Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load

Water Quality Improvement Report and Implementation Plan - FINAL

DEPARTMENT OF ECOLOGY
State of Washington

December 2015 Revised July 2018
Publication no. 15-10-012

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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July 2, 2018

To: Interested Parties in the Deschutes River Watershed

From: Andrew Kolosseus, Department of Ecology,
Water Cleanup and Technical Assistance Unit Supervisor

Re: Deschutes River Total Maximum Daily Load (TMDL)

In 2015, the Department of Ecology (Ecology) completed a Total Maximum Daily Load (TMDL) for the Deschutes River, Percival Creek, and Budd Inlet Tributaries. This 2015 Deschutes River TMDL Plan is available on our website.

On June 29, 2018, the Environmental Protection Agency (EPA) approved the sections of the TMDL Plan that relate to temperature impairments in the Deschutes River, Percival Creek, and Black Lake Ditch. Additionally, EPA disapproved sections related to bacteria, dissolved oxygen, fine sediment, and pH. According to the Clean Water Act, EPA now has 30 days to write a new TMDL Plan for these disapproved parameters. For questions on EPA's partial approval and partial disapproval, please contact Dave Croxton from EPA at (206) 553-6694 or croxton.david@epa.gov.

Ecology stands behind the strong science and the implementation plan included in the original TMDL Plan submitted to EPA in 2015. The TMDL process began in 2003 and used water quality monitoring, computer models, and stakeholder input to develop the TMDL Plan. Our knowledgeable local partners worked with us for years to identify water quality problems, develop solutions, and review drafts of the TMDL Plan. As we understand them, EPA's disapprovals stem from legal and process concerns – not fundamental scientific concerns. The 2015 Deschutes River TMDL Plan determined necessary actions to bring waterbodies into compliance with the state water quality standards. The TMDL Plan identified:

- Fecal coliform bacteria concentrations must be reduced during both the summer season and winter seasons, particularly during storm events. The highest reductions are needed in the small tributaries to Budd Inlet.

- Mature system potential riparian shade must be established and river channels restored throughout the watershed. Restoring riparian vegetation and channel conditions are projected to cool peak temperatures up to 6.9°C, increase minimum dissolved oxygen by 1 mg/L, and decrease maximum pH by 0.5 standard units under critical conditions.

These actions – and the others identified in the implementation plan of the TMDL Plan – are still needed to improve water quality in the watershed. No matter what action EPA takes, we encourage watershed partners to use the TMDL Plan as a resource for identifying, prioritizing, and focusing water quality improvement efforts.
EPA's approval of the temperature sections of the TMDL Plan turns the temperature-related elements (referred to as "allocations") into requirements. This includes:

- Loading capacity for temperature (pages 39-43).
- Wasteload allocations for temperature (pages 49-58). Ecology will therefore turn the temperature-related wasteload allocations into permit limits for facilities covered by a National Pollutant Discharge Elimination System (NPDES) permit.
- Load allocations for temperature (pages 61-64).
- Implementation plan components related to temperature (pages 101-131).

Implementation of the temperature requirements will simultaneously also lead to significant improvements in dissolved oxygen and pH.

For the remaining parameters that EPA is disapproving, EPA will likely reincorporate the state recommended allocations and implementation actions into the new federal TMDL Plan. We encourage our watershed partners to engage with EPA as they write a new federal TMDL Plan for the remaining parameters. In the meantime, we urge local businesses and government agencies in the watershed to implement all the actions identified in the state TMDL Plan. Science tells us these specific actions will improve water quality, help meet water quality standards, and protect the beneficial aquatic life and recreation uses in the Deschutes River and tributaries.

In the meantime, Ecology is preparing a separate TMDL Plan to address low levels of dissolved oxygen in Budd Inlet. This TMDL effort is progressing, and it is independent of the Deschutes River TMDL. Ecology and EPA have committed to working together on any overlapping pieces of the two TMDLs. The Budd Inlet TMDL Plan will set limits on nitrogen and carbon entering Budd Inlet from the Deschutes River and other sources. (Science tells us that dissolved oxygen problems in the Deschutes River are caused by a lack of healthy riparian areas and to a much lesser extent phosphorous and low flow – not nitrogen and carbon.) Many implementation actions – such as keeping human, livestock, and pet waste out of the river – would reduce multiple problems and will help the Deschutes River and Budd Inlet.

