Water Quality Restoration Plan

Klamath Basin

Jenny Creek Watershed

Bureau of Land Management (BLM)
Medford District
Ashland Resource Area

Lakeview District
Klamath Falls Resource Area

August 2011

Jenny Creek Watershed at a Glance	
Hydrologic Unit Code Number	**1801020604**
WQRP Area/Ownership	Total: 134,348 acres BLM: 58,534 acres (44%) BOR: 3,023 acres (2%) USFS: 1,328 acres (1%) State of Oregon: 80 acres (<0.1%) Private: 71,383 acres (53%)
303(d) Stream Miles Assessed	Total: 55.7 miles BLM Ownership: 23.6 miles
303(d) Listed Parameters	Temperature
Key Resources and Uses	Resident salmonids, domestic, recreation, aesthetic
Known Human Activities	Agriculture, forestry, roads, rural residential development, and recreation
Natural Factors	Geology: volcanic landforms Soils: various series and complexes

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) *Upper Klamath and Lost River Subbasins Total Maximum Daily Load (TMDL)* (ODEQ 2010) for 303(d) listed streams on BLM-administered lands. Its organization is designed to be consistent with the DEQ's *Upper Klamath and Lost River Subbasins Water Quality Management Plan (WQMP)* (ODEQ 2010). The area covered by this Water Quality Restoration Plan (WQRP) includes all lands managed by the BLM, Medford District, Ashland Resource Area and Lakeview District, Klamath Falls Resource Area within the Jenny Creek Watershed.

B. Watershed Characterization

Jenny Creek Watershed covers approximately 210-square miles (134,348 acres) within southeastern Jackson County and southwestern Klamath County in Oregon, and northern Siskiyou County in California (Figure 1). The watershed lies within the Upper Klamath River Subbasin of the Klamath Basin (Figure 2). Subbasins are subdivided into watersheds and Jenny Creek Watershed is one of eleven watersheds within the Upper Klamath River Subbasin (Figure 3). Jenny Creek flows south into California where it joins the Klamath River at Iron Gate Reservoir. Major tributaries within the watershed include Johnson, Beaver, and Keene creeks.

Jenny Creek Watershed is situated in the Western and High Cascade Mountains in southwestern Oregon. Elevation in the watershed ranges from approximately 2,375 feet at Iron Gate Reservoir to 6,565 feet at the top of Surveyor Mountain. There are several small communities in the watershed: Greensprings, Lincoln, Mountain View, and Pinehurst located along State Highway 66.

Figure 1. Jenny Creek Watershed Location

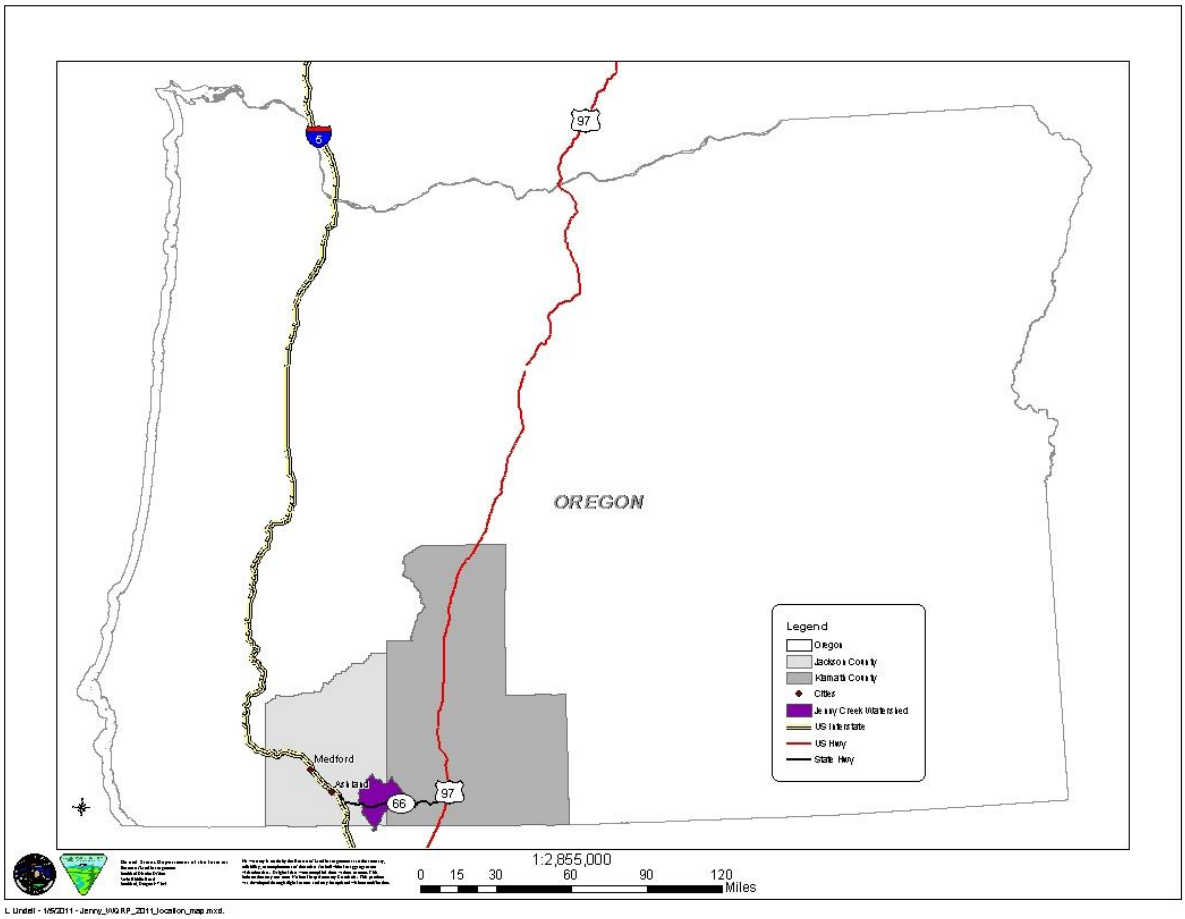

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Figure 2. Klamath Basin and Upper Klamath River Subbasin

