Water Quality Restoration Plan

Deer Creek Watershed
HUC 1710031105

Prepared by:
Medford District Bureau of Land Management, Grants Pass Resource Area

December 2011

Water Quality Restoration Plan
Southern Oregon Coastal Basin
Illinois River Subbasin

Deer Creek Watershed

(excluding McMullin Creek Subwatershed)

Bureau of Land Management, Medford District
Grants Pass Resource Area

Deer Creek Watershed at a Glance	
Hydrologic Unit Code	1710031105
Watershed area/ownership	Total: 55,922 acres BLM: 23,052 acres USFS: 7,905 acres State: 1,026 acres Private: 23,939 acres
2010 303(d) listed parameters	None
Water Quality Limited for Temperature	*Deer Creek* mouth to river mile 17, *Anderson Creek* mouth to river mile 3.2, *Squaw Creek* mouth to river mile 3
Beneficial Uses	Fish (salmonids) and aquatic life, irrigation, domestic water supply
Known Impacts (human)	Water diversions, bank erosion, agriculture w/o riparian buffer, riparian harvest, woody debris removal, mining
Natural factors	Serpentine soils

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Statement of Purpose

Water quality standards are established to protect beneficial uses of the State's waters. Beneficial uses are assigned by basin in the Oregon Administrative Rules (OAR-340-041-0271, Table 271A, November 2003) for water quality. Beneficial uses in the plan area are:

public domestic water supply	wildlife and hunting
private domestic water supply	fishing
industrial water supply	boating
irrigation	water contact recreation
livestock watering	aesthetic quality
fish and aquatic life	hydro power

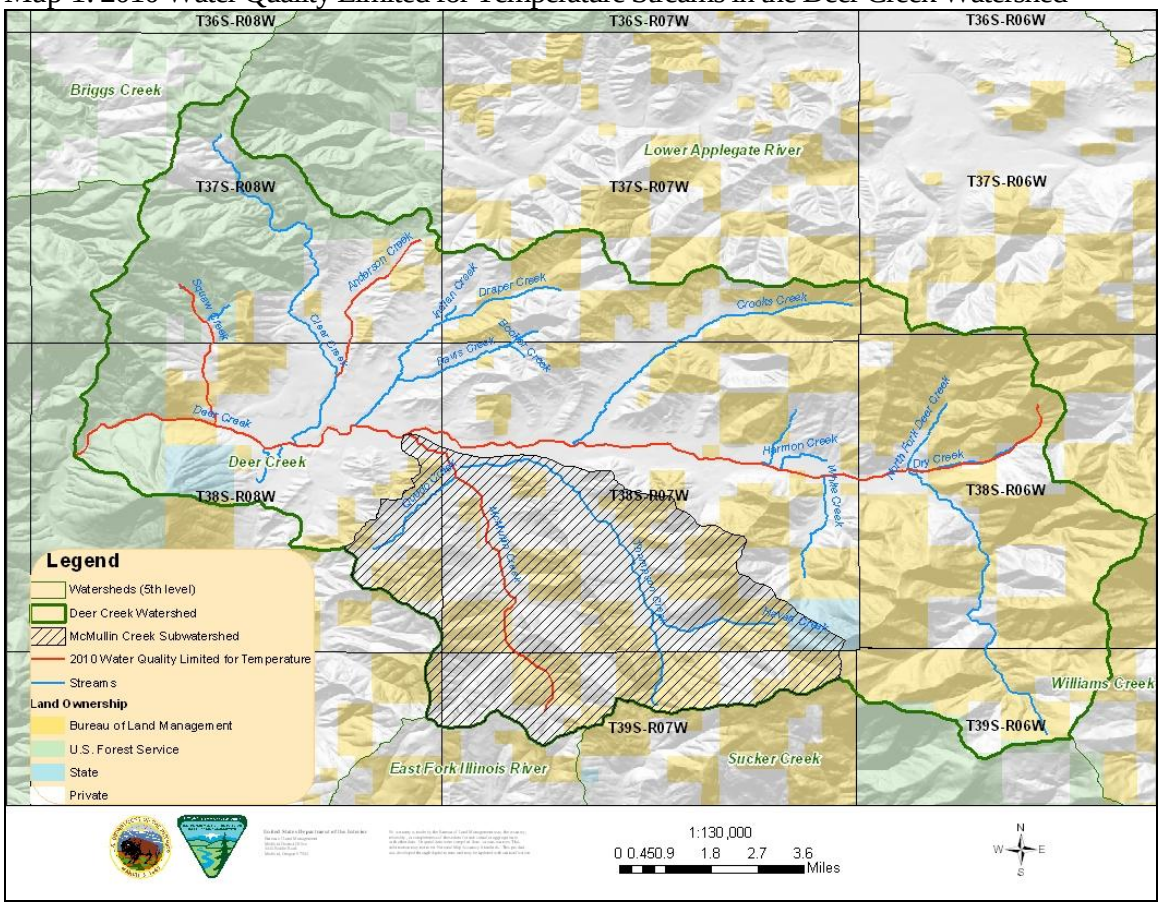
The Deer Creek Watershed Water Quality Restoration Plan (WQRP) was prepared to fulfill a requirement of Section 303(d) of the Clean Water Act and the 2011 Memorandum of Understanding between the Bureau of Land Management (BLM) and the Oregon Department of Environmental Quality (DEQ) (USID, ODEQ 2011). It is organized as per part 4 (Water Quality Restoration Plan Template) of the Northwest Forest Plan Temperature Total Maximum Daily Load (TMDL) Implementation Strategies (USDA, USDI 2005) and complies with the Water Quality Management Plan (WQMP) within the Rogue River Basin TMDL (ODEQ 2008). This plan covers all the BLM-administered lands within the Deer Creek Watershed except the McMullin Creek Subwatershed (Figure 1). The BLM prepared a WQRP for the McMullin Creek Subwatershed in November 2005 and it was approved by the DEQ on February 14, 2006.