For questions on the Deschutes River TMDL, please contact Rich Doenges at 360-407-6271 or rich.doenges@ecy.wa.gov. For questions on the Budd Inlet TMDL, please contact Leanne Weiss at 360-407-0243 or leanne.weiss@ecy.wa.gov.

Publication and contact information

This report is available on the Department of Ecology's web site at
https://fortress.wa.gov/ecy/publications/SummaryPages/1510012.html

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Cover photo: Deschutes River at Huckleberry Creek.

Project Codes and 1996 303(d) Water-body ID Numbers

Data for this project are available at Ecology's Environmental Information Management (EIM) website at www.ecy.wa.gov/eim/index.htm. Search Study ID, MROB0001.

Activity (Project) Tracker Code (Environmental Assessment Program) is 03-077-01.

Water Resource Inventory Area (WRIA) for this study: 13.

Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load

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Water Quality Improvement Report
and
Implementation Plan

by

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Abstract

Portions of the Deschutes River, Percival Creek, and Budd Inlet tributaries do not meet water quality standards and are on the Clean Water Act Section 303(d) list for one or more of the following parameters: fecal coliform bacteria, temperature, dissolved oxygen (DO), pH, or fine sediment. This Total Maximum Daily Load (TMDL) report sets the load and wasteload reductions needed to meet Washington State water quality standards, and describes implementation actions to achieve those reductions. This document is also referred to as the Water Quality Improvement Report/Implementation Plan (WQIR/IP). It includes the TMDL study findings and implementation goals and actions.

In 2012, the Washington State Department of Ecology (Ecology) completed a technical study on the Deschutes River, Capitol Lake, and Budd Inlet. The findings indicate temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment levels, violated Washington State surface water quality standards. The complete *Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report: Water Quality Study Findings* is available at: https://fortress.wa.gov/ecy/publications/SummaryPages/1203008.html. The data collected through this study were analyzed to determine the loading capacity for fecal coliform bacteria, temperature, DO, pH, and fine sediment in portions of the watershed, and to set loading reduction targets to meet water quality standards.

This TMDL project is focusing on the necessary actions to bring freshwater bodies within the TMDL boundary into compliance with the state water quality standards. This report, based on the technical study findings, describes the actions needed to improve water quality within the Deschutes River, Percival Creek, and Budd Inlet tributaries. While the study included Capitol Lake and the marine waters of Budd Inlet, this TMDL report is focused only on freshwater sections of the watersheds. The remaining water bodies will be addressed in the next phase of this TMDL project effort after additional modeling is completed.

Fecal coliform bacteria concentrations must be reduced during both the summer season and winter seasons, particularly during storm events. The highest reductions are needed in the small tributaries to Budd Inlet.

Mature system potential riparian shade must be established and the channels restored throughout the Deschutes River and Percival Creek watersheds. Restoring riparian vegetation and channel conditions are projected to cool peak temperatures up to 6.9°C, reduce the number of reaches above lethal temperatures for salmonids, increase minimum DO by 1.03 mg/L, and decrease maximum pH by 0.5 standard units (SU) under critical conditions.

Improvement and restoration of riparian areas, reduction of wetted widths and the near stream disturbance zone, and microclimate cooling produce the biggest effect to increase minimum DO and decrease maximum pH in the Deschutes mainstem. This report establishes a numeric target for watershed nutrient reductions upstream of Offut Lake. A 72.3% load reduction of dissolved inorganic nitrogen and 10.1% reduction of orthophosphate from anthropogenic sources

cumulatively above Offut Lake are needed to meet system potential conditions for dissolved oxygen in this part of the watershed. Additional reductions may be needed to meet standards in downstream water bodies such as Budd Inlet; these will be established in the next phase of the TMDL project.

This TMDL project is considered successful when:

- All impaired water bodies identified in this report meet water quality assessment listing criteria for Category 1, meeting water quality standards (including Natural Conditions criteria as determined by Ecology Policy WQP 1-11).
- Wasteload allocations (WLA) are integrated into all National Pollutant Discharge Elimination System (NPDES) permits to prevent future degradation of surface waters and permittees meet the conditions of the permits.
- The TMDL implementation plan is successfully implemented and there is ongoing adaptive management in the TMDL area so that there is continuous identification and correction, through technical assistance or enforcement, of nonpoint source pollution related to poor management of land use activities.