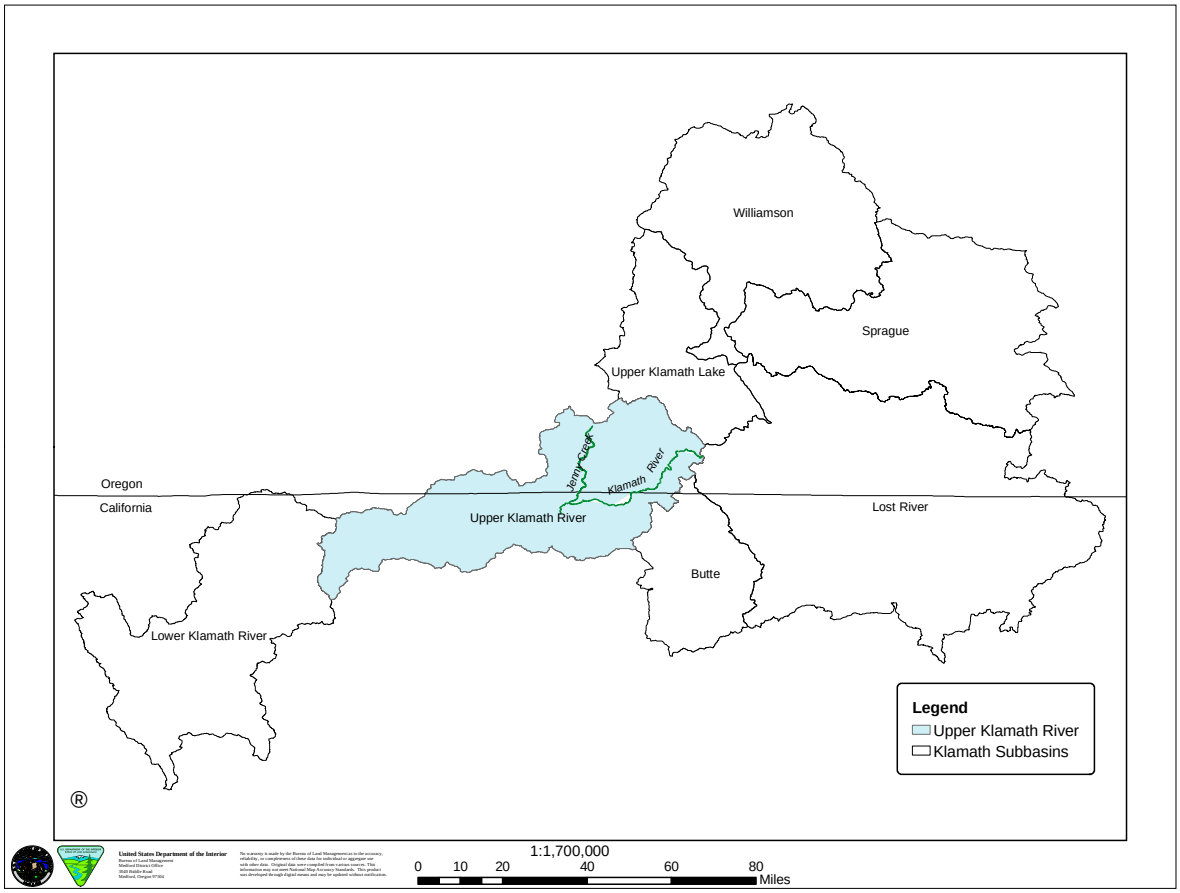

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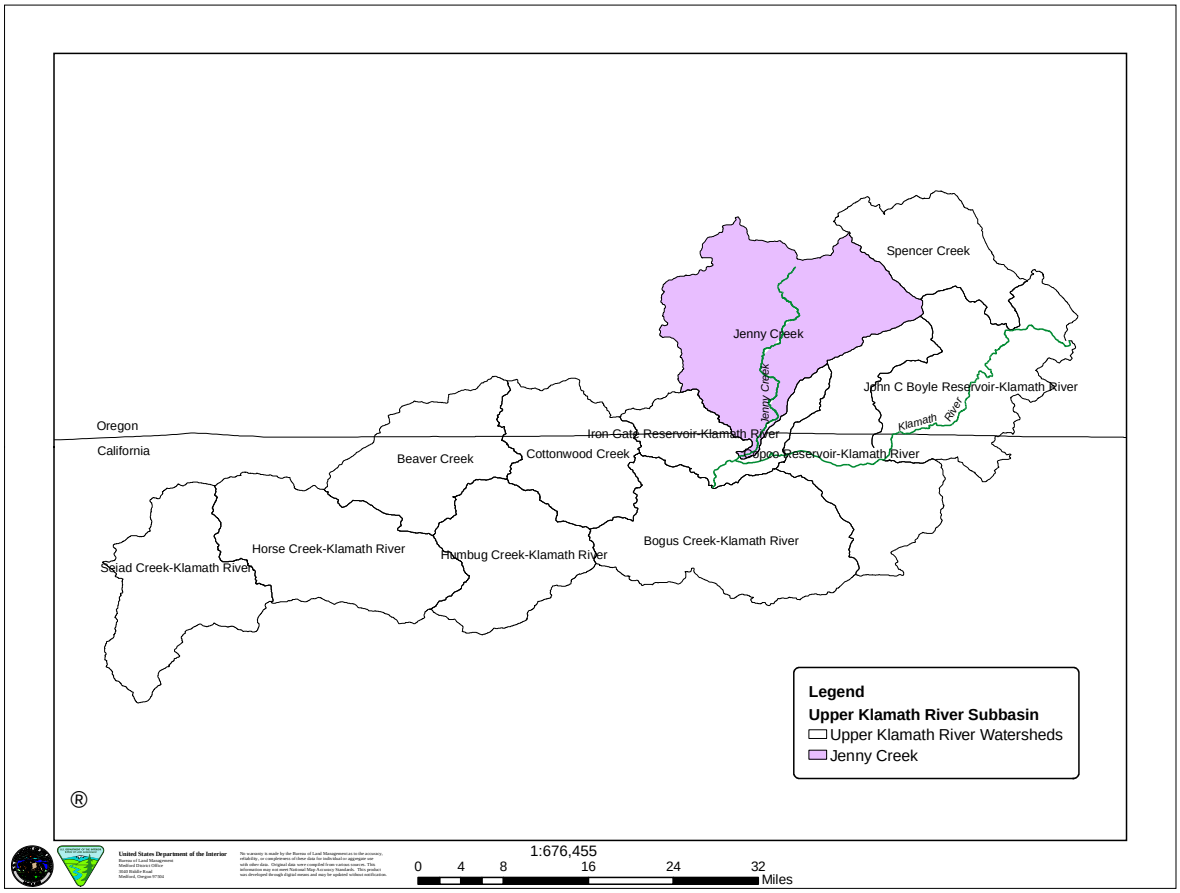
Figure 3. Watersheds within Upper Klamath Subbasin



Land Ownership and Use

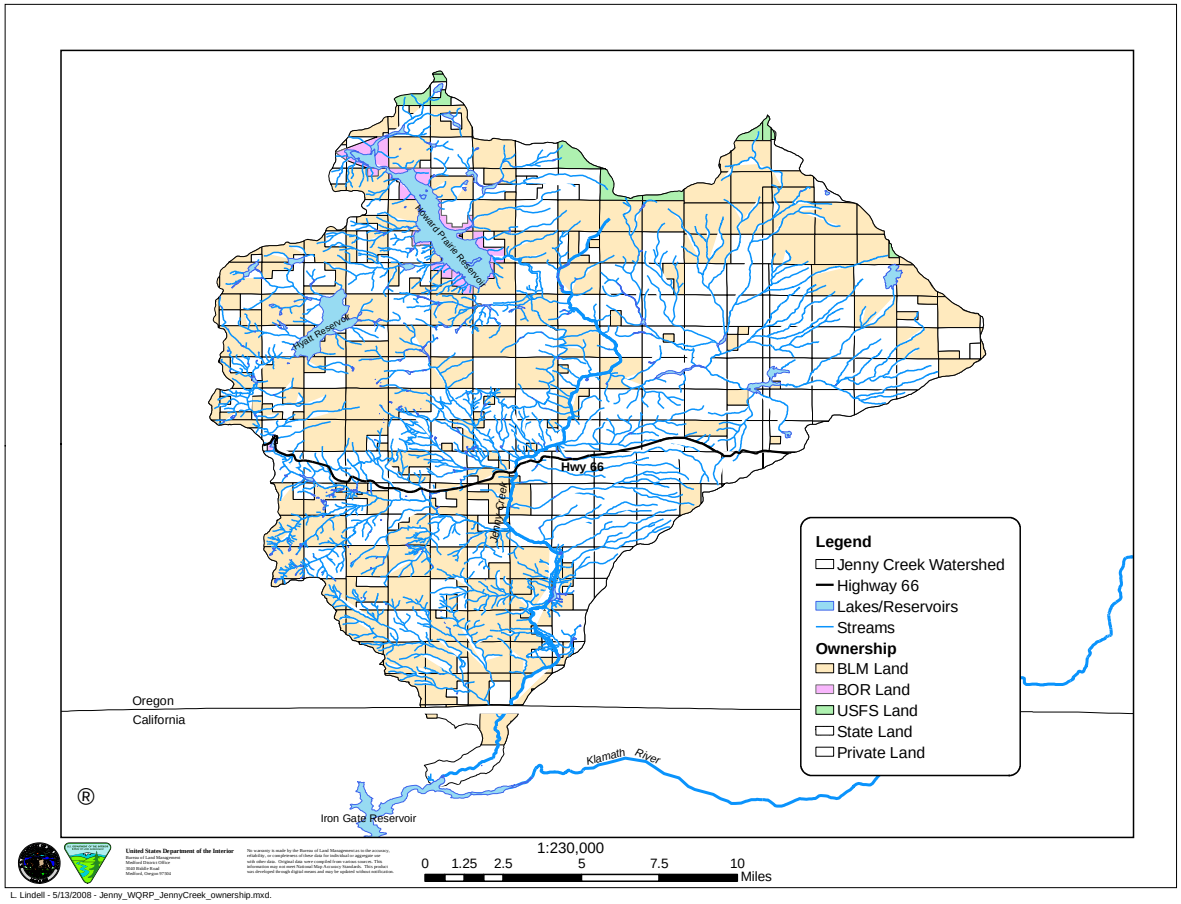
The BLM manages 58,534 acres (44 percent) within Jenny Creek Watershed (Table 1 and Figure 4). The BLM-administered lands are within two administrative units in Oregon: Ashland Resource Area in the Medford District and Klamath Falls Resource Area in the Lakeview District; and one administrative unit in California: Redding Field Office in the Northern California District. Ashland Resource Area manages 46,010 acres, primarily in a "checkerboard pattern" in the western half (Jackson County) of the watershed; Klamath Falls Resource Area manages 12,052 acres in the northeastern portion (Klamath County); and Redding Field Office manages 472 acres in the southern portion (Siskiyou County). The BLM-administered lands in California are not addressed further in this document because the WQRP only pertains to Oregon water quality standards.