This WQRP addresses all water quality limited listings on the DEQ's 2010 Integrated Report for the Deer Creek Watershed (except McMullin Creek which was covered in the 2005 McMullin Creek WQRP). The DEQ 2010 303(d) list is the most recent listing of impaired waters in Oregon. Deer, Anderson and Squaw creeks were on the State of Oregon's 2004/2006 303(d) list for failure to meet the water temperature criteria outlined below. The 2010 Integrated Report shows these three streams as water quality limited but delisted because the Rogue River Basin TMDL was approved in December 2008.

Watershed Characterization

Deer Creek Watershed is located within the Klamath Mountain Geomorphic Province of southwest Oregon approximately 15 miles southwest of Grants Pass (Map 1). There are four 6^{th} field subwatersheds within the watershed: Upper Deer Creek, Middle Deer Creek, McMullin Creek, and Lower Deer Creek. The watershed ranges in elevation from near 1,300 feet above sea level to near 5,450 feet and has approximately 581 stream miles that drain into Deer Creek. Deer Creek is approximately 15 miles in length and is one of the major tributaries of the Illinois River.

Map 1. 2010 Water Quality Limited for Temperature Streams in the Deer Creek Watershed



Land Ownership

Land ownership is mostly a mix of private and BLM (Map 1), with private being the dominant ownership. The BLM, Medford District administers 41 percent of the lands, private ownership totals 43 percent, U.S. Forest Service manages 14 percent, and the State of Oregon lands total 2 percent. The BLM parcels are within a checkerboard of ownership with some small contiguous areas in the eastern portion of the watershed.

BLM land allocation within the plan area includes Late-successional Reserve (LSR), Matrix (Southern General Forest Management Area), 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: pp. 24-40 and 56-62).

Major land uses in the watershed are agriculture and logging. Early European inhabitation resulted in logging of the surrounding hills and agricultural development of the valley bottoms.