Acknowledgements

We thank the following groups and individuals for their contribution to this report:

The Deschutes TMDL Advisory Group met from 2009 to 2015 and provided considerable input and external review of this document. The group included representatives from the following:

- Black Hills Audubon Society
- Business
- Capitol Lake Improvement and Protection Association
- Citizens
- Deschutes Estuary Restoration Team
- Lacey, City of
- LOTT Clean Water Alliance
- Olympia, City of
- Olympia, Port of
- Olympia Yacht Club
- Puget Sound Partnership
- Squaxin Island Tribe
- Thurston Conservation District
- Thurston County Government
- Thurston Public Utility District
- Tumwater, City of
- U.S. Environmental Protection Agency
- Washington State Government: (Agriculture, Ecology, Enterprise Services, Fish and Wildlife, Health, Natural Resources, and Transportation)
- Washington State University (Extension Office, and Stormwater Center)

Washington State Department of Ecology staff:

- Anise Ahmed
- Bob Bergquist
- Bob Cusimano
- Betsy Dickes
- Rich Doenges
- Christine Hempleman (Retired)
- Chuck Hoffman
- Andrew Kolosseus
- Kim McKee (Retired)
- Greg Pelletier
- Mindy Roberts
- Kirk Sinclair
- Sally Toteff
- Greg Zentner

We also acknowledge the previous work by the Deschutes Technical Advisory Group (TAG), whose input resulted in the Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment, Total Maximum Daily Load Technical Report. As noted in the technical study Acknowledgements page, the TAG members included:

- Jim Bachmeier, Sue Davis, and Barbara Wood (Thurston County)
- John Konovsky (Squaxin Island Tribe)
- Andy Haub, Liz Hoenig, Roy Iwai, and Vince McGowan (City of Olympia)
- Ken Butti and Karla Fowler (LOTT Clean Water Alliance)
- Don Bache (Port of Olympia)
- Anne Mills (Thurston Conservation District and South Sound GREEN)
- Kathleen Whalen (Thurston Conservation District)
- Rich Eltrich and Hal Michael (Washington State Department of Fish and Wildlife)
- Jim Erskine and Nathaniel Jones (Washington Department of General Administration)
- Steven Morrison (Thurston Regional Planning Council)
- Dave Ragsdale (U.S. Environmental Protection Agency)
- Sue Danver (Black Hills Audubon Society)
- Julie Rector (City of Lacey)
- Bob Bilby (Weyerhaeuser Company)
- Bob Simmons (Washington State University)
- Kim Zabel (Washington State Department of Health)
- Mike Stephens (Washington State Department of Transportation)
- Betsy Dickes, Dave Dougherty, Chris Hempleman, Chuck Hoffman, Andrew Kolosseus, Azizullah Mahar, Kim McKee, Derek Rockett, Jason Shira, and Lydia Wagner (Washington State Department of Ecology)

Executive Summary

Introduction

In 2012, Ecology completed a technical study on the Deschutes River, Capitol Lake, and Budd Inlet. The findings indicated temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment levels violated Washington State surface water quality standards. The complete Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report: Water Quality Study Findings is available at https://fortress.wa.gov/ecy/publications/SummaryPages/1203008.html.

Using the results from this study, Ecology determined wasteload and load allocations to meet water quality standards for the Deschutes River, Percival Creek, their tributaries, and other tributaries to Budd Inlet. This Total Maximum Daily Load (TMDL) report, which is also called the Water Quality Improvement Report/Implementation Plan (WQIR/IP), contains those allocations and implementation actions. The TMDL, based on the study findings, states what needs to happen to bring freshwater bodies within the TMDL boundary into compliance with the state water quality standards. It describes what actions are needed to improve water quality, including the roles and authorities of cleanup partners (those organizations with jurisdiction, authority, or direct responsibility for cleanup) and the programs or other means through which they will address these water quality issues.

Ecology is developing the freshwater and marine water TMDLs separately in two phases. The first phase includes the freshwater portions of the watershed. The second phase of the TMDL, addressing the marine waters of Budd Inlet and Capitol Lake, will be developed after additional marine modeling is completed. This TMDL report addresses freshwater bodies within the TMDL Boundary (Figure 1). Decisions on allocations for dissolved oxygen in Budd Inlet are dependent on the outcomes of further analysis; implementation of the freshwater TMDL should begin immediately.

