 7-day statistics for all sites listed in Table 7 exceed both the 1996 and 2004 temperature criteria.

Table 7. Temperature Summary for the Elk Creek Watershed

Stream Name	Period of Record [1]	7-day Statistic (ave. for all years) (°F)	Range of 7-day Statistic (for all years)	
			Minimum (°F)	Maximum (°F)
Elk Creek (above Dam)	1999, 2000	80.6	64.7	82.9
West Branch Elk Creek (below Morine Creek)	1999, 2003-2005	69.0	59.8	71.7
West Branch Elk Creek (below Morine Creek)	1998	70.4	60.1	71.5
West Branch Elk Creek (33s-1w-1)	2003-2005	68.8	57.7	70.6
Sugarpine Creek (above Elk Creek)	1999, 2000	70.6	58.4	73.2
Sugarpine Creek (above Hawk Creek)	1994, 1998-2007	71.3	57.2	76.9
Sugarpine Creek (32s-1e-11)	2003-2006	70.7	58.6	73.0

1/ Temperature measured from June to September

Nonpoint Source Temperature Factors

Stream temperature is influenced by riparian vegetation, channel morphology, hydrology, climate, and geographic location. While climate and geographic location are outside of human control, the condition of the riparian area, channel morphology and hydrology can be altered by land use. Human activities that contribute to degraded thermal water quality conditions in the Elk Creek Watershed

include: agricultural activity; rural residential developments; water withdrawals; timber harvests; local and forest access roads; and state highways. Timber harvest, roads, and livestock grazing are the primary impacts specific to federally managed lands that have the potential to affect water quality conditions in the plan area. For the Rogue Basin temperature TMDL, there are four nonpoint source factors that may result in increased thermal loads: stream shade, stream channel morphology, flow, and natural sources (ODEQ 2004:8).

Temperature Factor 1: Stream Shade

Stream temperature is driven by the interaction of many variables. Energy exchange may involve solar radiation, long wave radiation, evaporative heat transfer, convective heat transfer, conduction, and advection (USDA and USDI 2005). While interaction of these variables is complex, some are much more important than others (USDA and USDI 2005). The principal source of heat energy for streams is solar energy striking the stream surface (USDA and USDI 2005). Exposure to direct solar radiation will often cause a dramatic increase in stream temperatures. Highly shaded streams tend to experience cooler stream temperatures due to reduced input of solar energy. Stream surface shade is dependent on riparian vegetation height, location, and density. The ability of riparian vegetation to shade the stream throughout the day depends on vegetation height and the vegetation position relative to the stream. 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 (USDA and USDI 2005).

Removal of riparian vegetation, and the shade it provides, contributes to elevated stream temperatures. Activities in riparian areas such as timber harvest, road construction, residential and agricultural clearing, and livestock grazing, have reduced the amount of riparian vegetation in the Elk Creek Watershed. Riparian areas in the plan area cover less area and contain fewer species than under historic conditions. They tend to be younger in age and dominated by hardwoods. Conifers, such as Douglas-fir, ponderosa pine, and white fir are a bigger component of the riparian vegetation as the elevation increases, however the average diameter is smaller than what existed historically. Riparian vegetation appears patchy: areas with many layers of riparian vegetation, including large-diameter trees, are scattered in between clumps of even-aged alder and cottonwood and shrub-dominated areas. Woodland stands are fragmented, creating a patchy, poorly connected landscape of simpler and less biologically productive habitat. These changes have resulted in less shade on stream surfaces and an increase in stream water temperatures. Such altered riparian areas are not sources of large wood and they lack the cool, moist microclimate that is characteristic of healthy riparian zones.

The primary reason for elevated stream temperatures on BLM-managed lands is an increase in solar radiation reaching the stream surface following timber harvest or road construction that removed stream shading vegetation. Pre-NWFP management activities along streams on federal lands in the plan area have left a mosaic of vegetation age classes in the riparian areas. The amount of riparian area with late-successional forest characteristics has declined on federal lands primarily due to timber harvest and road construction within or adjacent to riparian areas. In some cases the large conifers have been replaced by young, small diameter conifer stands and in other cases, hardwoods have replaced conifers as the dominant species in riparian areas. In riparian areas where the trees are no longer tall enough to adequately shade the adjacent streams, the water flowing through these exposed areas is subject to increased solar radiation and subsequent elevated temperatures.