Climate

The Deer Creek Watershed has a Mediterranean climate with cool, wet winters and warm dry summers. The watershed receives from 40 to 55 inches of precipitation annually with

the majority falling between December and March. The mountainous area above 4,000 feet has a snow pack for three to four months in most years. Below this elevation the precipitation mostly occurs in the form of rain.

Streamflow

Streamflows in the Deer Creek Watershed fluctuate with seasonal variation of precipitation. One of the main hydrologic characteristics of the Deer Creek Watershed is the very low stream flows in the mainstem and tributary streams during the late summer and early fall. Sections of Deer Creek and many of its major tributaries are often reduced to no more than intermittent pools with most of the water moving below the surface in the late summer. Moderate to high flows generally occur from mid-November through May.

Consumptive use for agriculture and domestic supplies has reduced summer surface water flows in Deer, Anderson and Squaw creeks. According to the Oregon Department of Water Resources, there are 224 points of diversion in the Deer Creek Watershed. Currently, no summer stream flow is available for future water rights claims for irrigation in Deer Creek. In other words, summer surface waters in the Deer Creek Watershed have been fully appropriated. Exacerbating the effects of surface water diversions on baseflows may be groundwater withdrawals for domestic and irrigation use. Water withdrawn from wells can be hydrologically connected to the surface water. In these instances, ground water is removed that would have flowed subsurface, discharging into streams, however there is no known study that shows this phenomenon is occurring in the Deer Creek Watershed.

Peak flow increases have been linked to channel instability, as greater flow volume yields greater energy. Peak flow increases in the Deer Creek Watershed's main streams (particularly Deer Creek and Draper Creek) due to management activities are unlikely given the vegetative condition, and lack of scale and disturbance, in the transient snow zone. Some roads intercept surface and groundwater and thus have increased flow routing to the stream network. But, given the low level of roaded area (less than 2.5% of the upper watershed area), though there may be isolated effects to runoff and sedimentation at local sites, landscape scale flow changes resulting in increased peak flow magnitude are highly unlikely (USDI, Bureau of Land Management, Medford District, Grants Pass Resource Area. 1997).

Channel Condition

Aerial photographs following the 1964, 1974, and 1997 flood events display widespread bank erosion in the low gradients parts of Deer Creek downstream from BLM-managed land. Miles of creek were scoured, fully exposing the channel. In addition, bedload was increased due to channel scour upstream. Currently, channel conditions are generally poor as indicated by high levels of bank erosion, high riffle to pool ratios, high extent of exposed bars in the lower valley. Prevalent bank erosion in the downstream valley areas of non-BLM-managed land indicates that energy moving through the system has increased or the ability to dissipate energy has decreased.

Stream flow velocity increases are due to channel modifications. Stream kinetic energy increases exponentially with flow velocity. Stream velocity increases with depth and with gradient, and decreases in habitat complexity. There is a lack of large wood in moderate gradient reaches. Ongoing stream degradation is occurring in the lower watershed along with decreased complexity. Additive to the effects of increased energy is decreased resistance to bank scour by removal of riparian vegetation. Riparian zones in the mid and lower reaches of Deer Creek were cleared prior to the 1964 flood event. The combination of increased stream velocity, riparian vegetation removal, and bedload increases have led to high levels of bank erosion.

Presently, channel banks are the primary energy dissipater, resulting in continued bank erosion. The continued altered channel processes are the mechanism responsible for high levels of bank erosion and low habitat complexity.

While bank erosion is high through the lower gradient floodplain reaches downstream of BLM-managed land, field surveys and aerial photographs show that the channel has changed locations at some sites and widened in the floodplain. Widened and generally shallower channels lead to higher stream temperatures.

Riparian Condition

Floodplains in the lower gradient valley bottom of Deer Creek have been cleared for agricultural production, resulting in narrow strips (25-75 feet for narrow streams, 50-150 for Deer Creek and other large streams) of hardwood dominated vegetation along the stream channel. In the moderate to high gradient reaches, rotational harvest on private lands and past BLM forest practices have reduced distribution of mature riparian forest stands.