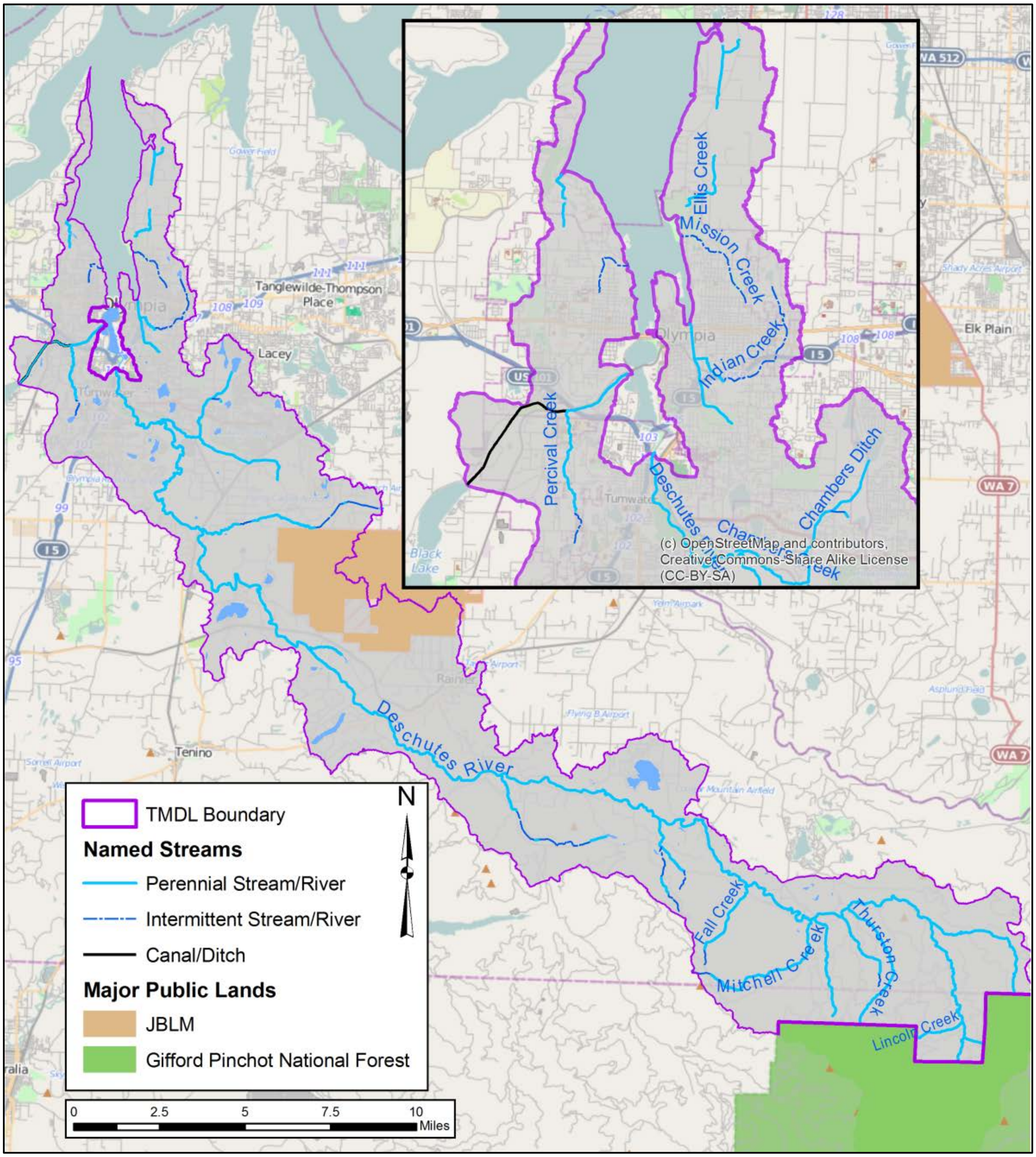

Figure 1: The TMDL boundary encompasses the watershed area included in this TMDL.

The load allocation (LA) compliance areas are the subwatersheds which have specific LA and encompass the drainage area contributing to each LA.

Why did we develop a total maximum daily load (TMDL)?

