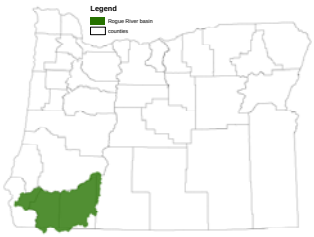
Rogue River Basin TMDL



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Oregon Department of Environmental Quality

State of Oregon
Department of Environmental Quality

Rogue River Basin
Total Maximum Daily Load (TMDL)

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"My great-grandfather said that he spent 'one of the briefest and happiest days I have ever had' on the Rogue near Winkle Bar, despite the fact he never got a single bite fishing. He was in love with the wilderness, and the pristine Rogue was a remnant of what America had been."
~Zane Grey

EXECUTIVE SUMMARY

The Oregon Department of Environmental Quality (DEQ) is proposing pollution limits to protect human health and salmon and trout in the Rogue River Basin. This document contains the required components for a Total Maximum Daily Load (TMDL) as described by the U.S. Environmental Protection Agency (EPA) for compliance with the Federal Clean Water Act. The document and its appendices provide a thorough analysis of pollutant sources and accumulation processes in the Rogue River Basin. TMDLs are limits on pollution which are intended to bring rivers and streams into compliance with water quality standards. DEQ is the agency authorized by federal and state law and regulation to develop these pollution limits in Oregon.

The Rogue River Basin TMDL applies to all perennial and intermittent streams, rivers, and lakes within the Rogue River Basin in Oregon with the exception of those areas where TMDLs have been previously developed: Bear Creek Watershed, Applegate Subbasin, Lobster Creek Watershed, and Sucker Creek Watershed. The 5,156 square mile Rogue River Basin is located within Jackson, Josephine, Curry, Douglas, and Klamath Counties in Oregon and Siskiyou and Del Norte Counties in California.

Under Section 303(d) of the Clean Water Act, EPA or its state delegates are required to develop a list of the surface waters in each state that do not meet water quality criteria. These criteria are developed by each of the states to protect "beneficial uses" and must be approved by EPA. The resulting "303(d) list" of impaired waterbodies is based on the best available data and, in most cases, must be revised every two years. An impaired waterbody must have a TMDL developed for each applicable pollutant. A TMDL includes a geographic description, identification of pollutants, applicable standards, source assessment, description of data collected, loading capacity, allocation of loads, and margin of safety. In this document, DEQ sets pollution limits that address temperature and bacteria impairments. Also included in this document is a Water Quality Management Plan which designates management agencies that are responsible for implementing pollution limits.

Temperature TMDL

The temperature standard protects salmon and trout throughout their life histories: spawning, rearing and migration. All of the streams in the Rogue River Basin are designated as either core cold-water habitat or salmon and trout rearing and migration habitat. Spawning areas and times have been determined for streams in the basin. The water quality temperature standard allows for a determination of natural stream temperatures which may supersede a numeric criterion. The TMDL addresses 100 temperature impairments on the 2004-06 list of impaired waterbodies and sets basin-wide limits on pollution.

In most streams, a major source of temperature impairment is the removal of near stream vegetation leading to increased solar radiation reaching the water. Removal of near stream vegetation has resulted from various agricultural practices, logging, and urban/rural development. Other sources of impairment include facilities that release heated waste water, channel modification, reservoirs, removal of water, and return of irrigation water. Operations of Lost Creek Reservoir, a major reservoir on the Rogue River, generally lead to cooler temperatures on the Rogue River during the summer, at times offsetting the impact of other sources. However, there is concern about the reservoir's impact during other periods of the year.

The natural temperature profile for some of the major rivers and streams in the Rogue River Basin was developed through analyzing extensive amounts of local data and the development of mathematical water quality models. The natural conditions temperatures were used to develop pollution limits for some sources, such as waste water treatment plants and reservoirs. Shade targets were also developed for streamside areas throughout the basin.

Dramatic improvements in stream temperatures are expected when the thermal pollution limits are implemented. DEQ predicts an average 7 °C temperature decrease to peak summer temperatures on the

smaller streams analyzed (excluding the Rogue River). Currently, operations of Lost Creek Reservoir lead to lower summer peak temperature in the Rogue River than DEQ's prediction of natural summer peaks. However, during the early fall, up to a 2 °C improvement is expected in the Rogue River. Cooler stream temperatures will protect salmon and trout throughout the Rogue River Basin.

Bacteria TMDL

The bacteria standard protects human health during recreation in streams, rivers, and lakes by setting safe levels for bacteria. In Oregon, *E. coli* bacteria are used as an indicator of fecal contamination. The TMDL addresses the twenty-five reaches on the 2004/2006 list of impaired waterbodies and sets pollution limits for these.

Major sources of fecal contamination are associated with agricultural practices, including confined animal feeding operations, livestock grazing, irrigation runoff and stormwater runoff. Other sources include runoff from urban and rural-residential lands and failing septic systems. Point source facilities which discharge waste water were determined to not contribute to bacteria impairments.

DEQ is requiring 5% to 97% reductions in fecal pollution in order to meet water quality standards. Pollution limits apply basin-wide and will insure streams, rivers, and lakes are safe for water contact recreation.

Water Quality Management Plan

DEQ identifies local, state, and federal government agencies with responsibility for implementing pollution limits as Designated Management Agency (DMAs). Each DMA has 18 months from the time this TMDL becomes an executive order to develop and submit to DEQ an implementation plan.

The Rogue River Basin DMAs include:

- Urban DMAs: Curry, Jackson, and Josephine Counties; the Cities of Butte Falls, Cave Junction, Eagle Point, Gold Beach, Gold Hill, Grants Pass, Rogue River, and Shady Cove.
- Irrigation Districts: Eagle Point, Rogue River Valley, Medford, Gold Hill, Grants Pass, other irrigation districts and ditch associations where appropriate in the Rogue River Basin.
- Oregon Department of Agriculture (responsible for agriculture on private lands).
- Oregon DEQ (responsible for sources regulated under the National Pollution Discharge Elimination System permit program).
- Oregon Department of Forestry (responsible for forestry on private lands).
- Oregon Department of Geology and Mineral Industries.
- Oregon Department of State Lands.
- Oregon Department of Transportation.
- Oregon Parks and Recreation Department.
- U.S. Army Corps of Engineers.
- U.S. Forest Service.
- U.S. Bureau of Land Management.

ROGUE RIVER BASIN TMDL
CHAPTER 1: INTRODUCTION

Prepared by
Oregon Department of Environmental Quality

State of Oregon
Department of Environmental Quality

Statement of Purpose

This Total Daily Maximum Load (TMDL) document has been prepared to meet the requirements of Section 303(d) of the 1972 Federal Clean Water Act.

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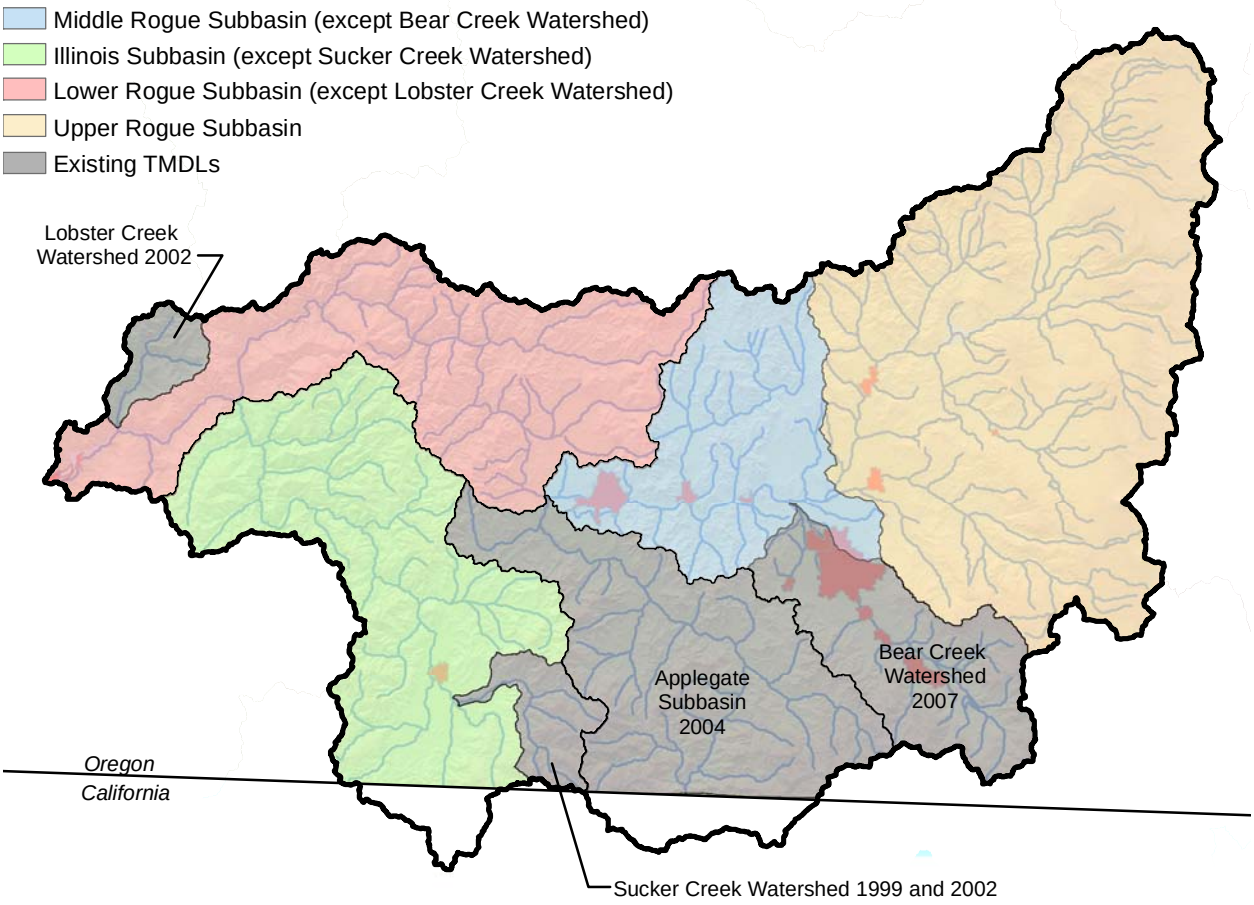
1.1 Purpose

Oregon Department of Environmental Quality (DEQ) is proposing pollution limits to protect human health and salmon and trout in the Rogue River Basin. Human health is at risk due to fecal contamination on a portion of the streams. Elevated stream temperatures are a risk to salmon and trout. This document seeks to clearly address the elements required by United State Environmental Protection Agency (EPA) and State of Oregon Administrative Rules for Total Maximum Daily Load (TMDL) development. These elements are addressed in this TMDL with references to the accompanying Water Quality Management Plan (WQMP). The TMDL and its associated WQMP were prepared by the DEQ with assistance from state, federal, and local partners.