Roads along sections of Deer, North Fork of Deer, Draper, and Crooks creeks as well as reaches of several unnamed tributaries, prevent portions of future riparian vegetation development. In many riparian zones, fire suppression and/or past harvest activities have led to high density, slow growing riparian stand conditions.

On BLM-managed lands over the past 15 years, management activities in the riparian zone focused on the protection of riparian functions of instream wood recruitment, stream shade and wildlife corridors. The recovery of past riparian harvest units with a management emphasis to maintain or improve riparian zones has led to an improving trend in riparian and aquatic conditions.

Riparian surveys, completed in the summer of 2008, on BLM land in Deer Creek Watershed showed a prevalence of improved functioning condition (Table 1).

Table 1. Number of BLM Riparian Reaches by Functioning Condition Rating*

Subwatershed	PFC	FARU	FARD	FARN	NF
Draper Creek	22	10	2	30	6
Crooks Creek	22	23	3	4	3
Thompson Creek	39	29	12	33	0

*(USDI, Bureau of Land Management, Grants Pass Resource Area. 2008)
PFC – Proper Functioning Condition
FARU – Function at Risk, Upward Trend
FARD – Functioning at Risk, Downward Trend
FARN - Functioning at Risk, Trend Not Known
NF – Non Functional

Based on the ownership distribution and aerial scanning (Google Earth), approximately 70% of the riparian zones in the Deer Creek Watershed lack mature tree structure necessary to provide large instream wood. On private lands, in the lower gradient floodplain reaches of Deer, Anderson/Clear, Draper, and Crooks creeks, reductions in riparian vegetation have decreased stream shade, thereby increasing solar radiation input into surface waters. While harvest activities fragmented riparian habitats, typical stream shade on BLM-managed land in the Deer Creek Watershed is high.

Many riparian stands are overstocked due to past activities and fire suppression. These stands exhibit lower growth rates, reduced stand resiliency, and higher fire risk. The Grants Pass Resource Area actively investigates riparian conditions to identify riparian stands which would benefit from thinning or underburning. Benefits include increased growth rates, stand complexity, as well as reduced fire danger, leading to improved stream shade and wood recruitment.

Fisheries

Fish species found in the Deer Creek Watershed include coho salmon, fall chinook salmon, winter steelhead trout and resident cutthroat trout. Fall chinook are only found in the Deer Creek mainstem. Nongame species such as speckled dace, Pacific lamprey, sculpin, and redside shiner also inhabit streams within the watershed.

Watershed Analysis

The Northwest Forest Plan (NWFP) Standards and Guidelines (USDA and USDI 1994) incorporate the Aquatic Conservation Strategy (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. A watershed analysis was completed for the Deer Creek Watershed in 1997 (USDI 1997). This WQRP tiers to and appends the watershed analysis. A summary of historical and present watershed conditions that may affect stream temperatures in the Deer 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 BLM-Administered Lands in the Deer Creek Watershed

Riparian Vegetation	
Historic Condition	• Late seral conifers dominant. • Diverse mix of species and age classes (fire driven ecosystem).
Present Condition	• Mature hardwoods, small and large diameter conifers, dense understory. • Common non-natives, blackberries & scotch broom in lower stream corridors.
Forest Health and Productivity	
Historic Condition	• Frequent (<25 years), low intensity fires maintained low fuel levels and open understory. • Forest stands had less dense with larger trees than current • Forest stands were diverse in age • Forests composed mainly of Douglas-fir/Ponderosa pine, but white fir/Western hemlock in high elevation upper Deer Creek drainage area. • In lower elevations white oak with shrubs and/or grasses are common
Present Condition	• Fire suppression has resulted in high fuel loads and • High plant densities commonly with low vigor (60% pole stands). • No Western hemlock after 1947 harvest. • Common forest mortality at lower and middle elevation due to drought. • In the summer of 2005, the Deer Creek Fire burned 1,548 acres north of Deer Creek between Davis and Crooks Creeks. Roughly 60% of the fire was at moderate (scorched foliage) to high (no foliage) Soil Burn Severity.
Instream Large Wood	
Historic Condition	• Adequate supply based on stands in Deer Creek, Draper Creek and other fish streams.
Present Condition	• Common lack of large wood due to past “stream cleaning”. • Stream road crossings disrupt dynamic transport of wood.
Roads	
Historic Condition	• Very few roads or stream crossings until mining and logging started.
Present Condition	• Roads occupy low to moderate levels of the Deer Creek Watershed with the higher levels in the middle Deer Creek subwatersheds; not enough to increase measurable peak flows over historic condition. • Roads located in riparian areas commonly with stream crossings. • OHV use is prevalent in the Draper Creek drainage area.
Flow Regime	
Historic Condition	• Stable channel morphology developed in response to climate with natural ranges of streamflows (winter peaks and summer lows).
Present Condition	• Winter peak flows may be increased slightly but not measurable. • Summer low flows reduced by water withdrawals.