The federal Clean Water Act (CWA) requires that a TMDL be developed for each of the water bodies on the 303(d) list of impaired waters. The 303(d) list is a list of water bodies, which the CWA requires states to prepare, that do not meet state water quality standards. The TMDL study identifies pollution problems in the watershed and specifies how much pollution needs to be reduced or eliminated to achieve clean water. With the assistance of local governments, agencies, and the community, Ecology then develops a plan that describes actions to control the pollution, and a monitoring plan to assess the effectiveness of the water quality improvement activities. The water quality improvement report/implementation plan (WQIR/IP) consists of the TMDL study findings and implementation actions and goals.

Ecology, in cooperation with the Squaxin Island Tribe, Thurston County, the city of Olympia, and others, conducted a TMDL study in the Budd Inlet watershed because the Deschutes River, Capitol Lake, Budd Inlet, and some of their tributaries are on the CWA 303(d) list for fecal coliform bacteria, temperature, DO, pH, and/or fine sediment. The study involved data collection to characterize the sources and processes relevant to the impairments as well as analytical tool development, including computer models, to simulate the potential benefits of various management strategies.

Watershed description

The TMDL boundary (Figure 1) extends from the headwaters of the Deschutes River northward to the confluence with Capitol Lake, and also includes Percival Creek, Black Lake Ditch, and the freshwater tributaries to Budd Inlet. The boundary includes portions of Thurston County and Lewis County, as well as the cities of Olympia, Lacey, Tumwater, and Rainier.

Capitol Lake was formed in 1951 as an impoundment of the Deschutes estuary to create a reflecting pool for the State Capitol building. The lake, along with the marine waters of Budd Inlet, will be addressed in the second phase of the TMDL.

The watershed includes forested lands, rural residential, agricultural, and urban lands. Potential pollutant sources include a variety of point sources and nonpoint sources. Point source discharges include domestic wastewater, combined sewer, and separate storm sewer systems operating under National Pollutant Discharge Elimination System (NPDES) permits. Other potential permitted discharges include those operating under general permits for municipal stormwater, industrial stormwater, construction stormwater, and sand and gravel operations. Nonpoint sources are those traditionally more diffuse in origin that cannot be identified with a discrete discharge location. Examples of nonpoint sources can include, in addition to natural sources, lack of riparian vegetation, onsite sewage systems (OSS), domestic animals, livestock, fertilizers, land use activities, recreational users, roads, and culverts.

Potential temperature pollutant sources

Potential sources of temperature impairments in streams include the lack of riparian shade that would otherwise block incoming solar radiation to water surfaces, low summer streamflows due to natural conditions and anthropogenic (human caused) activities, and increased stream surface area (widening and decreased depth) due to natural and anthropogenic activities.

The role of riparian vegetation in maintaining a healthy stream condition and water quality is well documented and accepted in the scientific literature (Holtby, 1988; Lynch et al., 1984; Rishel et al., 1982; Patric, 1980; Swift and Messer, 1971; Brown et al., 1971; Levno and Rothacher, 1967; Brown and Krygier, 1970; Adams and Sullivan, 1989). The important benefits that riparian vegetation has upon stream temperature include:

- Vegetation height, width, and density combine to intercept shortwave radiation that reduces solar heat flux to the water surface.
- Riparian vegetation creates a thermal microclimate that generally maintains cooler air temperature, higher relative humidity, lower wind speed, and cooler ground temperature along stream corridors.
- Bank stability is largely a function of near-stream vegetation. Specifically, channel morphology is often highly influenced by land cover type and condition, affecting floodplain and instream roughness, contributing large woody debris, and influencing sedimentation, stream substrate composition, and streambank stability. Streamflows influence water temperatures by varying the volume over which heat is dissipated. As the volume of water decreases, the temperature, equivalent to the concentration of heat, increases. Natural contributors to low streamflows include seasonally varying meteorology driven by our maritime climate and influenced by global climate change, as well as hydrogeology influenced by geology and groundwater recharge from precipitation. Potential anthropogenic contributors include water withdrawals and altered hydrogeology due to land surface processes that increase the heat load of stormwater runoff and decrease groundwater recharge.