1.2 Geographic Scope

The Rogue River Basin TMDL applies to all perennial and intermittent streams, rivers, and lakes within the Rogue River Basin in Oregon with the exception of those areas where TMDLs have been previously developed: Bear Creek Watershed (TMDL approved 2007), Applegate Subbasin (TMDL approved 2003), the Lobster Creek Watershed (TMDL approved 2002) and Upper and Lower Sucker Creek (TMDLs approved 1999 and 2002, respectively) (**Figure 1.1**). The TMDL process provides an analysis for all lands within the basin; however Oregon Administrative Rules (OARs) that set water quality standards apply only to those lands within the State of Oregon. There are currently no streams in the California section of the upper Illinois Subbasin listed as impaired on the California 303(d) list (North Coast Regional Water Quality Control Board 2008).

Figure 1.1. The geographic scope of this TMDL and previously completed TMDLs



1.3 Oregon's TMDL Program

The quality of Oregon's streams, lakes, estuaries, and groundwater is monitored by DEQ and a variety of partners. This information is used to determine whether water quality criteria are being violated and whether the beneficial uses of the waters are being threatened. Specific State and Federal plans and regulations are used to determine if violations have occurred: these regulations include the Federal Clean Water Act of 1972 and its amendments (40 Codified Federal Regulations 131), Oregon's Administrative Rules (OAR Chapter 340) and Oregon's Revised Statutes (ORS Chapter 468).

The term *water quality limited* is applied to streams and lakes where required treatment processes are used, but violations of state water quality criteria still occur. With a few exceptions, such as in cases where violations are due to natural causes, the State must establish a TMDL for any waterbody designated as water quality limited.

Loading capacity is the greatest amount of pollutant load that a waterbody can receive without violating water quality standards and is equal to the literal definition of a TMDL. The TMDL is the sum of the allowable load from current sources, load set aside for future sources and load set aside to account for uncertainty. Allowable loading from point sources is termed Waste Load Allocations and allowable loading from nonpoint sources is termed Load Allocations. Point and nonpoint sources are discussed later in this chapter. Allowable loading set aside for future sources is termed Reserve Capacity and allowable loading set aside to account for uncertainty is termed Margin of Safety. The margin of safety may be implicit, as in conservative assumptions used in calculating the loading capacity, wasteload allocations, and loading allocations. The margin of safety may also be explicitly stated as an added separate allocation in the TMDL calculation. This general TMDL concept is represented by the following equation:

TMDL = Waste Load Allocation + Load Allocation + Reserve Capacity + Margin of Safety

As defined in OAR 340-042-0040 a Total Maximum Daily Load will contain the following elements:

- Name and Location
- Pollutant Identification
- Water Quality Standards and Beneficial Uses
- Loading Capacity
- Excess Load
- Sources and Source Catagories
- Wasteload Allocations
- Load Allocations
- Margin of Safety
- Seasonal Variation
- Reserve Capacity
- Water Quality Management Plan

1.4 Watershed Characterization

Geographic Setting

The Rogue River Basin (within Southern Oregon Coastal Basin, Hydrologic Unit Code [HUC] 171003) contains 3,300,000 acre (5,156 square miles) in southwestern Oregon and northern California (**Figure 1.2**). This TMDL applies to all land uses including lands managed by the State of Oregon, the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), irrigation districts, private forestlands, agricultural lands, rural residences, urban areas and others. For the purposes of this TMDL, the Rogue River Basin refers to five 4th field hydrologic unit subbasins: the Lower Rogue River Subbasin (HUC 17100310), Middle Rogue River Subbasion (HUC 17100308), Upper Rogue River Subbasin (HUC 17100307), Illinois Subbasin (HUC 17100311) and Applegate Subbasin (HUC 17100309). The subbasins are located on the northeastern flank of the Siskiyou Mountains and the western flanks of the Cascade Mountains in southwestern Oregon. This is one of the most biologically,

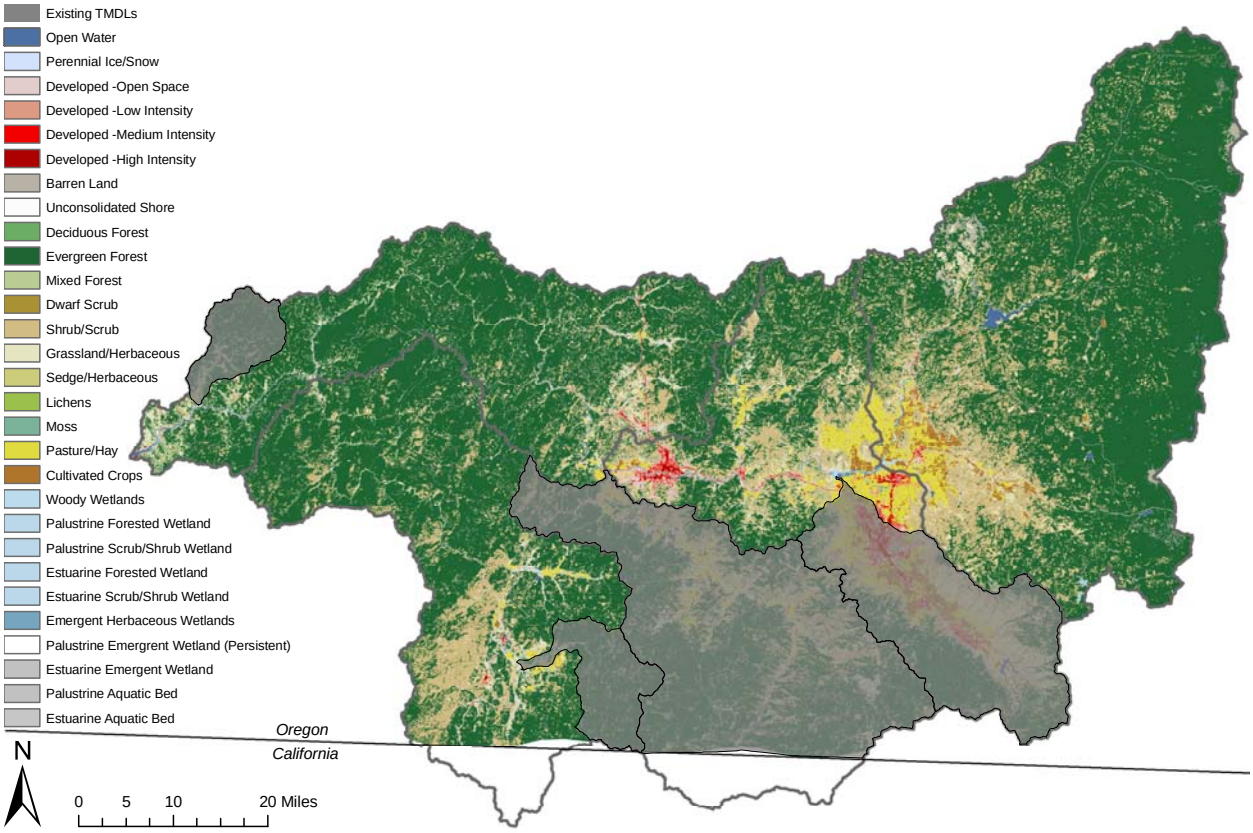
botanically, and geologically diverse areas in the country. It is steep and rugged, ranging in elevation from 0 feet to 9,485 feet at the summit of Mount McLoughlin.

Ownership

The Rogue River Basin is located within Jackson, Josephine, Curry, Klamath and Douglas Counties in Oregon with portions located in Siskiyou and Del Norte County California. Jackson County has a population of 181,269 most of whom reside within the Bear Creek valley in the population centers of Ashland (19,522), Talent (5,589), Phoenix (4,060), Medford (63,154), Central Point (12,493), and Jacksonville (2235). Outside of the Bear Creek Valley are the Jackson County cities of Shady Cove (2,307), Eagle Point (4,792), Butte Falls (439) and Rogue River (1,847). Josephine County has a population of 75,726 and contains the cities of Grants Pass (23,003) and Cave Junction (1,363). Gold Beach (1,897) is the only city in Curry County (21,137) within the Rogue River Basin (US Census Bureau 2000). Only small, relatively uninhabited, portions of the basin are within Klamath and Douglas Counties.

Approximately 60 percent (1,980,000 acres) of the Rogue River Basin is publicly owned and managed by the US Forest Service, Bureau of Land Management, and US Bureau of Reclamation (Rogue Basin Coordinating Council 2006). These lands are managed for multiple use including water quality, timber production, livestock management, wildlife and recreation.

Figure 1.2. Land use in the Rogue River Basin.