Temperature Factor 2: Stream Channel Morphology

Stream channel morphology can also affect stream temperature. Wide channels tend to have lower levels of shade due to simple geometric relationships between shade producing vegetation and the angle of the sun. For wide channels, the surface area exposed to radiant sources and ambient air temperature is greater, resulting in increased energy exchange between the stream and its environment (ODEQ 2004:8). Conversely, narrow channels are more likely to experience higher levels of shade. An additional benefit

inherent to narrower/deeper channel morphology is a higher frequency of pools that contribute to aquatic habitat or cold water refugia (ODEQ 2004:8).

Large wood plays an important role in creating stream channel habitat. Obstructions created by large wood help to settle out gravel. The deposition of gravel helps to decrease thermal loading by reducing the amount of water exposed to direct solar input, as a portion of the water will travel sub-gravel and not be exposed to sun. The loss of large wood in the Elk Creek Watershed has had a direct impact on stream channel morphology. Once the large wood was removed, the alluvial material held behind it washed out, causing channels to down-cut and eventually widen, allowing for increased thermal loading and stream heating.

Channel widening is often related to degraded riparian conditions that allow increased streambank erosion and sedimentation of the streambed. Both active streambank erosion and sedimentation correlate strongly to riparian vegetation type and age. Riparian vegetation contributes to rooting strength and floodplain/streambank roughness that dissipates erosive energies associated with flowing water. Established mature woody riparian vegetation adds the highest rooting strengths and floodplain/streambank roughness. Annual (grassy) riparian vegetation communities offer less rooting strength and floodplain/streambank roughness. It is expected that width to depth ratios would be lower (narrower and deeper channels) when established mature woody vegetation is present. Annual (grassy) riparian communities may allow channels to widen and become shallower.

Changes in sediment input can lead to a change in channel morphology. When sediment input increases over the transport capability of the stream, sediment deposition can result in channel filling, thereby increasing the width-depth ratio. During storm events, management-related sources can increase sediment inputs over natural levels and contribute to channel widening and stream temperature increases. Natural erosion processes occurring in the plan area such as landslides, surface erosion, and flood events contribute to increased sedimentation (USDI and USDA 1997:99). Sediment sources resulting from human activities include roads; logging (tractor skid trails, yarding corridors, and landings); off-highway vehicle (OHV) trails; concentrated livestock grazing in riparian zones; residential and agricultural clearing of riparian zones; maintenance of irrigation diversions; irrigation return flows; and irrigation ditch blowouts (USDI and USDA 1997:99). Roads appear to be the primary human-caused sediment source from BLM-administered lands in the plan area.

Temperature Factor 3: Streamflow

Streamflow can influence stream temperature. The temperature change produced by a given amount of heat is inversely proportional to the volume of water heated (USDA and USDI 2005). A stream with less flow will heat up faster than a stream with more flow given all other channel and riparian characteristics are the same.

The Elk Creek Watershed experiences extreme flow conditions typical of southwest Oregon streams. Historical flows are a function of seasonal weather patterns: rain and snow in the winter months contribute to high flow volumes, while the summer dry season reduces flow.

Water withdrawals and irrigation return flows likely result in increased thermal loads within the Elk Creek Watershed. The management of water withdrawals is within the jurisdiction of the Oregon Water Resources Department (OWRD).

Temperature Factor 4: Natural Sources

Natural processes that may elevate stream temperature include drought, floods, fires, insect and disease damage to riparian vegetation, and blowdown in riparian areas. The gain and loss of riparian vegetation

by natural process will fluctuate within the range of natural variability. The processes in which natural conditions affect stream temperature include increased stream surface exposure to solar radiation and decreased summertime flows (ODEQ 2004:9). These natural events and their effects on stream temperature are considered natural background and no attempt is made to quantify the impact or frequency of such events in this WQRP.

Temperature TMDL Loading Capacity and Allocations

DEQ's 2004/2006 303(d) list identifies four streams (Elk, West Branch Elk, Sugarpine, and Bitter Lick Creeks) within the plan area that exceed the numeric water quality criteria from the 1996 and 2004 standards (64°F and 60.8°F, respectively).

For the plan area, loading capacity is defined as the thermal load in btu/ft^2/day when: (1) National Pollution Discharge Elimination System (NPDES) permitted point source effluent discharge results meet their waste load allocation and (2) solar loading is reduced to that of system potential (ODEQ 2008).