Temperature Standard

The Oregon water quality temperature standard below applies to the Deer Creek Watershed and is found in OAR 340-041-0028 (4) (a-c) (ODEQ 2008).

> *(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);*

Element 1: Condition Assessment and Problem Description

The Oregon Department of Environmental Quality (ODEQ) gathers and assesses water quality data for streams in Oregon and maintains a list of streams (the 303(d) list) that do not meet water quality standards. These streams are considered water quality limited, meaning that beneficial uses of the stream are adversely affected by water quality conditions. The Deer Creek Watershed has four stream segments listed as water quality limited on DEQ's 2010 Integrated Report. Three of these segments are addressed in this WQRP and the fourth segment, McMullin Creek, was addressed in 2005 (USDI 2005). Table 1 displays the stream segments, miles and water quality parameter not meeting standards.

Table 1. Deer Creek Watershed[1] 2010 Water Quality Limited (WQL) Streams

Stream Segment	WQL Stream Miles	Miles on BLM	Pollutant	Season	Standard
Deer Creek	0 - 17	2.8	Temperature	October 15-May 15	7-day-average max. ≤ 13°C.
Deer Creek	0 - 17	2.8	Temperature	Year Around (Non-spawning)	7-day average max.≤ 18°C
Anderson Creek	0 - 3.2	0.1	Temperature	Year Around (Non-spawning)	7-day average max.≤ 18°C
Squaw Creek	0 - 3	0.6	Temperature	Year Around (Non-spawning)	7-day average max.≤ 18°C

1/ Deer Creek Watershed, excluding the McMullin Creek Subwatershed (USDI 2005).

In 2008 the DEQ issued the Rogue River Basin TMDL (ODEQ 2008). The following is taken from Chapter 2.

2.7.2 Effective Shade Targets

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^{o}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.

A reduction of both baseflow and riparian vegetation in the mid- and lower reaches of Deer, Anderson and Squaw creeks are primarily responsible for increased water temperatures. Reduced volumes of water are more susceptible to warming and reduced vegetative cover increases solar radiation input.

Current shade and site potential shade targets (percent-effective shade) were calculated for perennial streams on BLM-managed lands within the Deer Creek Watershed (Table 2). The data analysis method used for the shade assessment was the Shadow model (USDA 1993). The Shadow model determines the site 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 site potential tree height.

BLM-administered lands along the assessed reaches of Anderson Creek meet the target shade. BLM-administered lands along the assessed reaches of Crooks, Draper, Dry, North Fork Deer, and South Fork Deer creeks do not meet the target shade; however, they have existing shade that is greater than 80% and they are considered recovered. BLM-administered lands along assessed reaches of Deer and White creeks need 49 and 21 years, respectively, to reach the target shade. The shade assessment used 1996 aerial photos, thus 14 years of recovery have already occurred.