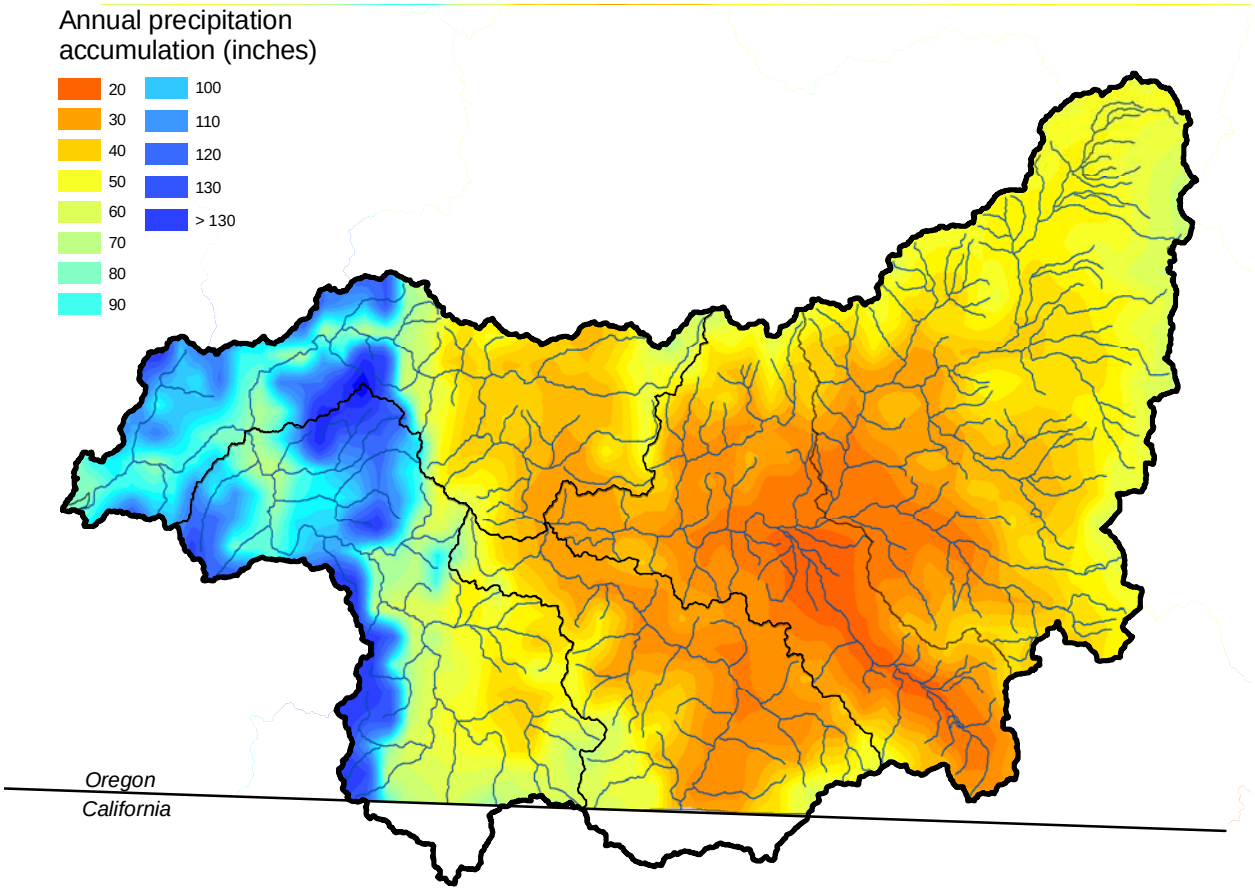


Climate and Hydrology

The Rogue River Basin lies on the Pacific Northwest coast of the North American continent located in a transitional area between four very different climate zones: Pacific Maritime on the Coast, Oregon High Desert to the east, California Mediterranean to the south, and Northern Temperate to the north. The fluctuating boundary between these four zones results in highly unpredictable weather and large annual fluctuations in precipitation

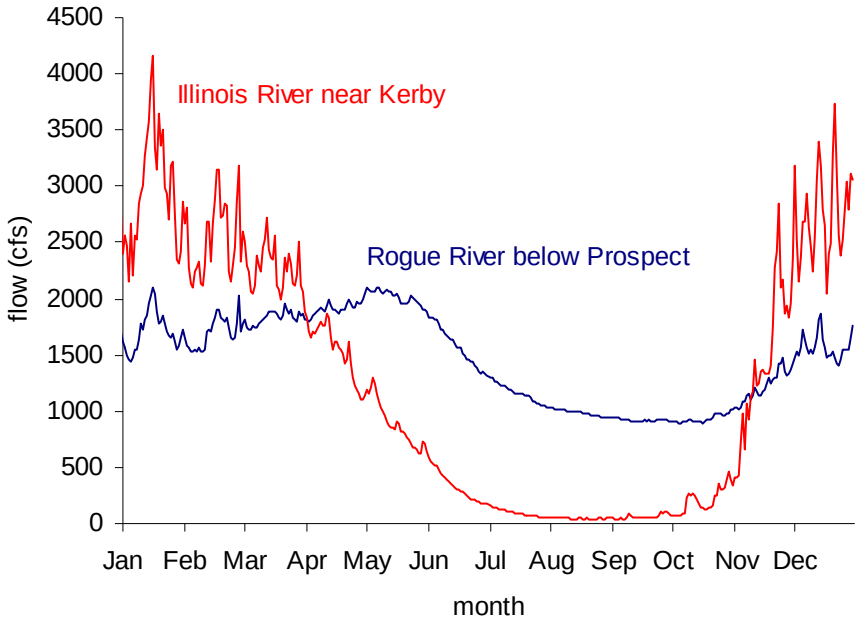
and temperature within longer climatic cycles. Rainfall ranges from 20 inches in the interior valleys to over 120 inches on the coast (**Figure 1.3**). Significant snowfall occurs at higher elevations in the interior.

Figure 1.3. Annual precipitation accumulation in the Rogue River Basin.



The hydrology of the basin is strongly influenced by the climate and the soils. At higher elevations, on the slopes of the cascades, much of the precipitation falls as snowfall and a significant portion infiltrates into the highly permeable volcanic soil and rock. This leads to higher flows in May due to snow melt and summer flows supported by significant spring flow, as seen in the upper portions of the Rogue River (**Figure 1.4**). In contrast, the flow of the Illinois River is more typical of the coast range where most of the precipitation falls as rainfall and there are shallow soils, leading to rapid runoff and high flows during the winter storms and low flows during the summer dry period (**Figure 1.4**).

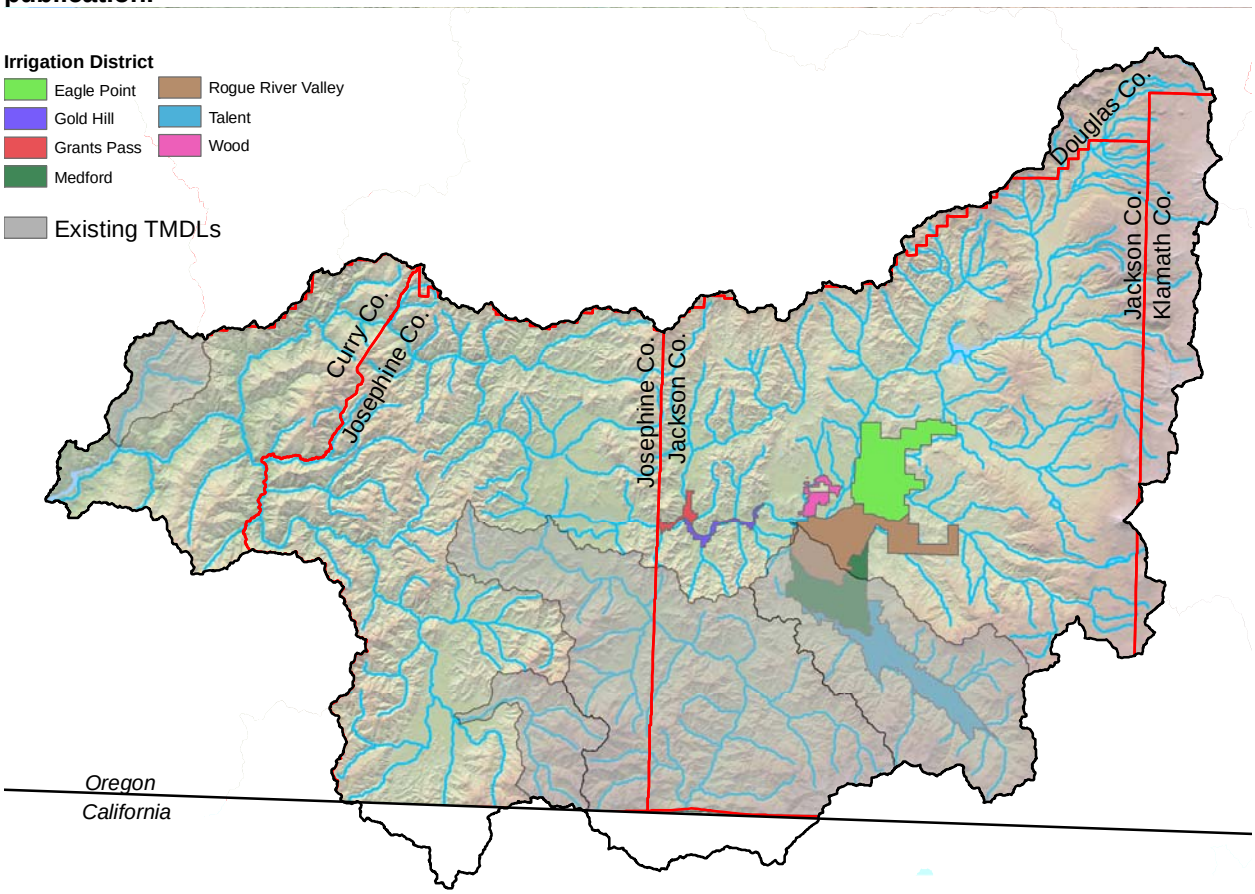
Figure 1.4. Daily average flows for the gages on the Illinois River, 1962 – 2007, drainage area 380 mi^2 and Rogue River, 1969 – 2007, drainage area 379 mi^2. Neither site is located downstream of a major storage reservoir.



Irrigation Districts

Irrigated agriculture began in the Rogue River Basin over 150 years ago, with the first water right in the state of Oregon being granted to Joseph Wagner in 1851 in the Bear Creek valley. The development of irrigation delivery and storage systems in the Rogue River Basin has significantly altered the landscape and hydrology in large areas of the basin (**Figure 1.5**).

Figure 1.5. Map of irrigation districts in Jackson County (Jackson County 1999**). There are additional irrigation districts in Josephine County, however boundary maps were not available at the time of publication.**



Rogue River Basin Fisheries

Salmonid species and races commonly found in the mainstem of the Rogue River, in areas downstream of Lost Creek Dam, include: coho salmon, spring chinook salmon, fall chinook salmon, summer steelhead, and winter steelhead (Oregon Department of Fish and Wildlife [ODFW] 2000). Rogue River Basin tributaries produce coho salmon, spring chinook salmon (Big Butte Creek only), fall chinook salmon, winter and summer steelhead, and multiple species of resident trout (**Table 1.1**). Other native species of freshwater fish found in the Rogue River Basin include Cutthroat trout, Pacific lamprey, green sturgeon, white sturgeon, Klamath smallscale sucker, speckled dace, prickly sculpin, and riffle sculpin (ODFW 2000). Nonnative species found in the basin include redside shiner, largemouth bass, smallmouth bass, black crappie, bluegill, catfish, brown bullhead, yellow perch, carp, goldfish, American shad, Umpqua pikeminnow, and varied species of trout (USFS 1995, ODFW 2000).