The Rogue River Basin Temperature TMDL incorporates other measures in addition to "*daily loads*" to fulfill requirements of the Clean Water Act §303(d). Although a loading capacity for heat energy is derived (e.g. kilocalories), it is of limited value in guiding management activities needed to solve identified water quality problems. In addition to heat energy loads, this TMDL allocates "*other appropriate measures*" (or surrogate measures) as provided under EPA regulations (40 CFR 130.2(i)).

Effective shade is the surrogate measure that translates easily into solar heat load. It is simple to measure effective shade at the stream surface using a relatively inexpensive instrument called a Solar Pathfinder™.

The term 'shade' has been used in several contexts, including its components such as shade angle or shade density. For purposes of this TMDL, effective shade is defined as the percent reduction of potential daily solar radiation load delivered to the water surface. The role of effective shade in this TMDL is to prevent or reduce heating by solar radiation and serve as a linear translator to the loading capacities.

Unless otherwise stated within this chapter, the applicable nonpoint source load allocations for Rogue River Basin streams are based upon potential effective shade values presented in this section and the human use allowance (0.04°C cumulative increase at the point of maximum impact).

Most streams simulated have no assimilative capacity, which translates into a zero heat load allocation for nonpoint sources. When a stream has assimilative capacity, nonpoint and point sources may receive allocations greater than background (ODEQ 2008).

The nonpoint source loading allocation is defined as the amount of solar radiation that reaches a stream surface when riparian vegetation and stream channels have achieved system potential. A TMDL allows for the use of surrogate measures to achieve loading capacity. Percent-effective shade serves as the surrogate measure for meeting the temperature TMDL. Percent-effective shade is defined as the percent reduction of solar radiation load delivered to the water surface (ODEQ 2003). It can be measured in the field and relates directly to solar loading.

System potential shade targets (percent-effective shade) along with current shade were calculated for three streams on BLM-administered lands within the Elk Creek Watershed: Elk, West Branch, and Sugarpine Creeks. (Table 8). The Shadow model (USDA 1993) was used for the shade assessment. The Shadow model determines the system potential targets and number of years needed to obtain shade recovery using forest growth curves for various tree species within southwestern Oregon. The growth

curves project growth rates and maximum heights for the dominant riparian tree species. Target shade values represent the maximum potential stream shade based on the system potential tree height.

The BLM-administered lands on the assessed reaches of Elk, West Branch Elk, and Sugarpine Creeks need 48, 10, and 20 years, respectively, to reach the target shade.

Table 8. Percent-Effective Shade Targets for BLM-Managed Lands in the Elk Creek Watershed (ODEQ 2004: Appendix A)

Stream	Tributary to	Stream Miles Assessed on BLM	Current Shade[1] (%)	Target Shade[1] (%)	Additional Shade Needed[2] (%)	Time to Recovery[3] (years)
Elk Creek	Rogue River	0.6	28	40	12	48
West Branch Elk Creek	Elk Creek	5.4	79	80	1	10
Sugarpine Creek	Elk Creek	0.8	66	80	14	20

1/ Current shade and target shade refer to percent-effective shade defined as the percent reduction of solar radiation load delivered to the water surface. Shade values are averages for all BLM stream miles assessed.

2/ Additional shade needed is the increase in percent-effective shade required to meet the target shade.

3/ If current shade is greater than or equal to the target shade, the time to recovery is listed as 0 years. If current shade is less than the target shade, the time to recovery is listed as the number of years needed to reach full system potential percent-effective shade. At a value equal to the target shade or ≥ 80 percent effective shade, a stream is considered recovered and the stream should not be a candidate for active restoration. Additional shade should come from passive management of the riparian area. Any increase over the target shade or 80 percent effective shade is considered a margin of safety. Years to recovery are a weighted average of recovery time for individual stream reaches.

D. E. Coli

Introduction

Water contact recreation is the most sensitive beneficial use affected by high levels of Escherichia coli for freshwaters (ODEQ 1998:11).

The current Oregon water quality bacteria standard is found in chapter 340, division 41, section 9 of the Oregon Administrative Rules (OAR) (ODEQ 2006). The following is an excerpt from the standard that applies to nonpoint sources in the Elk 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.