The United States Forest Service (USFS), Rogue River-Siskiyou and Winema National Forests, manages 1,328 acres along the northern edge of the watershed. The Bureau of Reclamation manages 3,023 acres surrounding and including Howard Prairie Reservoir. The State of Oregon manages 80 acres on the eastern edge of the watershed. The remaining 53 percent of the plan area consists of private lands. 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 1. Ownership within Jenny Creek Watershed

Ownership	Acres	Percent
BLM – Ashland Resource Area	46,010	34%
BLM – Klamath Falls Resource Area	12,052	10%
BLM – Redding District	472	<0.4%
Bureau of Reclamation	3,023	2%
USFS	1,328	1%
State of Oregon	80	<0.1%
Private	71,383	53%
Total	134,348	100%

Figure 4. BLM-Administered Land in Jenny Creek Watershed



BLM land allocations within the watershed include Cascade-Siskiyou National Monument, Tier 1 Key Watershed, Soda Mountain Wilderness, matrix, and Riparian Reserves. The watershed includes seven special areas: Jenny Creek, Hoxie Creek, Moon Prairie, and Tin Cup Areas of Critical Environmental Concern; Oregon Gulch and Old Baldy Research Natural Areas; and Surveyor Forest Environmental Education Area. There are also two special recreation management areas: Hyatt and Howard Prairie reservoirs and the Pacific Crest Trail that are located within Jenny Creek Watershed. Objectives and management actions/directions for these land allocations and special areas are found in the *Medford District Record of Decision and Resource Management Plan* (USDI 1995b:24-40; 56-68) and the *Cascade-Siskiyou National Monument Record of Decision and Resource Management Plan* (USDI 2008b).

The Northwest Forest Plan (NWFP) (USDA and USDI 1994) Standards and Guidelines incorporate the Aquatic Conservation Strategy (ACS) to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. A component of the ACS is the designation of Tier 1 Key Watersheds, which are areas that either provide, or are expected to provide, high quality aquatic habitat. Tier 1 Key Watersheds are intended to serve as refugia for maintaining and recovering habitat for at-risk stocks of salmonids and resident fish species. The NWFP designates Jenny Creek Watershed as a Tier 1 Key Watershed.

Major land uses in Jenny Creek Watershed include agriculture, timber, and recreation. Cattle operations

are the largest non-forestry agricultural activity. The BLM manages portions of 12 grazing allotments within the watershed (USDI 1995a:66-73).

Logging has occurred in the watershed since the late 1890s when the railroad opened the area to major timber exploitation. In the early 1900s, major lumber companies such as Weyerhaeuser bought large tracts of lands in the watershed. Several small mills were built along the Greensprings Highway (Highway 66). Logging activities diminished during the Depression era, but World War II brought a renewed demand for timber that revived the logging industry in the region. Large-scale logging started at the beginning of World War II with selective timber harvest. In the 1950s, timber harvesting became more intense and harvested areas looked more like clearcuts with only pole timber left standing. Approximately 40 to 50 percent of Jenny Creek Watershed has been clearcut since World War II (USDI 1995a:32).

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 were entitled to 50 percent of the timber receipts.

Jenny Creek Watershed offers a wide variety of recreational opportunities. The area receives a high degree of recreation use for hiking, fishing, swimming, boating, camping, hunting, mountain biking, horseback riding, off-highway vehicle (OHV) use, pleasure driving, mushroom and berry gathering, cross-country skiing, snowmobiling, ice-skating, and sledding/tubing. Facilities around Hyatt Reservoir are managed by the BLM and private operators and Jackson County Parks Department manages facilities around Howard Prairie Reservoir.

Roads distributed throughout the watershed provide vehicle access to managed forestlands, residences, and recreational areas. There are approximately 833 road miles within the watershed, of which 368 miles (44 percent) are controlled by the BLM (USDI 2008a). The State of Oregon controls 16 miles (Highway 66) and Jackson County controls 22 miles (primarily the access road to Hyatt and Howard Prairie reservoirs).

Geology and Soils

Jenny Creek Watershed consists of volcanic landforms comprised of two major topographic series, the Western Cascade and High Cascade. The Western Cascade series consists of tertiary basaltic to dacitic flows, tuffs and breccias. This area is primarily located on the west side of Jenny Creek. On the portion generally south of Highway 66, the surface landscape is complex with moderately steep uplands that are dissected and vertically convex and concave, due to natural differential erosional processes and uplift. Soils north of Highway 66 are developed from High Cascade material and overlay the West Cascade flow rock that leaves the surface landscape simple with gentle smooth slopes (USDI 1995a:5-6).

The High Cascade series consists of pleistocene and pleistocene-pliocene andesitic flows and shield volcanoes. This area is mostly located on the east side of Jenny Creek. The surface landscape is simple with moderate to gentle smooth slopes. Shield volcanoes include Brush Mountain, Old Baldy, Kent Peak, Surveyor Mountain, Buck Mountain, Parker Mountain, Chinquapin, and Little Chinquapin Mountains (USDI 1995a:6).

Slide areas found on the Western Cascade series are deposits from large, currently inactive, rotational block type slides. There is little evidence of recent movement of these slides. Parsnips Lakes are apparent sag ponds created by bulges blocking water flow. Springs at the base of the slide indicate an underlying relatively impervious contact (USDI 1995a:6).

Soils in the watershed vary with landform and source material. Soils in the upper east part of the watershed (High Cascade shield volcanoes and flows) are deep, low density, well drained soils with gravelly to very cobbly subsoils. Soils on the northwest Hyatt Reservior and Chinquapin areas (West Cascade flows and High Cascade shield volcanoes) are moderately deep and deep, low to moderate density, well drained soils with few gravels to extremely cobbly subsoils. Soils on wet alluvial margins and meadows are deep, moderately dense, poorly drained soils with silty clay loam to clay subsoils. Soils on the south portion of the Western Cascade series are well drained, moderately dense, moderately deep to deep soils with clayey subsoils. Soil patterns and landscapes in this part of the area are very complex due to differing degrees of weathering of the mixed basalt/tuff/breccia of the Western Cascade material (USDI 1995a:7).

Climate

Mild, wet winters and hot, dry summers characterize Jenny 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 in the watershed ranges from approximately 24 inches where Jenny Creek crosses the Oregon/California border to a high of approximately 56 inches at Old Baldy Mountain (elevation 6,339 feet). Winter precipitation in the higher elevations (generally above 4,000 feet) usually occurs as snow, which ordinarily melts during the spring runoff season from March through June. Rain predominates in the lower elevations (below 3,000 feet) with the majority occurring in the late fall, winter, and early spring. A mixture of snow and rain occurs between approximately 3,000 feet and 4,000 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.