Coho salmon in the Rogue River Basin belong to the Southern Oregon-Northern California Coast Evolutionarily Significant Unit (ESU) which occurs between Cape Blanco, Oregon and Punta Gorda, California. This ESU was listed under the Federal Register by NOAA's National Marine Fisheries Service as threatened in 1997 and reaffirmed as threatened in 2005 (Federal Register 1997 & 2005). Steelhead in the Rogue River and tributaries belong to the Klamath Mountain Province ESU, which is inclusive of the Klamath River in California north to the Elk River in Oregon. A status review concluded that the listing of Steelhead in this ESU was not warranted (Federal Register 2001). Chinook salmon in the Rogue River and tributaries belong to the Southern Oregon and Northern California Coastal ESU, which is inclusive of the lower portion of the Klamath River Basin in California north to Euchre Creek in Oregon. In 1999, NOAA Fisheries concluded that the listing of chinook salmon in this ESU was not warranted (Federal Register 1999).

In 2005, the state of Oregon completed status assessments for major population groups of native fish in Oregon (ODFW 2005). These assessments differed somewhat from those of NOAA Fisheries in relation to population groupings and identification of the racial characteristics of the fish. The term Species Management Unit (SMU) was used in relation to the population groupings. Interim assessments were made for each population group in southwest Oregon and the report concluded that the following SMUs were not at risk: Rogue winter steelhead, Rogue summer steelhead, Rogue fall chinook salmon, and southern Oregon coastal cutthroat (ODFW 2005). In contrast, the report concluded that the Rogue spring chinook salmon SMU was potentially at risk.

All salmonids require a cold freshwater environment for spawning and cool water for rearing as juveniles. Each species, however, differs in the extent to which they rear in freshwater. All salmonid species dig a nest (redd) in the gravel bottom of streams where the eggs are deposited by the female and fertilized by the male. Incubation of the egg depends upon the species and is water temperature dependent. After incubation, an alevin (a small fry with an attached egg yolk sac) emerges from the egg into the gravel. Once the egg sac has been completely absorbed, the alevin emerges from the gravel as a fully developed fry.

The salmonid life cycle involves a complex web of instream habitats, ocean conditions and harvest pressures that all combine to impact salmonid populations. Listed below is a brief description of specific habitat needs for the most abundant species of anadromous salmonids in the Rogue River Basin.

Chinook Salmon (Oncorhynchus tshawytscha)

Two distinct runs of chinook salmon are produced in the Rogue River Basin: spring chinook salmon and fall chinook salmon. Spring chinook salmon spawn only in a very small portion of the Rogue River Basin as compared to fall chinook salmon. Most spawning and rearing occurs in the mainstem of the Rogue, Applegate, and Illinois Rivers, but some spawning also occurs in the lower segments of larger tributary streams (ODFW 1992, ODFW 2000). Juvenile chinook salmon primarily rear in riverine pools and most migrate to the ocean during their first year of life. While freshwater returns of adult chinook salmon vary widely among years, fall chinook salmon are very abundant and have increased because of the operation of Lost Creek and Applegate Dams (ODFW 1990).

In contrast to fall chinook salmon, the abundance of spring chinook salmon have decreased significantly since the construction and operation of Lost Creek Dam. This decrease in abundance, and a concomitant change in life history, is associated with an increase of water temperature in the Rogue River in autumn and winter when eggs and alevins incubate in the gravel (ODFW 2000). Local and regional concern about the depressed status of spring chinook salmon led to the development of a State of Oregon conservation plan for this particular fish (ODFW 2007). The conservation plan describes the desired status of spring chinook salmon and the strategies and actions that will be taken to move the population towards desired status. Some of these actions are specifically directed towards minimizing the warming of water temperatures during the critical autumn and winter period when eggs and alevins incubate in the gravel.

Steelhead (Oncorhynchus mykiss)

Steelhead are rainbow trout which migrate to the ocean. Of the three anadromous fish species always present in the Rogue River Basin, steelhead are the most adaptive. Two distinct runs of steelhead are produced in the Rogue River Basin: summer run and winter run. Adult summer steelhead spawn primarily in small tributary streams (Everest 1973), while adult winter steelhead primarily spawn in larger tributary streams. Proportionally few adult steelhead spawn in the mainstem of the Rogue River (ODFW 1990, ODFW 1994). Juvenile steelhead reside in small and large tributary streams, as well as in the mainstem of the Rogue River. Unlike the salmon which prefer pools and glides, juvenile steelhead are able to rear in fast-moving water. This trait and their variable stay in fresh water from one to four years make them very adaptive to changing habitat conditions. They can compensate somewhat for elevated stream temperatures by seeking turbulent water with more oxygen. Many of the small streams preferred by steelhead for spawning dry up in the summer, and steelhead fry produced in these ephemeral streams migrate downstream into larger streams as flows decrease (Everest 1973). In addition to high water temperatures, numerous other factors limit steelhead production in the Rogue River Basin (ODFW 1992, ODFW 1994).

Coho Salmon (Oncorhynchus kisutch)

Coho salmon are most linked to the complex riverine habitats that were once prevalent in Rogue River tributaries. In the Rogue River Basin, adult coho salmon spawn primarily in small tributary streams. Spawning in the mainstem of the Rogue River is mostly limited to the area immediately downstream of Lost Creek Dam (ODFW 1991). Juveniles rear primarily in small streams during the summer months within pools, glides, and other slow velocity areas with overhead cover. They spend the winter months in low gradient braided channel areas where side channels, sloughs, and beaver ponds are present, before migrating to the ocean. In general, they depend on smaller streams that have wide riparian areas with marshes and side channels and pools in off-channel areas, alcoves along the edges of streams and rivers and beaver dams for summer and winter freshwater habitat. These fish must remain in freshwater habitat, generally tributary streams, for one year before migrating downstream to the ocean. Urbanization, agriculture, water withdrawals, warm water temperatures, and loss of stream/floodplain connectivity in the greater Rogue River Basin inhibit the recovery of coho salmon (USFS 1995).

Resident Trout (Oncorhynchus species)

The resident rainbow trout population in the Rogue River Basin is somewhat unusual for a coastal basin. Resident cutthroat and rainbow trout populations are generally located in headwater streams. In the simplified aquatic and riparian habitat of lower elevation streams, cutthroat and rainbow trout are out-competed by juvenile steelhead and non-native fish (USFS 1995).

Table 1.1. Generalized Salmonid Use Patterns within Tributaries of the Rogue River.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult Migration/Holding												
Coho	Usage											Peak Use
Spring Chinook									Usage	Peak Use	Usage	
Fall Chinook	Usage								Usage	Peak Use	Peak Use	Usage
Winter Steelhead	Usage	Peak Use	Peak Use	Peak Use	Usage						Usage	Usage
Summer Steelhead	Peak Use	Peak Use	Usage	Usage						Usage	Usage	Peak Use
Resident Rainbow/cutthroat	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage
Spawning												
Coho	Usage										Usage	Peak Use
Spring Chinook									Usage	Peak Use	Usage	
Fall Chinook	Usage								Usage	Peak Use	Peak Use	Usage
Winter Steelhead		Usage	Peak Use	Peak Use	Usage							
Summer Steelhead	Peak Use	Peak Use	Usage									Usage
Resident Rainbow/ cutthroat	Usage	Usage	Peak Use	Peak Use	Usage							
Incubation												
Coho	Usage	Usage	Usage	Usage	Usage						Usage	Usage
Spring Chinook	Usage	Usage	Usage	Usage					Usage	Usage	Usage	Usage
Fall Chinook	Usage	Usage	Usage	Usage						Usage	Usage	Usage
Winter Steelhead	Usage	Usage	Usage	Usage	Usage	Usage						
Summer Steelhead	Usage	Usage	Usage	Usage	Usage							Usage
Resident Rainbow/cutthroat	Usage	Usage	Usage	Usage	Usage	Usage						Usage
Rearing												
Coho	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage
Spring Chinook	Usage	Usage	Usage	Usage	Usage	Usage	Usage					
Fall Chinook	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage				
Winter Steelhead	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage
Summer Steelhead	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage
Resident Rainbow/cutthroat	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage	Usage

Peak Use
Usage

Source: Tom Satterthwaite, ODFW, personal communication 2008

Water Quality Impairments

The 2004/2006 303(d) list indicates that surface waters in the Rogue River Basin do not meet water quality standards for temperature, bacteria, dissolved oxygen, sedimentation, pH and nuisance weeds and algae. This document sets TMDLs to address temperature and bacteria impairments (**Table 1.2**). DEQ tracks completed TMDLs for reporting measures and the Rogue River Basin TMDL represents the completion of 125 TMDLs (**Table 1.2**). The Consent Decree between the US EPA and Northwest Environmental Defense Center, John R. Churchill, and Northwest Environmental Advocates (October 17, 2000) lists the cumulative number of TMDLs to be established through 2010. EPA reports the number of TMDLs completed to the plaintiff using a different counting method than DEQ. According to current EPA policy on counting TMDLs, the Rogue River Basin TMDL addresses 109 TMDLs (**Table 1.3**).

Table 1.2. Rogue River Basin TMDL Listings: DEQ Method

Parameter	Count	Total
Temperature: rearing and migration	90	
Temperature: spawning	10	
Temperature subtotal		100
Bacteria: Fecal Coliform	6	
Bacteria: *E. coli*	19	
Bacteria subtotal		25
Total		125

Table 1.3. Rogue River Basin TMDL Listings Addressed: EPA Method

Parameter	Count
Temperature	91
Bacteria	18
Total	109

This TMDL does not address water quality impairments where TMDLs have been developed previously (**Table 1.4 and Figure 1.1**) (DEQ 1999, 2002a, 2002b, 2003, 2007). These TMDLs are currently being implemented and are considered adequate at this time.