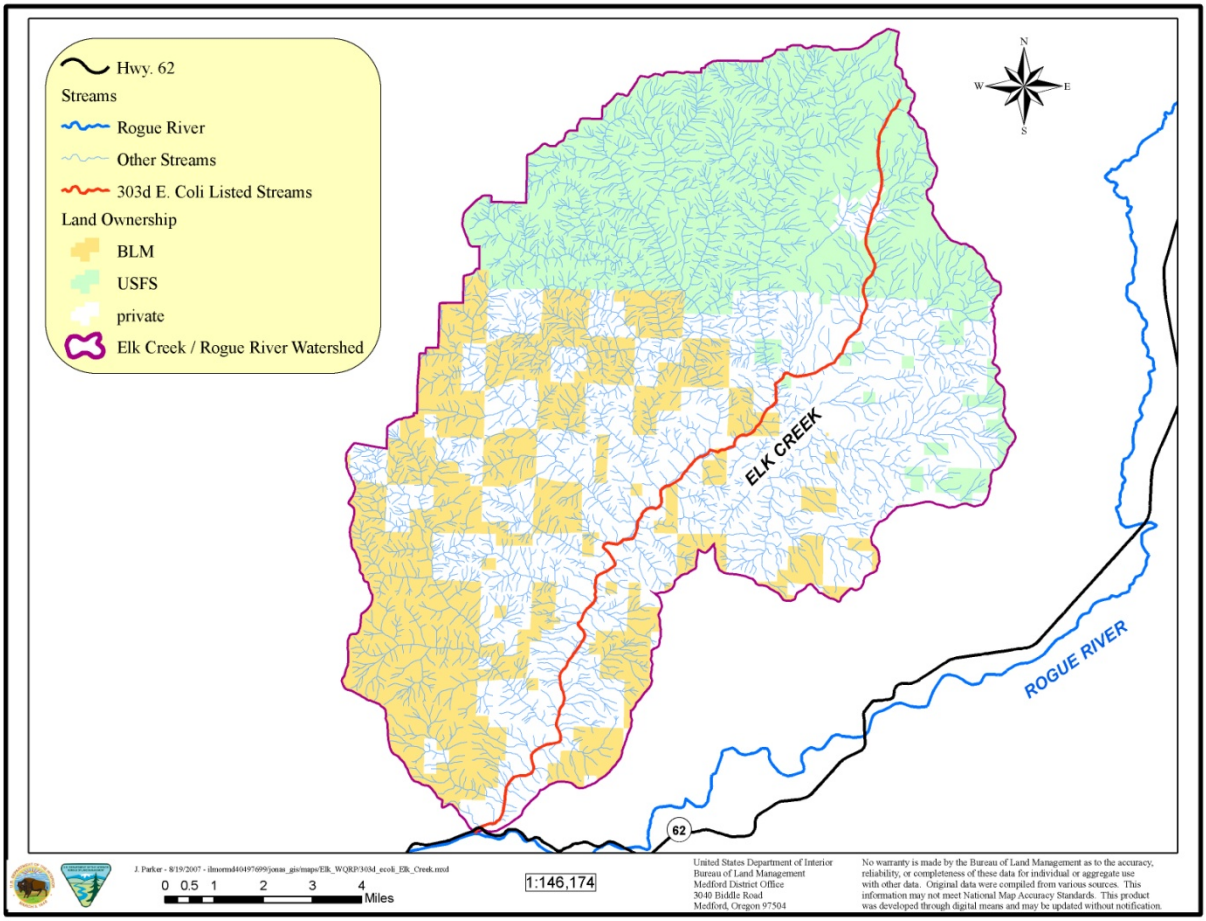
(11) In water bodies designated by the Department as water-quality limited for bacteria, and in accordance with priorities established by the Department, development and implementation of a bacteria management plan may be required of those sources that the Department determines to be contributing to 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 Elk Creek Watershed that is listed for exceeding E. coli standards which is Elk Creek (Table 9 and Figure 11). Only 1.2 miles of the 20.7 miles of E. coli-listed streams are on BLM-administered lands within the Elk Creek Watershed.

Table 9. 303(d) E. Coli-Listed Reaches in the Elk Creek Watershed

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Elk Creek	Summer	OAR 340-041-0009(1)(a)(A,B)	20.7	1.2
Total Stream Miles listed for E. Coli Criteria (Summer)				**20.7**	**1.2**

Figure 11. 2004/2006 303(d) E. Coli-Listed Streams for the Elk 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). The largest sources of contamination include runoff from agricultural, industrial, rural and urban residential activities (ODEQ 2004:9). Sources of bacteria from BLM-administered lands include animal feces (wild and domestic, including livestock such as cattle) and inadequate waste disposal by recreational users.