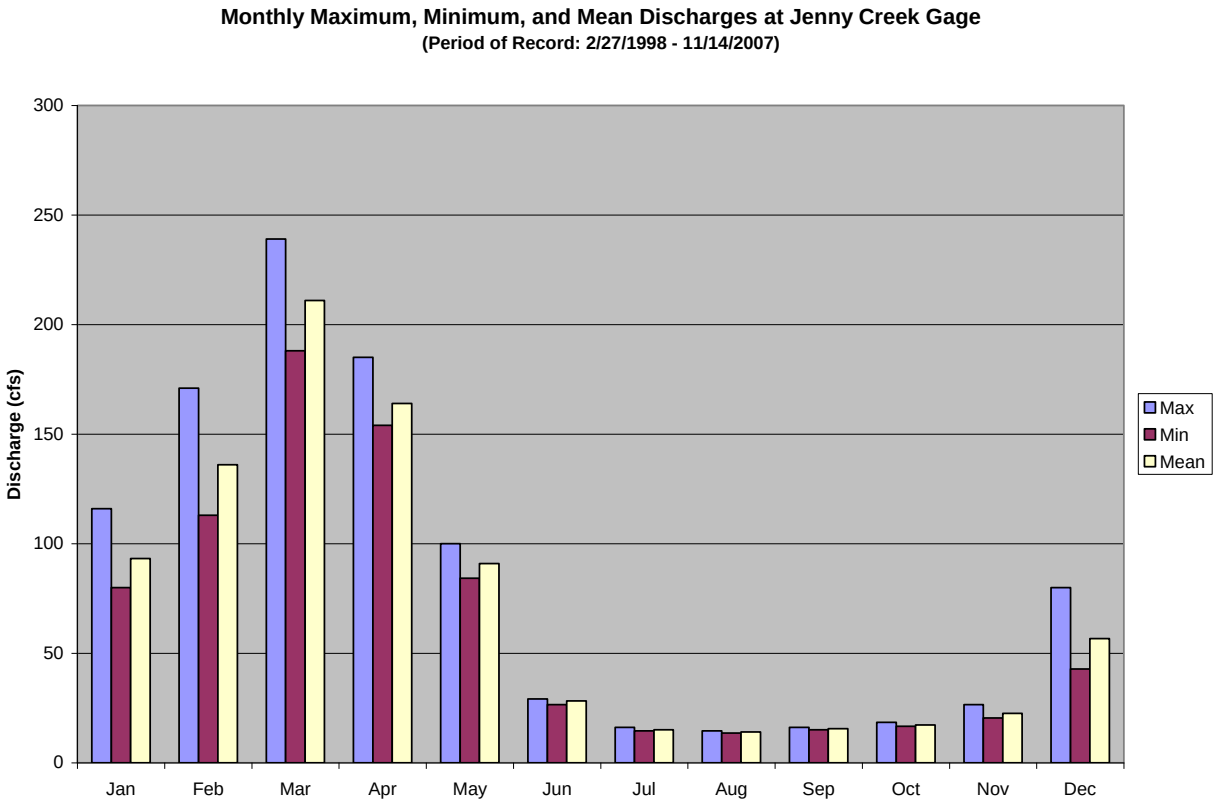
During the summer months, the area is dominated by the Pacific high pressure system, which results in hot, dry summers. Summer rainstorms occur occasionally and are usually of short duration and limited area coverage. Air temperatures can display wide variations daily, seasonally, and by elevation. The nearest NOAA weather stations with air temperature data are located at Howard Prairie Dam and Ashland (located west of the watershed). The highest average maximum monthly temperatures occur in July and August, where they reach 78.8^{o}F and 78.7^{o}F at the Howard Prairie Dam station and 86.7^{o}F and 85.4^{o}F at the Ashland NOAA station (USDI 2002:28-29).

Streamflows

There are no continuous streamflow-monitoring stations on non-flow regulated (natural flowing) streams within Jenny Creek Watershed. Unregulated streamflows in the watershed fluctuate with seasonal variation of precipitation. Moderate to high flows generally occur from mid-November through May. Streamflows during the months of March, April, May, and part of June are augmented by snow melt in the higher elevations. Low flows typically coincide with the period of low precipitation from July through October.

The BLM installed a streamflow gaging station on Jenny Creek (regulated by Hyatt and Howard Prairie reservoirs) downstream of Spring Creek in the fall of 1997 and it became fully operational in 1998. Mean monthly discharges range from a low of 14.1 cubic feet per second (cfs) in August to a high of 211 cfs in March (Figure 5). The average of the maximum monthly discharges ranges from 14.6 cfs in August to 239 cfs in March and the average of the minimum monthly discharges ranges from 13.6 cfs in August to 188 cfs in March (Figure 5).

Figure 5. Jenny Creek Monthly Discharge



Augmentation and diversion of flows in Jenny Creek Watershed for purposes of irrigation and hydroelectric production in the Bear Creek Watershed greatly complicate the instream flow regime for Jenny and Keene creeks. Howard Prairie Reservoir receives water that is diverted from South Fork Little Butte Creek and its tributaries (in Little Butte Creek Watershed to the north of Jenny Creek Watershed). Water diversions from Hyatt and Howard Prairie reservoirs, from Soda and Beaver Creeks by Talent Irrigation District (TID), and from Spring Creek by PacifiCorp export approximately 30,000 acre feet of water annually from Jenny Creek Watershed (USDI 1995a:35). This quantity represents 28 percent of the estimated total runoff that would otherwise be available to support the basin's fish populations (USDI 1995a:35). Upper Keene Creek has a significant increase in summer flows due to augmentation. Reservoirs in Jenny Creek Watershed are not managed for flood control and consequently, the reservoirs may reach full pool early in the water year. Peak flows may approximate pre-dam conditions when surplus reservoir water enters the stream system. Summer streamflows in Jenny Creek Watershed are highly influenced by human-caused factors such as water withdrawals, reservoir storage, and interbasin transfers.

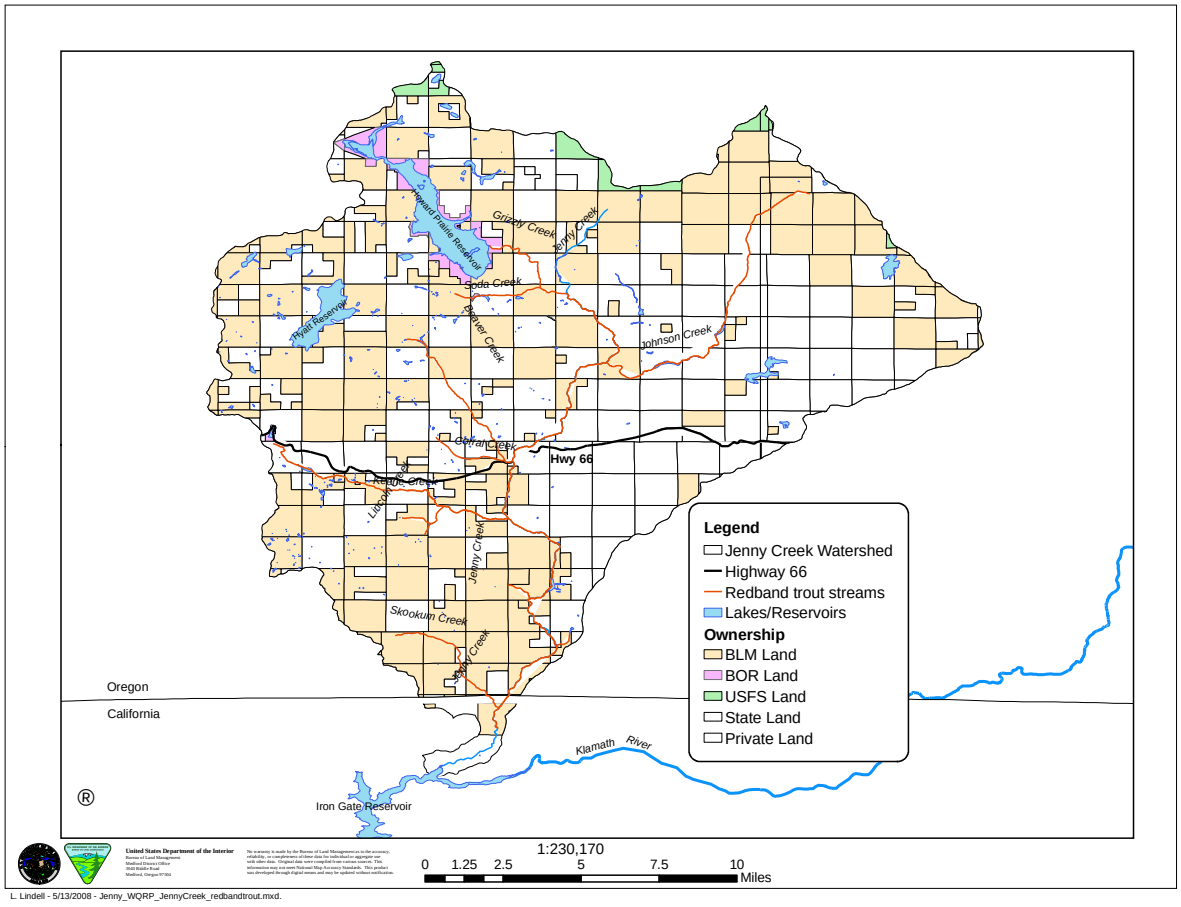
The only existing instream water rights were filed by the Oregon Department of Fish and Wildlife (ODFW) for Jenny Creek from Johnson Creek to Keene Creek. The instream water rights have a priority date of October 26, 1990 and were created to benefit anadromous and resident fish rearing (OWRD 2008).