Stream depth and width affect water temperature by varying the volume over which heat is dissipated, and by increasing the surface area over which the heat load is applied. Stream widths can increase due to sediment deposition from natural and anthropogenic sources. For example, natural decreases in the channel slope reduce the sediment transport capacity of the river. Anthropogenic activities may increase overall sediment in the system, leading to enhanced sediment deposition.

Lakes and wetlands can be sources of heat to downstream waterbodies. Shallow lakes and wetlands occupy the headwaters of many tributaries of the Deschutes River, as well as Percival Creek and Black Lake Ditch. These streams cool in a downstream direction due to groundwater inflow, as well as inputs from cooler spring-fed tributaries.

This study uses riparian shade as a surrogate measure of heat flux. Effective shade is defined as the fraction of the potential solar shortwave radiation blocked by vegetation or topography before it reaches the stream surface.

Potential fecal coliform bacteria, DO, and pH pollutant sources

Potential sources of fecal coliform bacteria include improperly maintained, poorly located, or failing septic systems. Human waste can also reach streams directly or indirectly through deteriorating or improperly connected sewer infrastructure. Leaks in sewer systems occur as the infrastructure ages and as surrounding soils are disturbed by construction or by tree roots. During construction or redevelopment, wastewater pipes may be inadvertently connected to stormwater infrastructure. Infrastructure-related sources are generally considered nonpoint sources unless the effluent reaches stormwater infrastructure covered by the Municipal Stormwater General Permit. Recreational users or homeless populations may contribute waste, including bacteria and nutrients, to surface waters through improper waste disposal practices.

Septic systems are not designed to remove nitrogen from the wastewater, and even functioning systems contribute nitrogen to groundwater. Septic system sources are generally considered nonpoint sources unless the effluent reaches stormwater infrastructure covered by a general permit.

Domestic animals, such as dogs and cats, may contribute to nonpoint source bacteria and nutrient contamination when owners fail to clean up after them. Stormwater runoff may suspend fecal matter in impervious areas and transport it to the stormwater infrastructure or in pervious areas as overland flow to surface waters.

Livestock, such as horses, cows, and sheep may contribute fecal coliform bacteria via overland flow during storms, unmanaged animal access to surface waters, or from improper manure storage and disposal. Other agricultural activities that could contribute to high fecal coliform bacteria levels include animal waste fertilizers improperly applied to growing areas. Birds and other wildlife may contribute bacteria and nutrients directly to water bodies or indirectly via overland stormwater runoff. Unless wildlife populations have increased artificially or been concentrated due to anthropogenic activities, wildlife contributions are considered natural background conditions which may be quantified in a TMDL but not assumed to be decreased.

Low DO and high pH levels may result from increased sunlight or nutrient loads that stimulate plant growth, referred to as primary productivity, above natural levels. Plant growth includes both macrophytes and algae that occur in freshwater and marine environments. Macrophytes can be emergent, submerged, or floating, and either rooted or unattached. Benthic algae that grow on stream substrates typically have a greater effect on streams than suspended phytoplankton.

The natural diel cycle of plant growth produces DO during daylight hours as the plants photosynthesize, but reduces DO levels to a natural minimum around sunrise as respiration occurs. Algae and other aquatic plants also consume carbon dioxide during photosynthesis, reducing the amount of carbon dioxide and bicarbonate in the water. Because alkalinity remains constant, the pH level increases. Primary productivity generally produces the highest pH in the late afternoon and the lowest DO levels in the early morning hours. Enhanced algae growth due to increased sunlight or nutrient loads from human activities increases the daily variation, resulting in lower DO and higher pH levels than would have resulted under natural conditions.

In addition to causing increased stream temperatures, lack of riparian vegetation also may reduce the filtering of nutrients from overland flow (NRC, 2002). Vegetation in riparian areas perform valuable functions and mitigate effects of upland disturbances. Plants, soil, and microorganisms can transform chemicals through processes such as denitrification.

Stream pH levels may be affected by natural sources, in addition to the diel effect of productivity described previously. The pH of rain in western Washington is generally 4.8 to 5.1 (NADP/NATN, 2004). Therefore, stormwater may have a low pH due to regional atmospheric conditions rather than local watershed conditions. Wetland systems also affect pH by enhancing natural decomposition processes, which results in acidic (low) pH levels.

Anthropogenic activities can lower pH as well. For example, decomposing organic material, such as that found in logging slash or piles of yard waste and grass clippings, and even acid deposition can lower pH below water quality standards. Some streams have a naturally low buffering capacity, which makes them more susceptible to pH changes. These streams can have both low and high pH in the same stretch, though often during different times of the year.