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.

E. Dissolved Oxygen (DO)

Introduction

Beneficial uses affected by DO values outside the standard include resident fish and aquatic life, salmon and steelhead spawning, resident trout spawning, cold-water aquatic life, cool-water aquatic life, warm-water aquatic life, and estuarine water (ODEQ 1998:23).

The current Oregon water quality DO standard for the Rogue Basin is found in chapter 340, division 41, section 16 of the Oregon Administrative Rules (OAR) (ODEQ 2006). The following is an excerpt from the standard that applies to nonpoint sources in the Elk Creek Watershed.

> *(1) For water bodies identified as active spawning areas the following criteria apply during the applicable spawning through fry emergence periods set forth in the tables and figures and, where resident trout spawning occurs, during the time trout spawning through fry emergence occurs:*

a) The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;

(b) Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels must not be less than 95 percent of saturation;

(c) The spatial median intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.

(2) For water bodies identified by the Department as providing cold-water aquatic life, the dissolved oxygen may not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen may not be less than 90 percent of saturation. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 8.0 mg/l as a 30-day mean minimum, 6.5 mg/l as a seven-day minimum mean, and may not fall below 6.0 mg/l as an absolute minimum (Table 21);

(3) For water bodies identified by the Department as providing cool-water aquatic life, the dissolved oxygen may not be less than 6.5 mg/l as an absolute minimum. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 6.5 mg/l as a 30-day mean minimum, 5.0 mg/l as a seven-day minimum mean, and may not fall below 4.0 mg/l as an absolute minimum (Table 21);

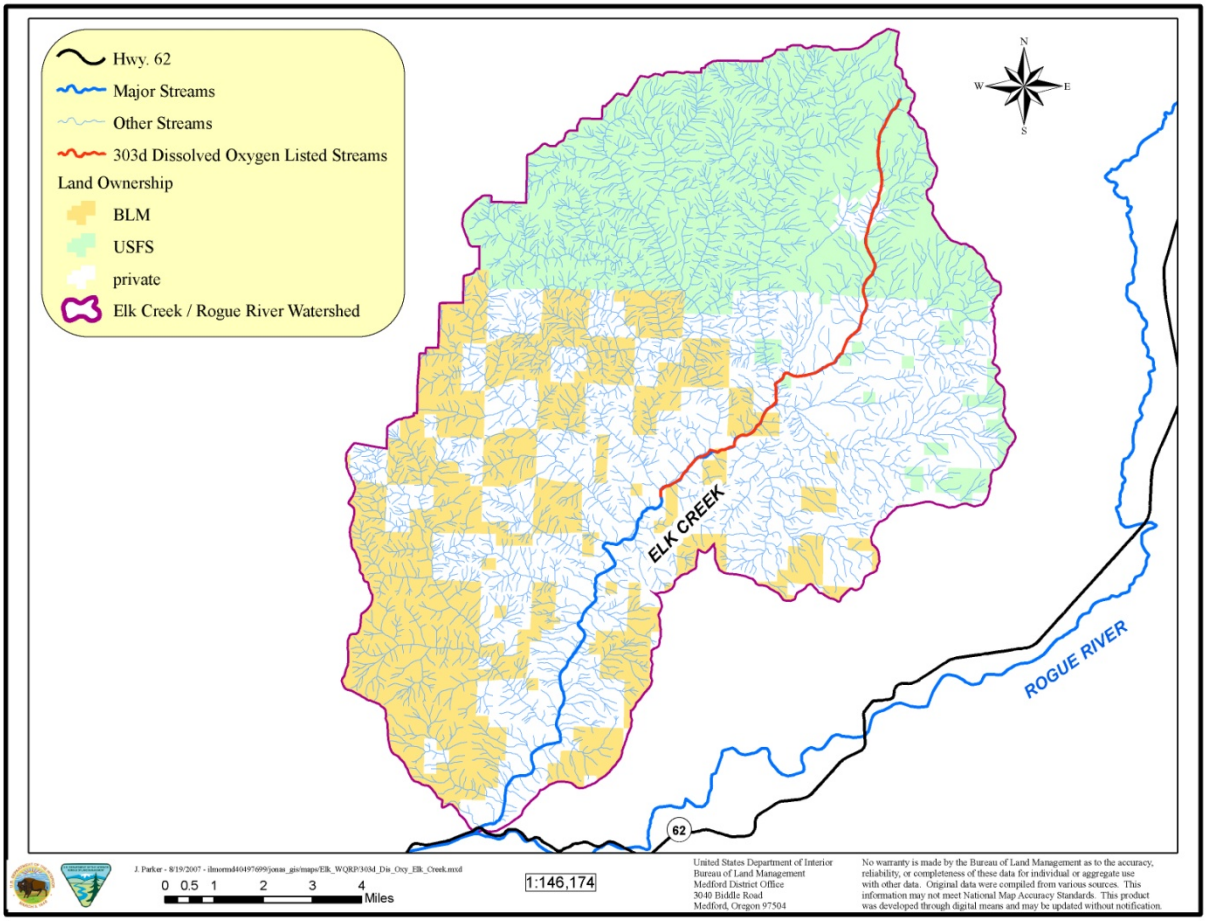
(4) For water bodies identified by the Department as providing warm-water aquatic life, the dissolved oxygen may not be less than 5.5 mg/l as an absolute minimum. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 5.5 mg/l as a 30-day mean minimum, and may not fall below 4.0 mg/l as an absolute minimum (Table 21);