Aquatic Wildlife Species

Fifteen species of fish are found in the lakes/reservoirs and streams of Jenny Creek Watershed; six are native and nine are introduced. The Jenny Creek sucker and the redband trout are endemic to the watershed. The Jenny Creek sucker's distribution extends from the falls on Jenny Creek at river mile (R.M.) 2 to R.M. 28. It also occurs in tributaries Grizzly, Johnson, Keene, and Soda creeks for an approximate total of 31 miles. Both the redband trout and the Jenny Creek sucker are on the BLM's list of special status species. The redband trout population is more widely distributed in the watershed than the Jenny Creek sucker and is found in Jenny Creek and the following tributaries: Beaver, Corral, Grizzly, Johnson, Keene, Lincoln, Oregon Gulch, Skookum, Soda, and Spring creeks for an approximate total of 76 miles (Figure 6). The native speckled dace is also widely distributed in the watershed as well as other parts of the Klamath Basin. The other three native species, the marbled sculpin, Pacific lamprey, and flathead minnow, are found throughout the Klamath Basin, but are confined to the lower two miles of Jenny Creek due to impassable waterfalls (USDI 1995a:33).

There are nine introduced species: golden shiner, brown bullhead, rainbow trout, brook trout, green sunfish, pumpkinseed, bluegill, largemouth bass, and black crappie (USDI 1995a:Appendix 7). All these introduced species are found in the major reservoirs in the watershed and the first three of these species are also found in streams.

Figure 6. Redband Trout Distribution in Jenny Creek Watershed



Watershed Analysis

The NWFP Standards and Guidelines (USDA and USDI 1994) incorporate the ACS 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 *Jenny Creek Watershed Assessment and Analysis* was completed in February 1995 (USDI 1995a). This WQRP tiers to and appends the watershed analysis. A summary of historical and present watershed conditions in Jenny Creek Watershed has been compiled from the watershed analysis (Table 2). 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 2. Summary of Watershed Conditions on BLM-Administered Lands in Jenny Creek Watershed

Riparian Vegetation	
Historical Condition	• Late seral vegetation dominant. • Diverse mix of species and age classes.
Present Condition	• Varies considerably from reach to reach. Some reaches characterized by good overstory of mixed conifers and hardwoods and a dense understory component. Other reaches have little or no overstory with sparse or absent ground cover except for grasses and forbs.
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, ponderosa pine, sugar pine, incense cedar, white fir, and hardwood mixtures. • Areas of hardwoods on south aspects or other dry sites.
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. • Peak flows with greater magnitude and frequency before dams built. • Summer low flows were directly related to the amount and timing of precipitation events.
Present Condition	• Winter peak flows decreased by dams. • Summer low flows reduced by water withdrawals and interbasin transfer.

Beneficial Uses

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses (Table 3). Water quality standards are developed to protect the most sensitive beneficial uses within a waterbody. Oregon's stream temperature standard is designed to protect cold water fish (salmonids) rearing and spawning as the most sensitive beneficial use (ODEQ 2010). Redband trout are cold water fish in Jenny Creek Watershed. Seasonal standards may be applied for uses that do not occur year round.

Table 3. Beneficial Uses in the Jenny Creek Watershed (OAR 340-41-180 (ODEQ 2008b))

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

1/ With adequate pre-treament (filtration and disinfection) and natural quality to meet drinking water standards.
2/ See Figure 180A for fish use designations for this watershed (http://www.deq.state.or.us/wq/rules/div041/fufigures/figure180a.pdf).

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 is responsible for designating streams that do not meet established water quality criteria for one or more beneficial uses. These streams are included 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 (CWA) 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 constitutes the BLM Medford District's commitment as a Designated Management Agency (DMA) responsible for compliance with the CWA on BLM-administered lands within the Jenny Creek Watershed, to the implementation of the TMDL and WQMP for the Upper Klamath River Subbasin.

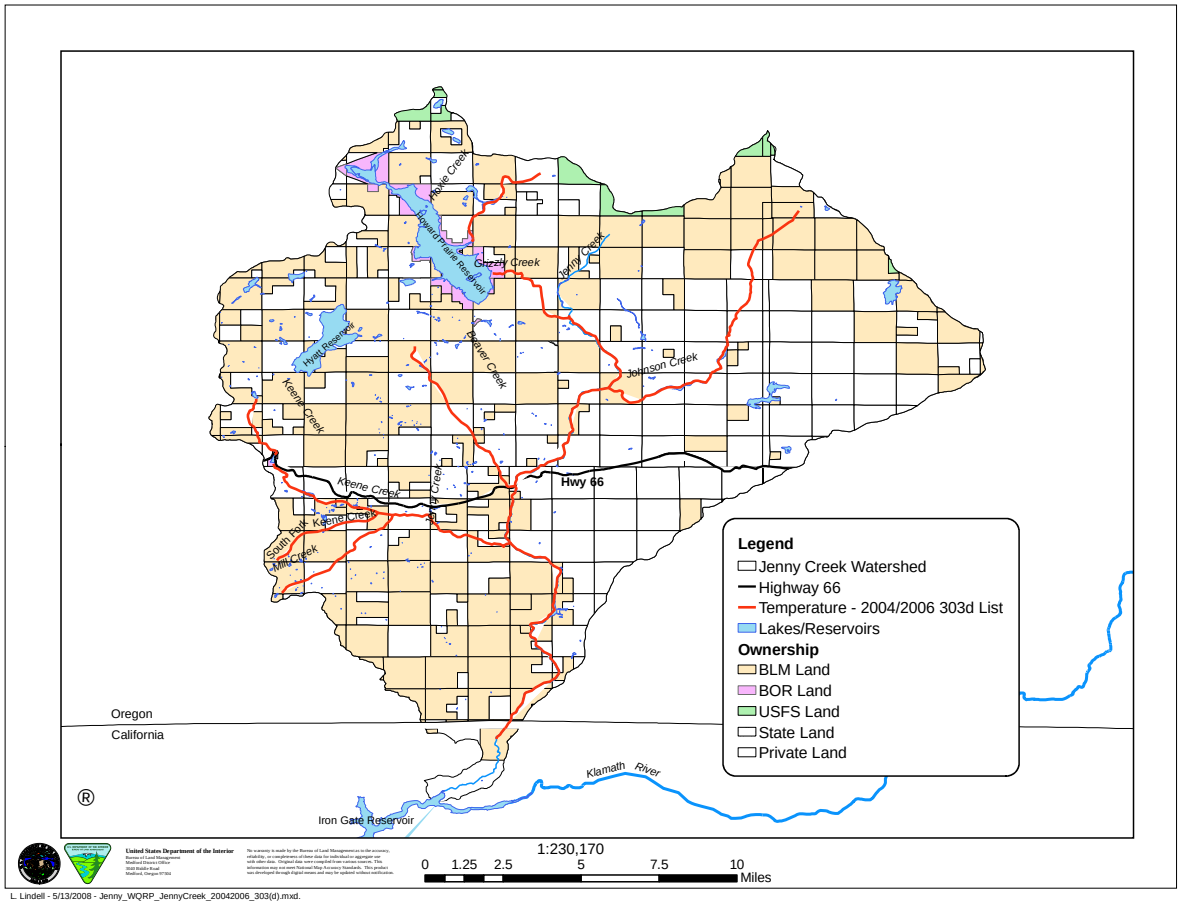
At the time of this writing, the 2004/2006 303(d) list is the most recent release. Changes from the 2002 303(d) list for streams in the watershed include the addition of Beaver Creek for year-around temperature. This WQRP addresses all listings on the 2004/2006 303(d) list for the watershed: seven streams listed for exceeding the summer (rearing) temperature criterion and one stream listed for exceeding the year-around non-spawning temperature criterion (Table 4). Within Jenny Creek Watershed, there are a total of 55.7 stream miles on the 2004/2006 303(d) list (Table 4), of which 23.6 miles cross BLM-managed lands (Figure 7). The water quality limited stream reaches on BLM-managed lands are: Beaver Creek, 2.7 miles listed for year-around temperature; and Grizzly Creek, 1.1 miles; Hoxie Creek, 1.3 miles; Jenny Creek, 8.6 miles; Johnson Creek, 2.9 miles; Keene Creek, 4.4 miles; Mill Creek, 1.4 miles; and South Fork Keene Creek, 2.0 miles listed for summer temperature.