Table 2. Percent-Effective Shade Targets for BLM-Managed Lands in the Deer Creek Watershed (ODEQ 2002)

Streams	Tributary to	Stream Miles Assessed on BLM	Current Shade[1] (%)	Target Shade[1] (%)	Additional Shade Needed[2] (%)	Time to Recovery[3] (years)
Anderson Creek	Clear Creek	0.2	96	96	0	0
Crooks Creek	Deer Creek	7.2	85	90	5	0
Deer Creek	Illinois River	1.4	39	50	11	49
Draper Creek	Deer Creek	3.4	96	97	1	0
Dry Creek[4]	Deer Creek	1.4	83	94	11	0
North Fork Deer Creek	Deer Creek	6.1	89	95	6	0
South Fork Deer Creek	Deer Creek	12.0	82	94	12	0
White Creek	Deer Creek	4.3	71	94	23	21

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 weighted 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 and less than 80%, 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 $\geq$ 80 percent effective shade, a stream is considered recovered and the stream would not be a candidate for active restoration. Additional shade would come from passive management within the primary shade zone, and active silvicultural treatments that are designed to increase stand vigor and diversity within the secondary shade zone. Any increase over the target shade or 80% effective shade is considered a margin of safety. Years to recovery are a weighted average of recovery time for individual stream reaches.

4/ Dry Creek is considered part of Deer Creek for the 303(d) listing.

Element 2: Goals and Objectives

For BLM-administered lands within the Deer Creek Watershed, the primary goal within the riparian reserves is the maintenance and long-term restoration of riparian ecosystems as identified in the Northwest Forest Plan Aquatic Conservation Strategy (ACS) objectives (USDA, USDI. 1994). Specific project goals include:

1) Manage riparian areas within one to two tree-heights of all streams to benefit riparian health and aquatic habitat. Management includes preserving current conditions (protective) and silvicultural treatments to increase stand vigor and resiliency (proactive).
2) Manage BLM-administered riparian lands to reach their shade potential.
3) Maintain/improve riparian reserve health on BLM-managed lands to maximize large wood recruitment into the channel and riparian environments. The instream wood will benefit downstream channel stability and improve aquatic habitat conditions. Maintenance of late-seral conditions where they currently exist. In early, mid-seral, and mature stands that lack structural complexity, treatments would accelerate stand development into late-successional/mature structure (i.e. large trees, snags, down wood, species diversity and hardwood retention).
4) Return stand density and fuel loads to range of natural variability to reduce potential for stand replacement events.

To accomplish this, the Northwest Forest Plan (NWFP) (USDA, USDI 1994) and the Medford District Resource Management Plan (RMP) (USDI 1995) provide management guidance to maintain or improve riparian health. The most relevant direction in the NWFP is included in the Aquatic Conservation Strategy (ACS) objectives; the ACS was developed to restore and maintain the ecological health of watersheds and to protect salmon and steelhead habitat on lands within the range of Pacific Ocean anadromy. The ACS contains specific water quality objectives that protect the beneficial uses identified in the state's water quality standards. 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. In addition to the ACS, the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl,* (1994) describe land allocations and specific standards and guidelines (S&Gs) for managing these land allocations. These S&Gs effectively serve as Best Management Practices (BMPs) to prevent or reduce water pollution further contributing to goals of Clean Water Act compliance.

Element 3: Proposed Management Measures

Management and protection of riparian zones will occur at two levels—programmatic and project. The Medford RMP, as amended, contains updated BMPs that are

important for preventing and controlling to the "maximum extent practicable" non-point source pollution and achieving Oregon water quality standards.

Programmatic: The Northwest Forest Plan standards and guidelines will be used to meet the goals of Deer Creek Water Quality Restoration Plan including:

- Stream Temperature – Shade Component
  Aquatic Conservation Strategy: B9 – B11, C30
  Riparian Vegetation: B31
  Riparian Reserves: B12 to B17
  Watershed Restoration: B30
- Stream Temperature – Channel Form
  Aquatic Conservation Strategy: B9 – B11, C30
  Riparian Vegetation: B31
  Riparian Reserves: B12 to B17
  Watershed Restoration: B30
  Roads: B19, B31 to B33

The riparian reserve width for fish-bearing streams in the Deer Creek Watershed is equal to twice the site potential tree height (380 feet) on each side of the stream. For intermittent and non-fish bearing streams the riparian reserve width is equal to the site potential tree height (190 feet) on each side.