Elk Creek is the only stream in the Elk Creek Watershed listed for DO on the 2004/2006 303(d) list (Table 19 and Figure 12). Only 1.2 miles of the 11.2 miles listed for DO on Elk Creek are on BLM-administered lands.

Table 10. 303(d) DO-Listed Reaches in the Elk Creek Watershed (2004 List Date)

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Elk Creek	Summer	OAR 340-041-0016(1)(a)(c)(2)	11.2	1.2
Total Stream Miles listed for DO Criteria (Summer)				**11.2**	**1.2**

Figure 12. 2004/2006 303(d) Dissolved Oxygen (DO) Listed Streams for the Elk Creek Watershed



DO Sources

Low summertime stream DO values in the Elk Creek probably result from high temperatures and lack of turbulence during summer low flows. DO generally is not sensitive to forest management activities that avoid adding logging slash to streams and use stream buffers to protect stream temperature. Reduced concentrations of DO in streams occur when conditions include low flows, warm temperatures, shallow stream gradients, fresh organic matter inputs, and high respiration rates (MacDonald et al. 1991:82). Current forest management activities and the use of stream buffers suggest that reduced levels of DO in streams from forest management would occur only under unusual circumstances (MacDonald et al. 1991:81).

DO TMDL Loading Capacity and Allocations

The 2008 Rogue River Basin TMDL did not address DA. It is anticipated that DEQ will develop a DO TMDL within 5 years.

The loading capacity for DO in the plan area is defined as (1) the load allocations (both nonpoint and point source) for temperature are met and (2) NPDES permitted point source effluent discharges meet permit requirements for DO (ODEQ 2004:11).

There are no point source discharges on BLM-administered lands within the Elk Creek Watershed, therefore the second loading capacity statement does not apply to BLM management.

In the absence of modeling, it is anticipated that the achievement of the temperature load allocation will reduce periphyton and lead to the attainment of the water quality standards for DO. The temperature section of this WQRP addresses how the nonpoint source temperature load allocation will be achieved on BLM-managed lands.

Element 2. Goals and Objectives

The overall long-term goal of this WQRP is to achieve compliance with water quality standards for the 303(d) listed streams in the Elk 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 Elk Creek Watershed will be dependent upon implementation of the BLM Medford District Resource Management Plan (RMP) (USDI 1995a, USDI 1995b) that incorporate the NWFP (USDA and USDI 1994). The RMP include 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 temperature, E. coli, and DO and restoration techniques for achieving these goals on BLM-administered land are specified in Table 20.