Table 1.4. Rogue River Basin Previously Approved TMDLs

TMDL (Year Issued)	Parameters Covered
Upper Sucker Creek (1999)	Temperature
Lower Sucker Creek (2002)	Temperature
Lobster Creek (2002)	Temperature
Applegate Subbasin (2004)	Temperature, Sedimentation, Biological Criteria
Bear Creek Watershed (2007)	Temperature, Sedimentation, Fecal Coliform, *E. coli*
Bear Creek Watershed (1992)	pH, Aquatic Weeds and Algae, Dissolved Oxygen

Due to limited resources and data, the following parameters will not be addressed in this TMDL:

- Estuarine bacteria: 1 year-round listing
- Sedimentation: 6 listings
- Dissolved Oxygen: 10 seasonal listings
- pH: 3 seasonal listings

Oregon Water Quality Index (OWQI)

The DEQ has conducted water quality monitoring in the Rogue River Basin since the mid 1980s and has used this water quality data to calculate Oregon Water Quality Index (OWQI) scores. OWQI is a single number which expresses water quality by integrating measurements of eight carefully selected water quality parameters: temperature, dissolved oxygen, biochemical oxygen demand, pH, ammonia+nitrate nitrogen, total phosphates, total solids, and fecal coliform. The index was developed for the purpose of providing a simple and concise method for expressing the significance of regularly generated laboratory data, and was designed to aid in the assessment of water quality for general recreational uses.

DEQ submits the results of the OWQI on an annual basis. The reports address trends over the previous 10 years; for example the 2007 report addressed the water years 1997-2006 (**Table 1.5**). Of the 8 sites within the basin that were tested, five are ranked as “good”, one as “excellent”, two as “poor”. The Rogue River mainstem scores decrease from a high of 92 at river mile 138.4 to 85 at RM 117.2 and increase back to 97 at RM 11.0. The decreasing trend seen at RM 138.4 and RM 11.0 has been seen in the 2003 through 2005 OWQI reports. Bear Creek’s water quality is rated as “poor”, although in past years the Rogue River Basin’s most populous watershed was either the most or second most improved waterbody in the state (+16.7 to +7.5 OWQI units,@ 99% significance) (DEQ 2007). See the DEQ website at http://www.deq.state.or.us/lab/wqm/wqimain.htm for more information.

Table 1.5. Rogue River Basin Oregon Water Quality Index (OWQI) Scores 1997-2006

River	River Mile	Score	Category	Trend
Rogue River at Dodge Park	138.4	92	Excellent	Declining Quality
Little Butte Creek at Agate Road (White City)	1.4	72	Poor	None
Bear Creek at Kirtland Road	0.9	63	Poor	None
Rogue River at Rock Point Bridge (Gold Hill)	117.3	85	Good	None
Applegate River at HWY 199	2.6	86	Good	None
Rogue River at Robertson Bridge (Merlin)	86.6	85	Good	None
Illinois River downstream of Kerby	48.4	89	Good	None
Rogue River at Lobster Point Bridge	11.0	87	Good	Declining Quality

Beneficial Uses

OAR 340-041-0271

The Oregon Environmental Quality Commission (OEQC) has adopted numeric and narrative water quality standards to protect designated *beneficial use*s. In practice, water quality standards have been set at a level to protect the most sensitive beneficial uses and seasonal standards may be applied for uses that do not occur year-round. The specific beneficial uses for the Rogue River Basin are presented in **Table 1.6** (Oregon Administrative Rules OAR 340–041–0271, Table 271A, November 2003).

Table 1.6. Designated beneficial uses in the Rogue River Basin.

Beneficial Uses	Rogue River Estuary & Adjacent Marine Waters	Rogue River Main Stem from Estuary to Lost Creek Dam.	Rogue River Main Stem above Lost Dam & Tributaries	All Other Tributaries to Rogue River and Bear Creek.
Public Domestic Water Supply[1]		✓	✓	✓
Private Domestic Water Supply[1]		✓	✓	✓
Industrial Water Supply	✓	✓	✓	✓
Irrigation		✓	✓	✓
Livestock Watering		✓	✓	✓
Fish and Aquatic Life[2]	✓	✓	✓	✓
Wildlife and Hunting	✓	✓	✓	✓
Fishing	✓	✓	✓	✓
Boating	✓	✓	✓	✓
Water Contact Recreation	✓	✓	✓	✓
Aesthetic Quality	✓	✓	✓	✓
Hydro Power			✓	✓
Commercial Navigation & Transportation	✓	✓		

[1] *With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards*.
[2] *See Chapter 2 for fish use designations for this basin.*

Applicable Water Quality Standards

Temperature Standard: OAR 340-041-0028(1)-(13)
The standard that now applies to the Rogue River Basin was approved by EPA on March 2, 2004 and is found in OAR 340-041-0028 (4) (a-c). Excerpts of the standard read as follows:

> *(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:*
>
> *(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B[*], 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;*
>
> *(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to OAR 340-041-340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A[*], 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);*
>
> *(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to OAR 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);*
>
> *8) Natural Conditions Criteria. Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body.*
>
> *12(b) Human Use Allowance. Insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria as follows:*
>
> *(A) Prior to the completion of a temperature TMDL or other cumulative effects analysis, no single NPDES point source that discharges into a temperature water quality limited water may cause the temperature of the water body to increase more than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after mixing with either twenty five (25) percent of the stream flow, or the temperature mixing zone, whichever is more restrictive; or*
>
> *(B) Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.*

*See Chapter 2 for fish use maps 271A and 271B

Bacteria Standard: OAR 340-041-0009
The standard that now applies to the Rogue River Basin was approved by EPA in 1996. The current applicable standard and the previous standard are described in **Table 1.7**.

Table 1.7. Water Quality Standards for Bacteria in the Rogue River Basin

Beneficial Use	Standard and Description
Freshwaters and Estuarine Waters Other than Shellfish Growing Waters (Water Contact Recreation)	(A) A 30-day log mean of 126 *E. coli* organisms per 100 milliliters, based on a minimum of five samples; (B) No single sample may exceed 406 *E. coli* organisms per 100 milliliters.
Freshwaters and Estuarine Waters (Water Contact Recreation) prior to 1996	(A) A 30-day log mean of 200 fecal coliform organisms per 100 milliliters, based on a minimum of five samples; (B) No more than 10% of samples greater than 400 fecal coliform organisms per 100 milliliters.

Point Sources

A point source is a stationary location or fixed facility, such as an industry or municipality that discharges pollutants through a defined conveyance, such as pipes, ditches, lagoons or wells. DEQ administers two different types of wastewater permits to protect surface waters from point source discharges: National Pollutant Discharge Elimination System (NPDES) and Water Pollution Control Facilities (WPCF) permits (Oregon Revised Statute [ORS] 468B.050). The statute requires that no person shall discharge waste into waters of the state or operate a waste disposal system without obtaining a permit from DEQ. DEQ has been given authority from the EPA to issue NPDES permits. Waste discharge pertains to releasing waste to surface waters from any operation that has a water discharge including but not limited to wastewater, sewage, processing water, wash water, cooling water, etc. These discharges to surface water may occur directly through a pipe or ditch or indirectly through a storm sewer system. Certain industries and activities may also be required to obtain permits for storm water runoff from their properties. NPDES permits fall into two categories: individual and general. Disposal pertains to getting rid of the waste by means other than discharge, such as evaporation, seepage, or land application. Disposal activities require a WPCF permit issued by DEQ. WPCF permitted operations do not allow for any discharge to surface waters, therefore they are not addressed in this TMDL.

NPDES – General

A general NPDES permit is used to cover a category of similar discharges, rather than a specific site. DEQ may issue a general permit when there are several minor sources or activities involved in similar operations that may be adequately regulated with a standard set of conditions. A general permit expires within five years. DEQ currently utilizes 29 different types of general permits. As of September 2008, there are 216 general permitted facilities within the scope of this TMDL: Lower Rogue River Subbasin 18, Illinois River Subbasin 13, Middle Rogue River Subbasin 145, Upper Rogue River Subbasin 40 (**Table 1.8**).

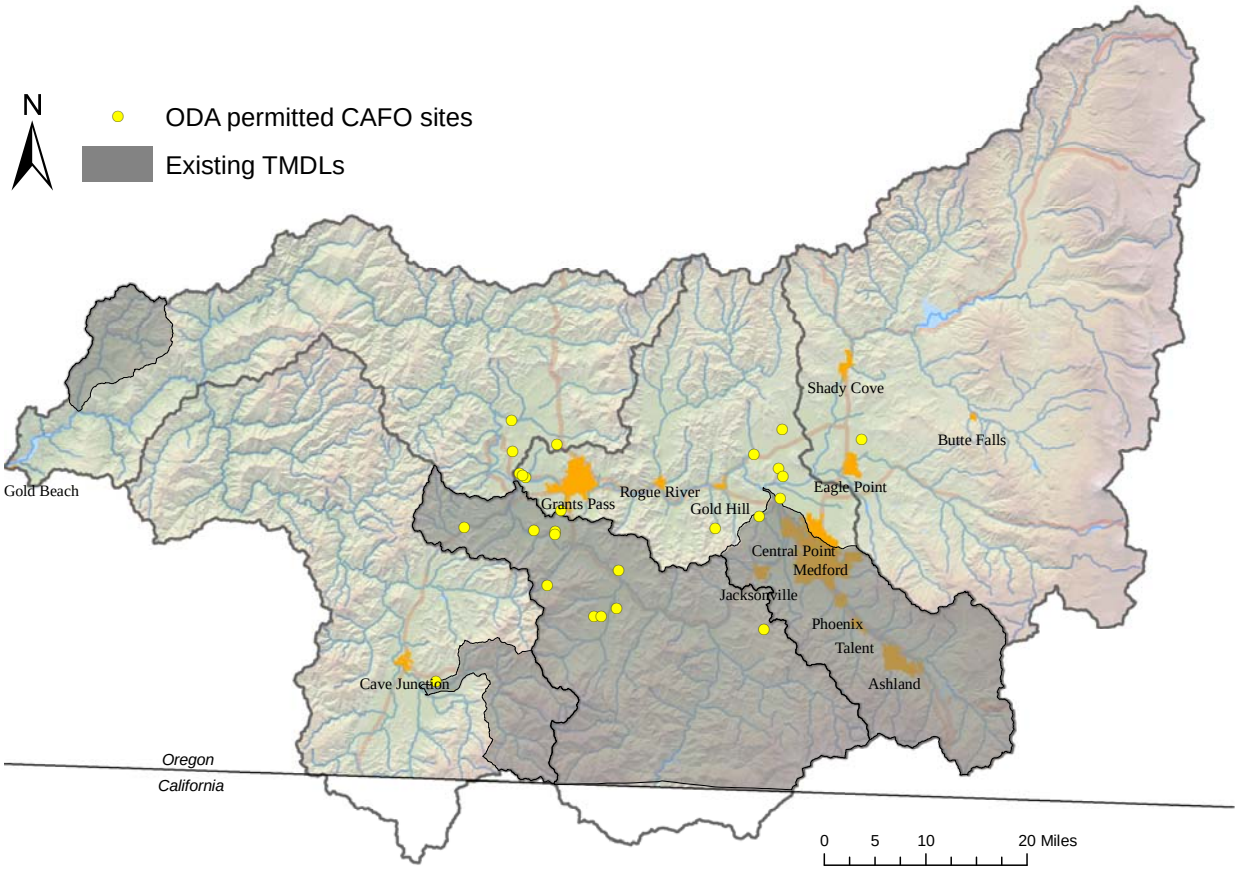
Table 1.8. Rogue River Basin – NPDES General Permits