Project: The second level of management and protection occurs at the project planning level. The project planning area is usually at the fifth field watershed scale. A team of specialists including fish biologists, hydrologists, botanists and silviculturalists examine watershed analysis conclusions and conduct field surveys to determine the most appropriate actions necessary to improve and/or maintain riparian health and protection. These actions typically include developing silvicultural prescriptions to improve stand vigor, large woody debris placement, culvert replacements, decommissioning legacy operator spurs and non-system roads, planting, and designing site specific BMPs.

The *Northwest Forest Plan (NWFP) Temperature TMDL Implementation Strategies* (USDA Forest Service, USDI Bureau of Land Management 2005) provides specific guidance for silvicultural practices within riparian reserves. Shade curves were computed based on stream width, orientation, and topography factors and show the required minimum no-cut buffers necessary to maintain and restore site-potential riparian shade. The shade curves and field surveys will ensure maintenance of riparian stands providing primary shade (those stands which provide shade between the hours of 10am and 2pm).

Objectives that will guide proposed treatments include:

- Retain vegetation providing primary shade.
- Silvicultural treatments in the riparian reserve can be described as thinning from below treatments, with the intention of leaving the larger and healthier trees in the overstory. Retain vegetation responsible for providing shade to the active channel.

The stocking level would provide adequate future recruitment of Large Woody Debris (LWD) to exceed the desired ODFW (1997) habitat benchmarks.

Element 4: Timeline for Implementation

The major provisions of this plan have already been implemented. Protection of riparian areas along all streams on BLM-administered lands has been ongoing since the NWFP became effective in 1994. Inherent in the implementation is the passive restoration of riparian areas that ensued as a result of the riparian reserve land allocation. Implementation of active restoration activities beyond the inherent passive riparian restoration occurs with watershed analyses and site-specific projects.

Implementing specific activities designed to improve riparian conditions requires analysis under the National Environmental Policy Act (NEPA) and will occur following the landscape level planning.

Stream temperature 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. While the BLM will manage their lands to meet shade requirements, as per the TMDL and MOU, water temperature decreases will be dependent on non-BLM land management actions due to the mixed ownership in the Deer Creek Watershed.

Stream shade levels are increasing in the Deer Creek Watershed on BLM-administered lands. Streamside shade levels are expected to continue to increase with passive restoration (riparian reserves) leading to improvement of past riparian harvest units combined with active riparian management to improve health, resiliency, and growth rates.

Element 5: Identification of Responsible Participants

The BLM signed a Memoranda of Understanding (MOU) with ODEQ (USDI and ODEQ 2011) that provides a framework for effective cooperation on programs and projects to pursue the shared goal of attainment of state water quality standards. To that end, the MOU includes provisions for implementation that satisfy State and Federal point and non-point source pollution control requirements, develops a common understanding of water quality protection and restoration, and constitutes the basis for continuing formal designation of the BLM as a Designated Management Agency (DMA).

The BLM Grants Pass Field Manager is responsible for ensuring this WQRP is implemented, reviewed, and amended as needed. This official is 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

The Record of Decision (ROD) and associated Medford District Resource Management Plan (RMP) were approved by the Oregon/Washington State Director on April 14, 1995. The ROD approves the BLM's decisions for managing 870,000 acres in portions of Josephine, Jackson, Douglas, Curry, and Coos counties.

Implementation and monitoring of the ACS and use of the Temperature Implementation Strategy's logic and tools provide reasonable assurance that watersheds under the direction of the NWFP will move towards attainment of water quality standards and beneficial use support. Implementation and adoption of the MOU with DEQ also provide assurances that water quality protection and restoration on lands administered by the BLM will progress. Additionally, adherence to BMPs developed through the NEPA process and project design guidelines instituted for Threatened and Endangered (T&E) species protection, under the Endangered Species Act, further provides reasonable assurance of progress toward water quality improvement. However, BLM acknowledges that periodic review of the Temperature Implementation Strategy and TMDLs is necessary to provide the assurance that goals and objectives are being met.