Table 4. 2004/2006 303(d) Listings in the Jenny Creek Watershed (ODEQ 2008a)

303(d) List Date	**Stream Segment**	**Listed Parameter**	**Season**	**Applicable Rule (at time of listing)**	**Miles Affected**
2004	Beaver Creek	Temperature	Year around	OAR 340-041-0028(4)(e)	5.5
1998	Grizzly Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	3.0
1998	Hoxie Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	3.6

303(d) List Date	Stream Segment	Listed Parameter	Season	Applicable Rule (at time of listing)	Miles Affected
1998	Jenny Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	17.8
1998	Johnson Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	9.4
1998	Keene Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	9.4
1998	Mill Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	3.9
1998	South Fork Keene Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	3.1
Total Stream Miles listed for Temperature Criteria (Year around)					5.5
Total Stream Miles listed for Temperature Criteria (Summer)					50.2
Total Stream Miles listed for Temperature Criteria					55.7

Figure 7. Jenny Creek Watershed 2004/2006 303(d) Temperature Listed Streams



C. Temperature

Introduction

The Oregon water quality temperature standard that applies to Jenny Creek Watershed was approved by EPA on March 2, 2004 and is found in OAR 340-041-0028 (4) (e) (ODEQ 2008c). 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:*
>
> *(e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 120B, 140B, 190B, and 250B, and Figures 180A, 201A,and 260A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);*

Fish use map 180A for temperature water quality standards applicable to Jenny Creek Watershed can be found at: http://www.deq.state.or.us/wq/rules/div041/fufigures/figure180a.pdf. The seven-day-average maximum temperature may not exceed 20.0°C (68.0°F) for streams in Jenny Creek Watershed designated as redband trout use on fish use map 180A.

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

The 2004/2006 303(d) temperature listings for Jenny Creek Watershed are based on list dates from 1998 and 2004 (Table 4). Beaver Creek is the only stream within the watershed that was listed in 2004. The 1998 listings use the State of Oregon water quality standards adopted in 1996. Excerpts of the 1996 standard (OAR 340-041-0962(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.*

Within Jenny Creek Watershed, Grizzly Creek (3.0 miles), Hoxie Creek (3.6 miles), Jenny Creek (17.8

miles), Johnson Creek (9.4 miles), Keene Creek (9.4 miles), Mill Creek (3.9), and South Fork Keene Creek (3.1 miles) are on the 2004/2006 303(d) list for exceeding the 64.0°F 7DADM for rearing salmonids (Table 4).

The BLM and Friends of the Greensprings (FOG) collected summertime stream temperature data at several locations within Jenny Creek Watershed from 1991 through 2010 (Table 5). The 7DADM for all sites except Johnson, Keene and Soda creeks, exceed both the 1996 and 2004 temperature criteria. Keene Creek exceeds the 1996 numeric temperature criterion, but not the 2004 temperature criterion.

Table 5. Jenny Creek Watershed Temperature Summary

Stream Name	Data Source	Period of Record[1]	7DADM[2] (ave. for all years) (°F)	Range of 7DADM (for all years)	
				Minimum (°F)	Maximum (°F)
Beaver Creek (above Corral Creek)	BLM	1994-1998, 2000-2001, 2003-2004	74.2	69.9	76.9
Corral Creek (above Beaver Creek)	BLM	1994-1998, 2000-2001, 2003-2004	78.0	74.9	80.9
Grizzly Creek (above Soda Creek)	BLM	2001, 2003, 2005	69.9	69.0	71.3
Hoxie Creek (above Keno access rd.)	FOG/ BLM	1997-1998	72.2	70.2	74.2
Jenny Creek (below Spring Creek)	BLM	1995-2010	78.5	71.9	83.2
Jenny Creek (below Oregon Gulch)	BLM	1991-2010	80.4	75.6	84.2
Jenny Creek (below Keene Creek)	BLM	1991-2005, 2007-2010	74.9	71.5	77.9
Jenny Creek (above Johnson Creek)	BLM	1996-2001	73.0	71.0	74.2
Johnson Creek (headwaters, sec. 28)	BLM	2003, 2005, 2007	61.9	61.0	63.5
Johnson Creek (headwaters, sec. 29)	BLM	2003, 2005-2007	54.4	53.5	55.2
Keene Creek (below Lincoln Creek)	BLM	1995-2001, 2005	67.4	63.6	69.7
Soda Creek (above Grizzly Creek)	BLM	1997, 2001	61.2	60.5	61.8
South Fork Keene Creek (mouth)	FOG/ BLM	1997-1998	68.2	66.8	69.6

1/ Temperature measured from June to September
2/ 7DADM = seven-day average of daily maximum temperature

Nonpoint Source Temperature Factors

The term "nonpoint sources" applies to a diffuse or unconfined source of pollution where wastes can either enter into or be conveyed by the movement of water to waters of the state (OAR 340-41-0002(42)). The Upper Klamath and Lost River subbasins temperature TMDL describes nonpoint sources as past or present human activities that contribute to warmer surface waters than that which would occur naturally (ODEQ 2010).

Stream temperature is influenced by riparian vegetation, channel morphology, hydrology, climate, and geographic location (ODEQ 2010). While climate and geographic location are outside of human control, the condition of the riparian area, channel morphology and hydrology can be altered by human land use. Human activities that contribute to degraded temperature conditions in Jenny Creek Watershed include: agriculture; rural residential developments; water withdrawal; timber harvest; local and forest access roads; and state, and county highways. Timber harvest, road management, and livestock grazing are the primary impacts specific to federally managed lands that have the potential to affect water quality conditions.

The Upper Klamath and Lost River subbasins temperature TMDL identifies five nonpoint source categories that may result in increased thermal loads: 1) near stream vegetation disturbance/removal; 2) channel modifications and widening; 3) hydromodification: dams, diversions, and water management districts; 4) hydromodification: water rights; and 5) other anthropogenic sources (ODEQ

2010).

Temperature Factor 1: Near Stream Vegetation Disturbance/Removal
Near-stream vegetation disturbance/removal reduces stream surface shading via decreased riparian vegetation height, width and/or density, thus increasing the amount of solar radiation reaching the stream surface (ODEQ 2010). Riparian vegetation also plays an important role in shaping channel morphology, resisting erosive high flows, and maintaining floodplain roughness. 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).

Riparian areas along Jenny Creek and its tributaries vary considerably in vegetative cover and width. Some reaches are characterized by a good overstory of mixed conifers and hardwoods with a dense understory component. Other reaches contain an incised stream channel with little or no overstory and sparse or absent ground cover except for grasses and forbs (USDI 1995a:41-42). Lack of riparian vegetation in these reaches has 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. Riparian areas differ between the upper and lower halves of the watershed. Riparian areas in the northern half are wider and wetter, dominated by Douglas-fir, red alder, and willow. Riparian areas in the southern, drier half are narrow and dominated by willow, ponderosa pine, and Oregon ash (USDI 2002:45). Common tree species found in riparian areas include: Douglas-fir, white fir, ponderosa pine, sugar pine, Pacific yew, Oregon ash, red alder, black cottonwood, Oregon white oak, and California black oak (USDI 1995a:Appendix 9).