Permit Type	Permit Description	Count
GEN01	Industrial Wastewater; NPDES cooling water	7
GEN02	Industrial Wastewater; NPDES filter backwash	4
GEN03	Industrial Wastewater; NPDES fish hatcheries	2
GEN04	Industrial Wastewater; NPDES log ponds	4
GEN12A	Stormwater; NPDES sand & gravel mining	10
GEN12C	Stormwater; NPDES construction more than 1 acre	146
GEN12CA	Stormwater; NPDES government agency construction, more than 1 acre	1
GEN12Z	Stormwater; NPDES specific SIC codes	33
GEN15A	Industrial Wastewater; NPDES petroleum hydrocarbon cleanup	2
GEN17A	Industrial Wastewater; NPDES wash water	7
	Total	216

Confined Animal Feeding Operations

There are currently 26 Confined Animal Feeding Operations (CAFO) in the Rogue River Basin (**Figure 1.6**). CAFOs are generally defined as the concentrated confined feeding or holding of animals in buildings, pens or lots where the surface is prepared to support animals in wet weather or where there are wastewater treatment facilities for livestock (e.g., manure lagoons). CAFO wastes include but are not limited to manure, silage pit drainage, wash down waters, contaminated runoff, milk wastewater, and bulk tank wastewater. The CAFO permit program began in the early 1980s to prevent CAFO wastes from contaminating groundwater and surface water. All CAFOs operate under a general NPDES permit issued and managed by the Oregon Department of Agriculture.

Figure 1.6. Rogue River Basin- Confined Animal Feeding Operations



NPDES - Individual

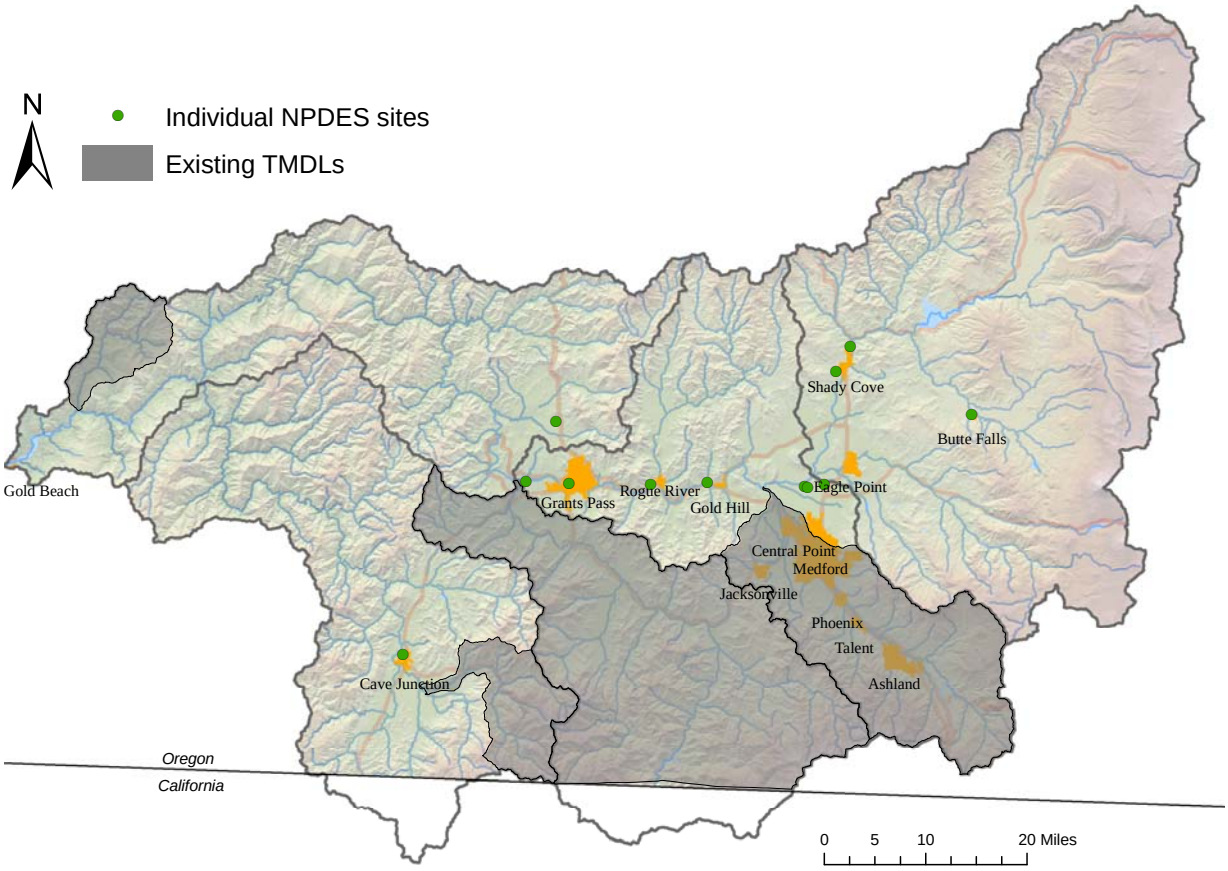
An individual NPDES permit is site-specific; it is developed to address discharges from a specific sewage or industrial wastewater treatment facility. Individual permits are usually issued for a period of five years. Individual permits require frequent monitoring by the permittee to assure that permit limitations are being met. At the time of this writing there are 12 individual NPDES permits within the Rogue River Basin TMDL area: Illinois 1, Lower Rogue 1, Middle Rogue 7, Upper Rogue 3 (**Table 1.9 and Figure 1.7**). Individual permitted sources have the potential to impact surface waters and are examined in more detail within this TMDL. NPDES permits may be revised when renewed, to insure that all permittees are operating in accordance with this TMDL.

Table 1.9. Individually permitted sites in the Rogue River Basin

Type of Permit	Permit ID	Point Source name	Receiving Stream	River Mile	Maximum Permitted Flow (MGD)	Fall-Winter-Spring Discharge only
NPDES-DOM-Da	101552	Town of Butte Falls	South Fork Big Butte Creek	RR 155.5	0.07	Yes
NPDES-DOM-Db	3427	Country View Mobile Home Estates	Rogue River	148.2	0.01	Yes
NPDES-DOM-Da	100998	City of Shady Cove WWTP	Rogue River	143.1	0.45	
NPDES-IW-B20	102305	Cascade Wood	Military Slough	RR 132.5	0.03[1]	
NPDES-IW-B21	102034	All Weather Wood Treaters	Rogue River	131.8	Stormwater	
NPDES-DOM-A3	100985	City of Medford WWTP	Rogue River	130.8	20	
NPDES-DOM-Da	102494	City of Gold Hill	Rogue River	118.1	0.35	
NPDES-DOM-Da	102588	City of Rogue River WWTP	Rogue River	110.5	0.43	
NPDES-DOM-C1a	101985	City of Grants Pass	Rogue River	100.9	4.0	
NPDES-DOM-Da	15856	Riviera Mobile Park	Rogue River	96.4	0.03	Yes
NPDES-DOM-Da	102578	Fleming Middle School WWTP	Harris Creek	RR 83.5	0.2	Yes
NPDES-DOM-Da	102610	City of Cave Junction	Illinois River	RR 27.5	0.52	Yes

Notes:
[1]Based on 2003 flows
RR refers to the river mile of the Rogue River at the confluence with the receiving stream.
MGD = million gallons per day

Figure 1.7. Rogue River Basin: NPDES Permits



Stormwater NPDES Permits

Rural residential, commercial, industrial, and urban zoning together compose approximately 12.5% of the Rogue River Basin (Oregon State Service Center 1998). Stormwater discharges from storm drains in urbanized areas are considered point source discharges and are a concern because of the potential for high pollutant concentrations. Concentrated development in urbanized areas substantially increase impervious surfaces such as city streets, driveways, parking lots, and sidewalks, on which pollutants from concentrated human activities settle and remain until a storm event washes them into nearby storm drains. Common pollutants include pesticides, fertilizers, oils, heavy metals, salt, pet waste, litter and other debris, and sediment. Another concern is the possible illicit connections of sanitary sewers, which can result in fecal coliform bacteria entering the storm sewer system. Storm water runoff picks up and transports these and other harmful pollutants untreated into waters of the state. When left uncontrolled, these discharges can result in fish kills, the destruction of spawning and wildlife habitats, a loss in aesthetic value, and contamination of drinking water supplies and recreational waterways that can threaten public health (EPA website: http://www.epa.gov/nps/).

Under certain circumstances, stormwater discharges require an NPDES permit. The federal NPDES permit regulations were issued in two phases. Phase I was established in 1990. It required NPDES permit coverage for large or medium municipalities that had populations of 100,000 or more as well as certain types of industrial facilities and construction sites disturbing 5 or more acres. The NPDES Phase II program extends permit coverage to construction sites disturbing one or more acres and smaller communities (< 100,000 pop.) and public entities that own or operate municipal separate storm sewer systems (MS4). Permit regulations (40CFR 122.34) require permittees at a minimum to develop, implement, and enforce a stormwater program designed to reduce the discharge of pollutants from the community to the maximum extent practicable.