Element 7: Monitoring and Evaluation

Monitoring will be used to ensure that decisions and priorities conveyed by BLM 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 effectiveness of management actions. If monitoring indicates that sufficient progress toward the goals contained in this plan are not being made, the goals and activities will be revisited and changes made as necessary to the action plan to assure attainment of water quality standards.

The primary objective of this WQRP is to increase stream shade, reduce bank erosion and sediment deposition that has led to changes in the width/depth ratio of the stream, and improve aquatic habitat. Due to the mixed ownership in the Deer Creek Watershed, attainment of the water temperature standard requires multi-ownership participation and commitment to improve riparian function.

Researchers at the Forest Service Pacific Northwest Experiment station are assessing the effectiveness of the management actions directed by the NWFP to improve water quality. This effort is monitoring the passive restoration measures implemented in this WQRP.

Grants Pass Resource Area (GPRA) will continue to periodically monitor water temperatures in Deer and Squaw creeks if funding is available.

Element 8: Public Involvement

Many of the elements contained in this WQRP derived from existing land use planning documents such as the Medford RMP and the NWFP. These documents received broad based public comment during scoping prior to development of alternatives and during public appeal of both documents. Both documents also received numerous responses to the Draft Environmental Impact Statement that were published for review, prior to development of the Final Environmental Impact Statements and Record of Decisions.

The Oregon Department of Environmental Quality has lead responsibility for creating TMDLs and WQMPs to address water quality impaired streams in Oregon. This Water Quality Restoration Plan will be provided to DEQ for incorporation into the Rogue River Basin WQMP. The *Rogue River Basin TMDL* was completed in December 2008.

Additionally, the NEPA process requires public involvement prior to land management actions, providing another opportunity for public involvement. During this process, 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.

Element 9: Maintenance of Effort over Time

The conditions leading to water quality limitations and 303(d) listing have accumulated over many decades. Management measures to address these factors will be carried out over an extended period of time. Furthermore, once restorative actions and protection practices achieve desired results, continued vigilance will be required to maintain water quality standards.

Northwest Forest Plan and Federal Land Management Plans

The NWFP and the Medford Resource Management Plan are ongoing federal land management plans. The NWFP became effective in 1994. The RMP was implemented in 1995 and covers a period of approximately 10 years or until the next RMP revision. Federal law requires RMP and Forest Plan implementation.

Water Quality Restoration Plan

The Medford District BLM, working in partnership with the DEQ, is responsible for ensuring the WQRP is implemented, reviewed, and amended as needed. This includes the following:

1. Review of the responsible agency's land treatments, verifying consistency with plans.
2. Promotion of ongoing communication, financial support, and partnerships for implementing priority projects.
3. Continue efforts to explore revised or additional management measures based on results of monitoring activities and other sources of information.
4. As additional information becomes available and techniques are improved, continue to improve and revise cost/benefit estimates.

Element 10. Costs and Funding

Active restoration can be quite costly, depending on the level of restoration. The following are estimated average costs of typical restoration activities (implementation only, does not include planning costs):

Riparian thinning	$2,000 per acre
Instream LWD Placement	$10,000 -$20,000 per mile
Culvert Replacement	$50,000 - $80,000 per structure

There are several sources of funding for restoration activities. This includes congressionally appropriated budget line items for restoration and grants.

Federal and state programs such as the Oregon DEQ 319 Non Point Source (NPS) Water Quality program and the Oregon Watershed Enhancement Board (OWEB) provide funds for watershed restoration activities. The BLM will be working with the local Illinois Valley River Watershed Council to forge partnerships to complete restoration projects on a cooperative basis.

Every attempt will be made to secure funding for restoration activities but it must be recognized that federal agencies have political and economic realities. Federal activities are subject to public and legal review prior to implementation; legal clearance is necessary prior to implementation. Historically, budget line items for restoration are a fraction of the total requirement. Grants may prove to be an increasingly important mechanism for funding restoration but funds are subject to availability, eligibility and approval of external parties.

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