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 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: Channel Modifications and Widening
Human activities that can alter channel form include direct modification (e.g. road building, flood control, gravel extraction, channel realignment), increased sediment load (e.g. agricultural, logging, and mining activities that trigger mass wasting events), and riparian vegetation removal (ODEQ 2010).

Channel modifications can impact water temperatures. Human activities can cause wider, shallower streams. 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. 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.

Large wood provides 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. Extensive riparian logging along tributaries and the northern half of Jenny Creek in the 1960s limited the amount of large-diameter wood available to mainstem Jenny Creek. The distribution of this large wood is clumped. Wood is concentrated primarily in the upstream canyon reaches that still retain large-diameter trees. Flood-deposited wood is rare in the lower meadow reaches because upstream sources are in short supply. In-channel debris jams are present, but not as extensive as expected in the lower canyon reaches (USDI 2002:45). The loss of large wood in Jenny Creek Watershed directly impacts 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 in narrower and deeper channels when established mature woody vegetation is present. Annual/grassy riparian communities may allow channels to widen and become shallower.

Beaver trapping, ranching, flood control, water diversion, and timber harvest have significantly altered the floodplains and stream channels in Jenny Creek Watershed in the last 150 years. Beaver dams maintained high water tables and wide riparian zones by adding structure to the flood plains, dissipating stream energy, and capturing sediment. As beaver were trapped and removed from the area, these beneficial hydrologic functions were diminished. Floodplains were cleared to provide more pastureland as ranchers became established in the area and efforts were made to control the stream. Eventually, much of the stream through ranch lands was straightened out, berms were constructed to prevent the stream from exceeding its banks, and stream-side shrubs and trees were removed to prevent debris jams from forming or channels from migrating. Grazing increased bank instability in areas and, reduced riparian vegetation. Regeneration of large riparian vegetation, which typically occurred following vegetation removal by flood flows or beaver activity, was retarded or prevented by grazing pressure. The combined effect of these actions decreased infiltration rates, increased runoff, and simplified the stream channel (USDI 2002:44).

Changes in sediment inputs can lead to changes in channel morphology. When sediment inputs increase over the transport capability of the stream, sediment deposition can result in channel filling, thereby increasing the stream's width-depth ratio. Reduced winter stream flows due to large-scale water diversions in Jenny Creek Watershed tend to decrease the sediment transport capacity of affected streams.

Natural erosion processes occurring in the watershed such as surface erosion, mass wasting, wildfire, and flood events contribute to increased sedimentation (USDI 2002:38). 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 2002:38-39).

Streambank erosion in the watershed is accelerated by human-caused disturbances in the riparian areas such as stream channelization and stream-adjacent land clearing, concentrated livestock grazing, road building, and tractor skid roads.

Temperature Factor 3: Hydromodification: Dams, Diversions, and Water Management Districts
Diversion dams affect stream temperature by dewatering the downstream reach of the stream. Reductions in stream flow in a natural channel slow the movement of water and generally increase the amount of time the water is exposed to solar radiation. Stream temperatures downstream of diversion dams can be substantially warmer than those above (ODEQ 2010). Water diversions from Hyatt and Howard Prairie reservoirs, from Soda and Beaver creeks by TID, and from Spring Creek by PacifiCorp export approximately 30,000 acre feet of water annually from Jenny Creek Watershed. This quantity represents 28 percent of the estimated total runoff that would otherwise be available to Jenny Creek and its tributaries (USDI 1995a:35).

Canals and other unpiped water conveyance systems generally are open ditches. These ditches are usually unshaded and increase the surface area of water exposed to solar radiation. Where canal waters are allowed to mix with natural stream flows, stream temperatures can increase (ODEQ 2010).

Dams and reservoirs may contribute to stream warming. Reservoirs increase the surface area of water exposed to solar radiation and may delay the movement of water through the river system. Throughout the summer months reservoirs store solar radiation as heat in the warm surface waters pooled behind the dam, causing thermal stratification to occur. Accumulated heat is discharged with the stored water from each reservoir into downstream reaches during annual draw down which occurs from early summer until late fall (ODEQ 2010).

There are approximately 71 small BLM-managed and Oregon Water Resources Department (OWRD)-permitted water developments on BLM-administered lands within the watershed. The developments range in size from 0.003 to 1.19 acre-feet (85 percent are less than 0.25 acre-feet) and are primarily used for wildlife, livestock, road operations, and prescribed fire on BLM-administered lands. In addition, the BLM has a water right permit for the Little Hyatt reservoir that holds 59 acre-feet and is used solely for storage with beneficial uses of recreation, aesthetics, and wildlife.

Temperature Factor 4: Hydromodification: Water Rights
The influence of stream flow is generally inversely related to the daily maximum stream temperature with higher flows moderating the diel swing of temperatures. Less water from the tributaries generally decreases the ability of the stream to assimilate heat load and result in warmer stream temperatures (ODEQ 2010).

Summer streamflows in Jenny Creek are highly influenced by water withdrawals, reservoir storage, and interbasin transfers. The majority of water right diversions in the watershed are for irrigation and livestock (ODEQ 2010). The BLM diverts a maximum of 9.9 acre-feet annually for the water developments described above under Temperature Factor 3.

Temperature Factor 5: Other Anthropogenic Sources
The Upper Klamath and Lost River subbasins temperature TMDL does not discuss any other anthropogenic sources.

Temperature TMDL Loading Capacity and Allocations
Oregon's water quality standard mandates a loading capacity based on the condition where stream temperatures do not increase more than 0.3^{o}C (human use allowance) above the applicable criteria at the point(s) of maximum impact (ODEQ 2010). There are no point sources in the Upper Klamath and Lost River subbasins temperature TMDL, thus allocations divide the loading capacity between nonpoint sources of heat and reserve capacity sectors (for future growth and new or expanded sources). The thermal load targets are set to result in achieving the water quality standards.

The nonpoint source human use allocation is 0.2^{o}C in the Upper Klamath and Lost River subbasins temperature TMDL and the cumulative effects of nonpoint source heating cannot exceed this allocation. Contributors to the cumulative effects of nonpoint source heating include all of the nonpoint sources located in the Upper Klamath and Lost River subbasins, including agriculture, forestry, urban areas, irrigation, dam operations, and hydroelectric projects. The Upper Klamath and Lost River subbasins temperature TMDL assigns each DMA load allocations that apply to all perennial and intermittent streams. For forestry nonpoint sources, the temperature TMDL targets system potential effective shade as the surrogate measure to meet the TMDL load allocation (ODEQ 2010).

The system potential condition as defined in the TMDL is the near-stream vegetative community that can grow on a site at a given elevation and aspect in the absence of human disturbance. System potential is an estimate of a condition without anthropogenic activities that disturb or remove near stream vegetation (ODEQ 2010). Effective shade is defined as the percent reduction of potential daily solar radiation load delivered to the water surface (ODEQ 2010). It can be measured in the field and relates directly to solar loading.

The Upper Klamath and Lost River subbasins temperature TMDL includes a modeled shade analysis for Jenny Creek. The average percent effective shade for Jenny Creek is currently 38% and the system potential is 65%. The average shade deficit is 26%. For BLM-administered lands along Jenny Creek, the average percent effective shade for Jenny Creek is currently 43%, the system potential is 66%, and the average shade deficit is 23%. Effective shade curves are included in the Upper Klamath and Lost River subbasins temperature TMDL for streams not specifically modeled for shade or temperature, including Jenny Creek tributaries. The effective shade surrogates are identified by ecoregion for different types of potential vegetation. Effective shade curves represent the maximum possible effective shade for a given vegetation type.

Local geology, geography, soils, climate, legacy impacts, natural disturbance rates, and other factors may prevent effective shade from reaching the values presented in the effective shade curves. The goal of the TMDL is to minimize anthropogenic impacts on effective shade. The TMDL recognizes that unpredictable natural disturbances may result in effective shade well below the levels presented in the effective shade curves (ODEQ 2010).

The RAPID effective shade model (Park and Hawkins 2007) was used to analyze the existing shade conditions and potential future shade along perennial Jenny Creek tributaries on BLM-administered lands within Jenny Creek Watershed (Table 6). The RAPID analysis generates a stream system and the length of these stream reaches is greater than the reaches on the DEQ's 303(d) mapped streams. The target shade values represent the maximum potential stream shade based on the system potential tree height. The analysis is based on regional shade curves (Park 1993) which provide effective shade values based on stream width, tree height, channel orientation, and stream adjacent slope. The projection of years to recovery uses forest growth estimates for Douglas-fir in southwest Oregon.