Table 11. Recovery Goals for BLM-Administered Land in the Elk Creek Watershed

Element	Goal	Passive Restoration	Active Restoration
Temperature ***Shade***	• Achieve coolest water possible through achievement of percent effective shade targets (Table 8).	• Allow riparian vegetation to grow up to reach target values.[1]	• Use prescriptions that ensure long-term riparian vegetation health. • Implement prescriptions that increase growth rate and survival of riparian vegetation. • Plant native species from local genetic stock to create a stand that will result in increased tree height and density.[1]
Temperature ***Channel Morphology***	• Increase the amount of large wood in channels. • Improve riparian rooting strength and streambank roughness. • Decrease bedload contribution to channels during large storm events. • Maintain or improve channel types, focusing on width-to-depth ratios. • Increase the ratio of wood-to-sediment during mass failures.	• Follow NWFP Standards and Guidelines or watershed analysis recommendations for Riparian Reserve widths (including unstable lands). • Allow historic streambank failures to revegetate. • Allow natural channel evolution to continue. (Time required varies with channel type.)	• Promote riparian conifer growth for future large wood recruitment. • Encourage woody riparian vegetation versus annual species. • Stabilize streambanks where indicated. • Maintain and improve road surfacing. • Reduce road densities by decommissioning non-essential roads. • Increase culverts to 100-yr flow size and/or provide for overtopping during floods. • Minimize future slope failures through stability review and land reallocation if necessary. • Ensure that unstable sites retain large wood to increase wood-to-sediment ratio.
Temperature ***Streamflow***	• Maintain optimum flows for fish life. • Maintain minimum flows for fish passage.		• Utilize authorized water storage facilities to avoid diverting streamflows during low flows.
E. Coli	• Decrease E. coli contamination caused by livestock.		• Manage livestock to prevent concentrations in streams or riparian zones.
DO	• Achieve coolest water possible through achievement of percent effective shade targets (Table 8).	• Follow NWFP Standards and Guidelines or watershed analysis recommendations for Riparian Reserve widths (including unstable lands).	• Use prescriptions that ensure long-term riparian vegetation health.

1/ Passive versus active restoration of riparian areas. If current percent effective shade is greater than or equal to the target shade or 80 percent, the stream is considered recovered in terms of percent effective shade and the riparian area should not be a candidate for active restoration for the purposes of temperature recovery (ODEQ 2004). If

current shade does not meet the target shade and is less than 80 percent, the site may benefit from active restoration and should be examined.

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 nonfish-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 1995a:149-177; USDI 1995b:D1-D46). 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.

Although passive restoration will be the primary means to achieving the stream shade goal (Table 11), active restoration measures will be considered for streams with current shade that is less than 80 percent (Table 7). The *Northwest Forest Plan Temperature TMDL Implementation Strategies* (USDA and USDI 2005) provides a tool for analyzing the effect of silvicultural practices within Riparian Reserves on effective shade. Shade nomographs were computed based on stream width, vegetation height, hill slope, and orientation factors and provide no-cut buffer widths to maintain stream shade while applying vegetation treatments to improve and restore riparian conditions.

The primary means to achieving the channel morphology goals (Table 11) on BLM-administered lands will be through passive restoration and protection of unstable areas. Active restoration measures will focus on promoting riparian conifer growth for future large wood recruitment through silvicultural practices, maintaining and improving road surfaces, and reducing road densities. The highest priority areas for road treatments will be in the Riparian Reserves and unstable areas.

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.

Minimizing management-caused sunlight and nutrient inputs to streams through appropriate BMPs will be the key measures used to prevent increases in DO.

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 (Table 8). 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 Elk 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 32 percent of the Elk Creek Watershed is managed by BLM. Other organizations or groups that are (or will be) involved in partnerships for implementing, monitoring, and maintaining the Rogue Basin WQMP 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 RMP was implemented in 1995 and 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 has collected stream temperature data in the Elk Creek Watershed since 1994 and will continue to monitor stream temperatures (as long as funding is available) in order to detect any changes in temperature from long-term data sets. Monitoring is conducted to meet a variety of objectives, thus long-term monitoring sites as well as project-specific, short-term sites will be used. Objectives include: monitor long-term temperature recovery; better understand the natural temperature variability; and track potential project effects. If funding is available, annual monitoring will continue on the following temperature-listed stream reaches until such time as they reach the state standard: West Branch Elk Creek, Sugarpine Creek, and Hawk Creek.

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 *Elk 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 now completed Rogue Basin WQMP.

Element 9. Costs and Funding

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 $15,000 per year and would include data collection, database management, data analysis, and report preparation.

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 BLM Clean Water and Watershed Restoration funds and Title 2 funds from the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393).

The Title 2 program began in FY 2000 and will continue through FY 2007. Projects funded by the Title 2 program must meet certain criteria and be approved by the appropriate resource advisory committee. At least 50 percent of all project funds must be used for projects that are primarily dedicated to: road maintenance, decommissioning, or obliteration; or restoration of streams and watersheds. The available funds are based on County payments.

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 Elk 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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