The stormwater management program must include these six minimum control measures:

1. Public education and outreach on stormwater impacts
2. Public involvement/participation
3. Illicit discharge detection and elimination
4. Construction site stormwater runoff control
5. Post-construction stormwater management in new development and redevelopment
6. Pollution prevention/good housekeeping for municipal operations

In addition, DEQ may propose specific TMDL-related requirements in the NPDES Phase II MS4 permits. If an approved TMDL establishes a waste load allocation for municipal stormwater, the MS4 permittee would be required to do the following: (a) revise their stormwater management plans, if necessary, to ensure that best management practices are designed to reduce the TMDL pollutant(s) to the maximum extent practicable; (b) establish a total pollutant load reduction target (or "benchmark") that can be achieved within a 5-year permit term, as well as performance measures for specific BMPs designed to meet the benchmark; (c) at the end of the permit term, evaluate the progress toward meeting the numeric benchmark, and if it hasn't been met, propose additional changes to the stormwater management plan to achieve greater reductions during the next 5-year permit term.

At the time of this writing, within the Rogue River Basin only the jurisdictions of Ashland, Talent, Phoenix, Medford, Central Point, Jacksonville and Jackson County are required to comply with NPDES Phase II requirements. None of the 6 Phase II communities operating under stormwater permits fall within the geographic scope of this TMDL.

Nonpoint Sources

Nonpoint sources of pollution are diffuse or confined sources of pollution where wastes can be conveyed by the movement of water to public waters. Activities that can lead to nonpoint source pollution include rural and urban development, agricultural practices, forest management and dam operations. Nonpoint sources of pollution are discussed in detail in the **Chapters 2 & 3**.

1.5 Parameters Not Addressed

Fecal Coliform

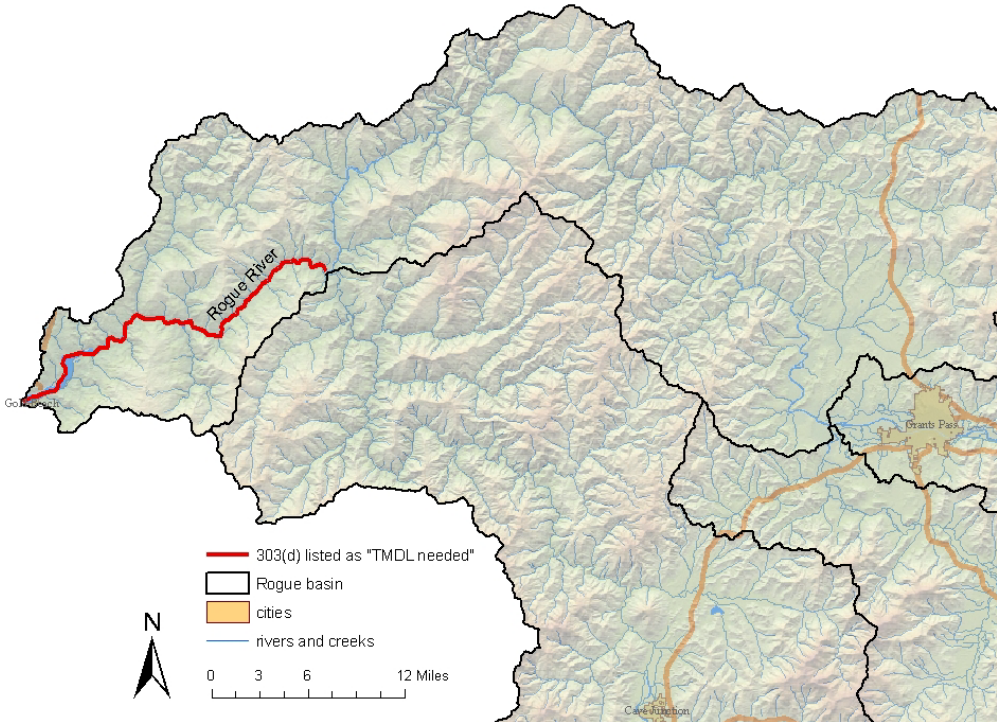
There is one river segment in the Rogue River Basin on the 2004/2006 303(d) listed as impaired for exceeding the fecal coliform citeria for shellfish growing waters (**Table 1.10 and Figure 1.8)**. As part of the TMDL development process, it was found that the listed segment extended far above the estuary, the actual extent of shellfish growing waters.[1] In the known estuary, DEQ does not have sufficient bacteria data to determine if there is an exceedance of the criteria. In the near future, DEQ will determine the extent of the estuary and collect data to determine if and when there is an impairment and therefore if a TMDL is required.

[1] DEQ uses a working definition of the estuary as sites with a field conductivity greater than 200uS/L. The current 303(d) shellfish listing is for river mile 0-27.2. ODFW, ODSL, and others estimate the extent of shellfish supporting waters from river mile 0-5.

Table 1.10. 2004/2006 303(d) Fecal Coliform Listed Waterbodies: Rogue River Shellfish Growing Waters.

Stream Segment	Season	Beneficial Use	Applicable Rule	River Mile
Rogue River	Year Around	Shellfish growing	*OAR 340-041-0009(4)* *OAR 340-041-0009(1)(b)*	0-27.2

Figure 1.8. Shellfish Criteria: 303(d) Fecal Coliform Listed Waterbodies in the Rogue River.



Dissolved Oxygen

There are ten segments in the Rogue River Basin that were listed in the 2004/2006 WQ Assessment as dissolved oxygen impaired (**Table 1.11 and Figure 1.9**). At the time of the writing of this TMDL, there were insufficient data to address the Rogue River Basin dissolved oxygen listings. There are no NPDES permitted point source inputs into any of the dissolved oxygen listed streams in the basin during the season of impairment. All impacts to dissolved oxygen above natural background are due to nonpoint sources. DEQ intends to re-visit the Rogue River Basin dissolved oxygen impairments when the temperature and bacteria TMDLs are reviewed, on a 5 year basis.

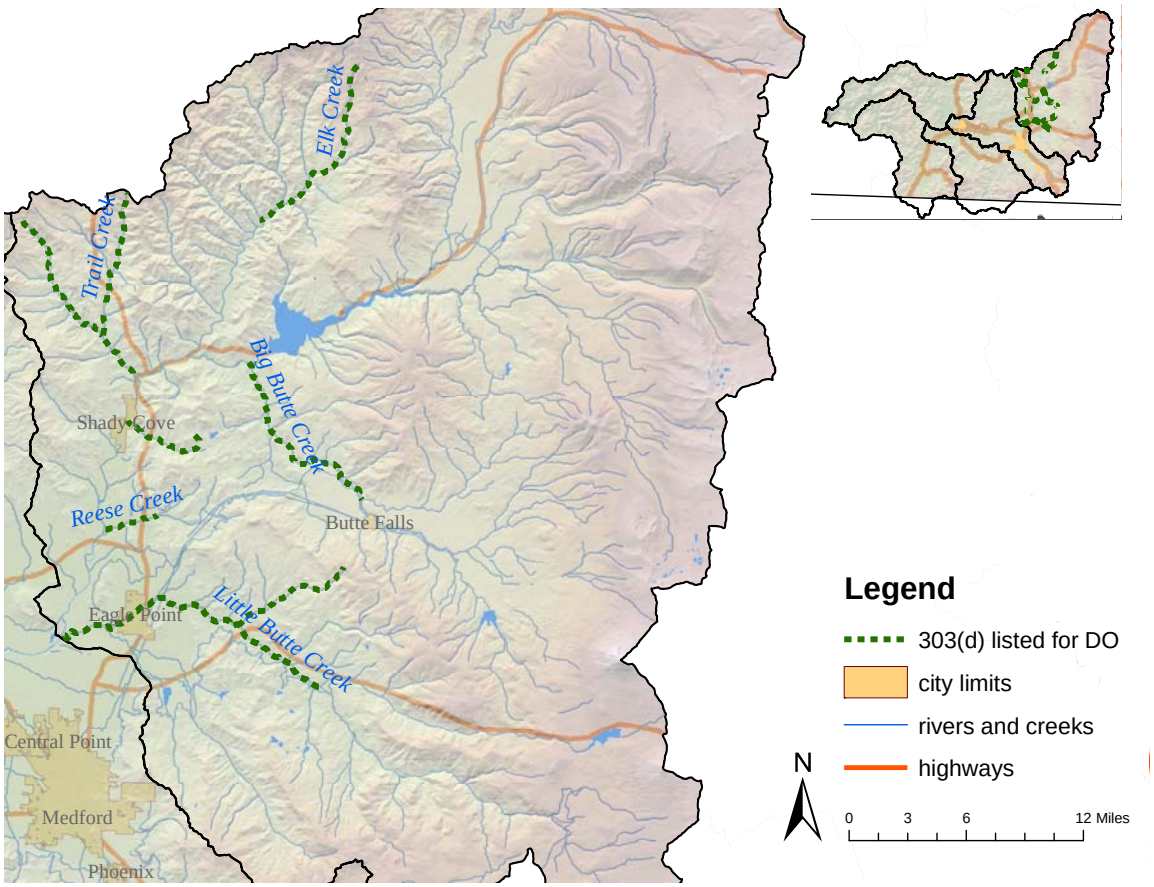
DEQ does however expect that improvements in dissolved oxygen levels will occur as a result of implementing the Temperature TMDL. Stream temperature has a significant impact on the dissolved oxygen level in a stream in two ways. As stream temperatures decrease, the amount of oxygen that can remain dissolved in water increases, and as temperatures decrease the amount of oxygen consumed by biological processes decreases. There are a number of causes of increased stream temperatures in the Rogue River Basin. Please see the Temperature TMDL (**Chapter 2**) for a complete discussion of this topic. It is anticipated that decreasing stream temperatures as required for nonpoint source heat load allocations in the Temperature TMDL will also reduce dissolved oxygen impairments. Surrogate measures to reduce nonpoint source heat loads include percent effective shade targets and hyporheic flow percentage targets.