Table 6. RAPID Shade Model Results for BLM-Managed Lands in the Jenny Creek Watershed

303(d) Stream	Stream Miles Modeled on BLM	Average Current Shade[1] (%)	Average Target Shade[1] (%)	Additional Shade Needed[2] (%)	Average Time to Recovery[3] (years)
Beaver Creek	2.8	53	54	1	70
Grizzly Creek	1.2	36	44	8	73
Hoxie Creek	1.5	35	59	24	85
Johnson Creek	3.2	34	53	19	95
Keene Creek	4.7	36	37	1	74
Mill Creek	1.4	77	77	0	0
S. Fk. Keene Creek	2.2	74	74	0	0

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.

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

3/ If current shade is 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 site potential percent-effective shade. When current shade is equal to the target 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. Years to recovery are a weighted average of recovery time for individual stream reaches.

Element 2. Goals and Objectives

The long-term goal of this WQRP is compliance with water quality standards for the 303(d) listed streams in Jenny Creek Watershed. The WQRP identifies TMDL implementation strategies to accomplish this goal. Recovery will focus on protecting areas where water quality meets standards and avoiding future impairment 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 Jenny Creek Watershed will be dependent upon implementation of the BLM Medford District and Klamath Falls Resource Area Resource Management Plans (RMPs) (USDI 1995b, USDI 1995c, USDI 2008b) that incorporate the NWFP (USDA and USDI 1994). The RMPs 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 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. 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 on BLM-administered land are specified in Table 7.

Table 7. Recovery Goals for BLM-Administered Land in the Jenny Creek Watershed

Element	Goal	Passive Restoration	Active Restoration
Temperature ***Shade***	• Achieve coolest water possible through achievement of the target percent effective shade.	• 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 Modification***	• 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 ***Hydromodification***	• Maintain optimum flows for fish life. • Maintain minimum flows for fish passage.		• Utilize authorized water storage facilities to avoid diverting streamflows during low flows.

1/ Passive versus active restoration of riparian areas. If current percent effective shade is greater than or equal to the target shade, 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 2003). If current shade is less than the target shade, 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 serve as general BMPs for preventing or reducing water pollution necessary to meet the goals of the Clean Water Act. 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 ACS 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 one 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 one acre include the wetland and extend to the outer edges of the riparian vegetation.

The Medford District and Klamath Falls Resource Area RMPs include BMPs that are important for preventing and controlling nonpoint source pollution to the "maximum extent practicable" (USDI 1995:149-177; USDI 1995:D-1-D-46). 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 for achieving the stream shade target (Table 7), active restoration measures will be considered for BLM-managed lands adjacent to streams with current shade that is less than the target shade as determined in the Upper Klamath and Lost River subbasins TMDL. The *Northwest Forest Plan Temperature TMDL Implementation Strategies* (USDA and USDI 2005) provides a tool for analyzing the effect of silvicultural practices in Riparian Reserves on effective shade. The strategy considers stream adjacent shade in the primary and secondary shade zones to determine the affect, overall of silviculture treatments on stream shade. Shade nomographs computed based on stream width, vegetation height, hill slope, and orientation are used to delineate no-cut buffers necessary for maintaining stream shade while allowing vegetation treatment that will ultimately improve and restore riparian condition.

The primary means for achieving channel modification goals (Table 7) on BLM-administered lands will be through passive restoration and protection of unstable areas. Active restoration will focus on promoting riparian conifer growth for future large wood recruitment through silvicultural treatment, maintaining and improving road surfaces, reducing the number of road crossings, and reducing road densities. The highest priority areas for road treatments will be Riparian Reserves and unstable areas.

Element 4. Time Line for Implementation

The major provisions of this WQRP are being implemented. Protection of riparian areas along all streams has been ongoing since the NWFP took effect in 1994. Inherent in the NWFP is passive restoration of riparian areas (e.g., Riparian Reserves). Active restoration directed in part by watershed analysis will be achieved through site-specific projects. These projects will be subject to NEPA analysis and the timing will be dependent on available staff and funding.

The problems leading to water quality impairment and 303(d) listing have accumulated over many decades. Natural recovery and restoration management to address these problems likewise will require time before the affects can be measured. Implementation will continue until 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 discusses these timeframes. The 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 improvement and habitat recovery depends 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 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 DMA 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 Ashland and Klamath Falls Field Managers are 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 managers will ensure coordination and consistency in plan development, implementation, monitoring, review, and revision. The managers 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 encompassed in the *Upper Klamath and Lost River Subbasins WQMP* (ODEQ 2010). The WQMP will cover all land within Jenny 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 public lands. Other organizations or groups that are (or will be) involved in partnerships for implementing, monitoring, and maintaining the Jenny Creek Watershed WQMP include Jackson and Klamath Counties, 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 U.S.

Bureau of Reclamation. The problems affecting water quality are widespread; coordination and innovative partnerships are key ingredients to successful restoration efforts.

The BLM, Ashland and Klamath Falls Resource Areas intend 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 and Klamath Falls Resource Area RMPs 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 RMPs contain requirements for implementation, effectiveness, and validation monitoring of BMPs for water resources. The Medford District and Klamath Falls Resource Area annual program summaries provide feedback and track how management actions are being implemented. RMP monitoring will be conducted as identified in the approved BLM Medford District and Klamath Falls Resource Area 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 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 in the BLM Medford District and Klamath Falls Resource Area annual program summaries. Activities that are tracked include in-stream structure and passage, riparian treatments, upland treatments, road decommissioning and improvements, and wetland treatments.

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. Monitoring will be conducted to evaluate improvements in water quality condition as well as the progress toward attaining water quality standards.

Core indicators of water quality and stream health including stream temperature, 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 Jenny Creek Watershed since 1991 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 will continue to be 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. Future stream temperature monitoring will be conducted as needed to track potential project effects. If funding is available, monitoring will continue on the following temperature-listed stream reaches until such time state standards are achieved: Beaver, Grizzly, Hoxie, Jenny, Keene, Soda, and South Fork Keene creeks. Temperature monitoring will also continue in the headwaters of Johnson Creek to determine the effectiveness of silvicultural treatments.

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 NWFP specify that vegetation management in the Riparian Reserves must have a goal of improving riparian conditions. The existing level of stream shade provided by stream-adjacent riparian vegetation 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 treatments meet prescribed goals.

Stream Channel Condition Monitoring

Restoration activities designed to improve stream channel conditions (i.e. road surface and drainage improvements, road decommissioning, and unstable area protection) will be monitored for implementation and effectiveness according to project level specifications and requirements.

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 2016, 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 and Klamath Falls Resource Area RMPs each 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 *Jenny Creek Watershed Assessment and 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 developing TMDLs and WQMPs to address water quality impaired streams. This WQRP will be provided to the DEQ for incorporation into the *Upper Klamath and Lost River Subbasins 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 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 $15,000 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, grazing 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 but it must be recognized that federal agencies are subject to political and economic realities. Currently, timber harvest in the Medford

District is minimal due to litigation and Endangered Species Act (ESA) clearances necessary 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 that is tied to some other land management objective is subject to funding availability for these other activities.

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

Element 10. Citation to Legal Authorities

The ESA and the CWA 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 and they provide a 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 require treatment are referred to as "water quality limited" and are identified as such 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 Departments of Agriculture, Interior, Commerce, and the EPA commissioned the Forest Ecosystem Management Assessment Team (FEMAT 1993) to formulate and assess the consequences of forest management on other resources. The assessment emphasizes producing management alternatives that comply with existing laws while maintaining the highest contribution of economic and social well being. The "backbone" of ecosystem management was recognized as constructing a network of late-successional forests and an interim and long-term scheme to protect aquatic and associated riparian habitat adequate to provide for threatened and at-risk species. Biological objectives of the NWFP were based on FEMAT science that examined what was necessary for management of 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 RMPs for the BLM Medford District and Klamath Falls Resource Area provide for water quality and riparian management and are written to ensure attainment of ACS objectives and compliance with the CWA.

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