DEQ encourages the long-term monitoring of dissolved oxygen on the 303(d) listed streams in the Rogue River Basin.

Table 1.11. 2004/2006 303(d) Dissolved Oxygen Listed Waterbodies in the Rogue River Basin.

Stream	Season	303(d) Listing Date	River Mile
Big Butte Creek	Summer	*2002*	0-11.6
Elk Creek	Summer	*2002*	9.5-20.7
Indian Creek	Summer	*2002*	0-5.2
Lick Creek	Summer	*2002*	0-6.8
Little Butte Creek	Sept 15 – June 15	*2004*	0-16.7
Little Butte Creek	Year-round	*2004*	0-16.7
Reese Creek	Summer	*2002*	0-3
Trail Creek	Summer	*2002*	0-3.9
Trail Creek	Summer	*2002*	4.3-10.7
WF Trail Creek	Summer	*2002*	0-8.4

Figure 1.9. 2004/2006 303(d) Dissolved Oxygen Listed Waterbodies in the Rogue River Basin



Sedimentation

There are six segments in the Rogue River Basin that were listed in the 2004/2006 WQ Assessment as sedimentation impaired (**Table 1.12 and Figure 1.10**). The impairments were determined based on Oregon Department of Fish and Wildlife (ODFW) reporting that a high percentage of fine sediment was measured in most reaches during a 1994 survey. At the time of the writing of this TMDL, DEQ is in the process of developing a sedimentation assessment methodology that could be used for implementing the narrative sedimentation standard. When the methodology and associated guidance is completed, the agency will establish sedimentation TMDLs for those waterways on the 303(d) list. DEQ also intends to re-visit the Rogue River Basin sedimentation impairments when the temperature and bacteria TMDLs are reviewed, on a 5 year basis.

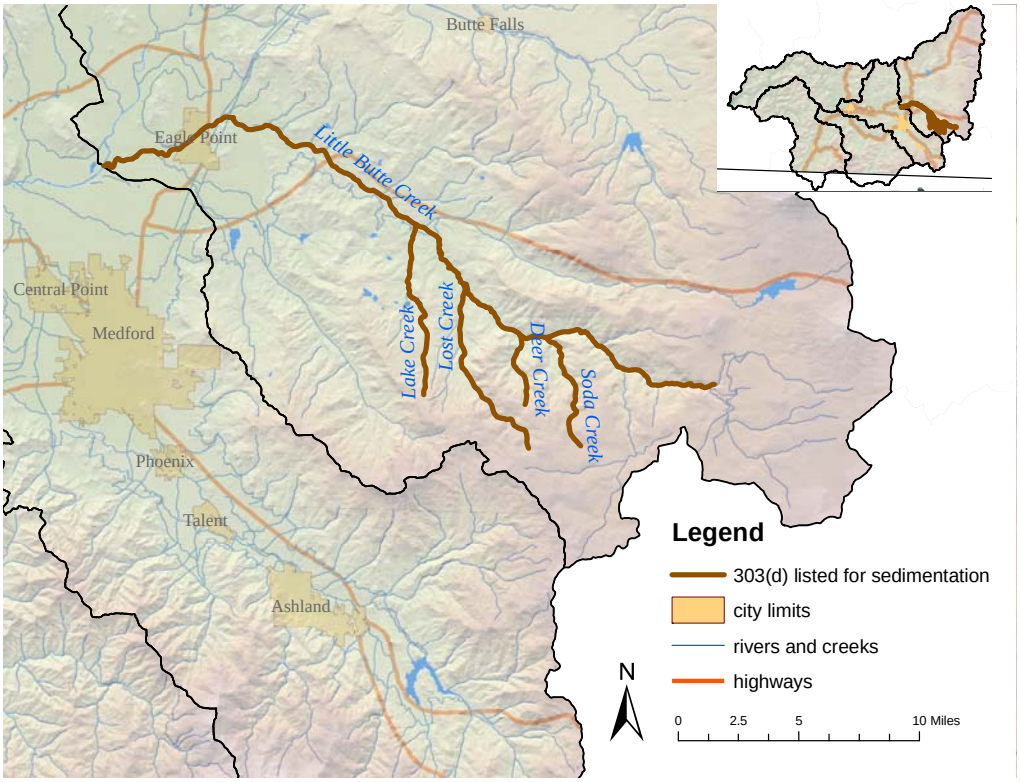
DEQ does however expect to see decreases in sedimentation as a result of implementing the Temperature TMDL (**Chapter 2**). Sediment is a natural part of a healthy stream system with equilibrium between sediment input, routing, and in-stream storage. Under natural conditions, there is generally a balance between the amount of fine sediment, coarse bed load sediment, and larger elements of instream structure (i.e. wood, boulders). Sedimentation results from either stream channel or upland erosion. Disturbances that change riparian vegetation, increase the rate or amount of overland flow, or destabilize a stream bank may increase the rates of stream bank erosion and result in sedimentation increases. Disturbances in the uplands that remove vegetation, reduce soil stability on slopes, or channel runoff can increase sediment inputs (DEQ 2003, DEQ 2007). Sediment created from upland erosion is delivered to a stream channel through various erosional processes. Wide mature riparian vegetation buffers filter sediment from upslope sources as well as stabilize stream banks from erosion. System potential riparian vegetation measured by percent effective shade is a surrogate measure that has been used in other TMDLs to address sedimentation (DEQ 2003). Percent effective shade targets for the Rogue River Basin were set in the Temperature TMDL.

DEQ encourages the long-term monitoring of sediment related parameters on the 303(d) listed streams in the Rogue River Basin. Typical monitoring would include: monitoring of stream cobble embeddedness or percent fines (through Wolman pebble count method) and/or macroinvertebrates as trend indicators for sedimentation.

Table 1.12. 2004/2006 303(d) Sedimentation Listed Waterbodies in the Rogue River Basin.

Stream Segment	Season	Applicable Rule	River Mile
Deer Creek	Undefined	*OAR 340-041-0007(13)*	0-3.2
Lake Creek	Undefined	*OAR 340-041-0007(13)*	0-7.8
Little Butte Creek	Undefined	*OAR 340-041-0007(13)*	0-16.7
Lost Creek	Undefined	*OAR 340-041-0007(13)*	0-8.4
Soda Creek	Undefined	*OAR 340-041-0007(13)*	0-5.6
SF Little Butte Creek	Undefined	*OAR 340-041-0007(13)*	0-16.4

Figure 1.10. 303(d) Sedimentation Listed Waterbodies in the Rogue River Basin



pH

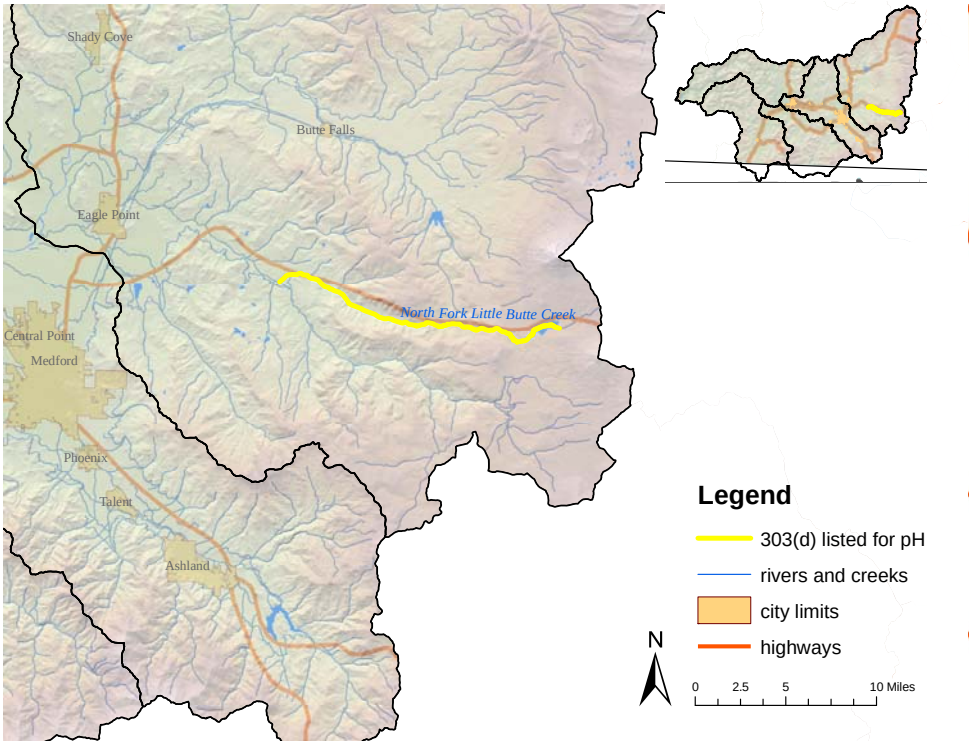
There were three listings on the 2004/2006 WQ Assessment as pH impaired on the North Fork Little Butte Creek and Fish Lake area (**Table 1.13 and Figure 1.11**). At the time of the writing of this TMDL, there were insufficient data to address these pH listings. There are no NPDES permitted point source inputs into the Little Butte Creek system in the area of the pH listings. All impacts to pH above natural background are due to nonpoint sources. DEQ intends to more closely examine the pH listings on Little Butte Creek and Fish Lake in the future. As per the rest of the Rogue River Basin, all impairments will be reviewed along with temperature and bacteria on a 5 year basis.

DEQ encourages the long-term monitoring of pH on the 303(d) listed streams in the Rogue River Basin.

Table 1.13. 2004/2006 303(d) pH Listed Waterbodies on the Little Butte Creek and Fish Lake.

Stream Segment	Season	Applicable Rule	Beneficial Use	River Mile
North Fork Little Butte Creek	Summer	*OAR 340-041-0021(1)*	Resident Fish and Aquatic Life	0-17.8
North Fork Little Butte Creek /Fish Lake	Summer	*OAR 340-041-0021(1)*	Resident Fish and Aquatic Life	15.9-17.6
North Fork Little Butte Creek /Fish Lake	Summer	*OAR 340-041-0021(1)*	Anadromous Fish Passage, Salmonid Fish Rearing and Spawning	15.9-17.6

Figure 1.11. 2004/2006 303(d) pH Listings: North Fork Little Butte Creek and Fish Lake.



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