Potential fine sediment pollutant sources

Stream sediment levels result from erosion that may be part of the natural processes or influenced by anthropogenic activities. River sediment processes reflect climate, geology, regional topography, soils, vegetation, and human land-use practices. Increased delivery of fine sediment can alter substrate composition and channel morphology, leading to degradation of spawning habitat for salmonids. Salmonid eggs require healthy DO levels for survival, which makes them particularly susceptible to degradation from fine sediment. Fine sediments may clog pores between gravel particles, impeding the exchange of oxygen between the stream and the underlying gravel beds (Johnson, 1980).

Potential sources of fine sediment include (1) natural sources, such as landslides and stream bank erosion, or (2) anthropogenic sources from land disturbances, such as road building, timber harvest, agricultural activities, residential development, and increases in stormwater runoff resulting in downcutting and scouring of the stream at the point of discharge.

Landslides constitute a natural part of the landscape, particularly in areas of steep slopes and abundant rainfall such as the forested headwater areas in the watershed. The delivery of high sediment volumes can result from unstable slope failure, which can overwhelm the capacity of the channel to transport sediment downstream. These processes lead to channel widening, bank erosion, and shallower water depths. Clearcutting and road building substantially increase landslide rates (Jones and Grant, 1996; Naiman and Bilby, 1998; Robinson et al., 1999; Spence et al., 1996; Swanson et al., 1998).

Rivers naturally mobilize and transport sediment through bank erosion and downcutting. Sediment transport is directly proportional to the availability of eroded material and the stream power to move it (Bull, 1979). In headwater streams, steep gradients create sufficient stream power to undercut the toe of slopes and downcut through streambed surfaces. Down-gradient streams typically erode floodplain banks as they migrate laterally and downstream. Most of the material eroded from the floodplain banks settles in river bars and overbank flood deposits. Bank erosion does not constitute a net sediment influx to the river unless channel widening occurs. However, natural equilibrium can be offset by increases in stream power or increases in sediment volume delivered to the stream. Increases in stream power can result from a variety of factors including natural storm events, clearcut logging, and road building. The latter two activities increase stream power by decreasing natural infiltration rates, which increases overland flow and the volume and speed of water delivered to the stream (Bull, 1979; Jones and Grant, 1996).

Human activities, such as agriculture and urbanization, can also increase the delivery of sediment to stream channels. The physical manipulation of soils from agricultural activities can lead to increased soil erosion by both wind and water. The common practice of draining and adding tile drains to wet agricultural lands also increases the volume of speed of delivery of water to the river channel, increasing stream power. Straightening channel meanders through channelization further increases stream energy and erosive power. Large domestic animals may increase streamside erosion in areas in which they are allowed direct stream access by damaging stream banks and eliminating riparian vegetation and regeneration needed for bank stability.

Fine sediments from both natural and anthropogenic sources can contribute phosphorus, often associated with weathered rock and soil particulate matter.

What needs to be done in this watershed?

Wasteload allocations

Through the NPDES permit program, Ecology regulates municipal, industrial, and construction stormwater through general permits. Sand and gravel facilities also operate under general permits issued by Ecology. Wasteload allocations (WLAs) are established for all permittees discharging to freshwater within this TMDL boundary (see Figure 2).

Each of the general permit types described in Tables 9 and 10 of the TMDL report have requirements for water quality based effluent limits, monitoring, reporting, and implementation of best management practices (BMPs) to protect water quality. With the exception of the noted permittees, compliance with the limits and requirements in the general permit for these permittees will mean compliance with the TMDL. The permittees identified with specific implementation actions or wasteload allocations (WLAs) will have those incorporated into their permit. The WLAs for pH, turbidity, and fine sediment can be found in the Wasteload and Load Allocations section and Appendix C of this report.

New general permittees in the Deschutes River watershed may not discharge nutrients to the Deschutes River or its tributaries that result in a 0.2 mg/L decrease to dissolved oxygen (DO) due to the combined effects of all human activity, nor create a visible accumulation of fine sediment in the Deschutes River or its tributaries. Any new discharges of pollutants must be offset such that all existing discharges during the critical period do not further degrade the receiving water quality.

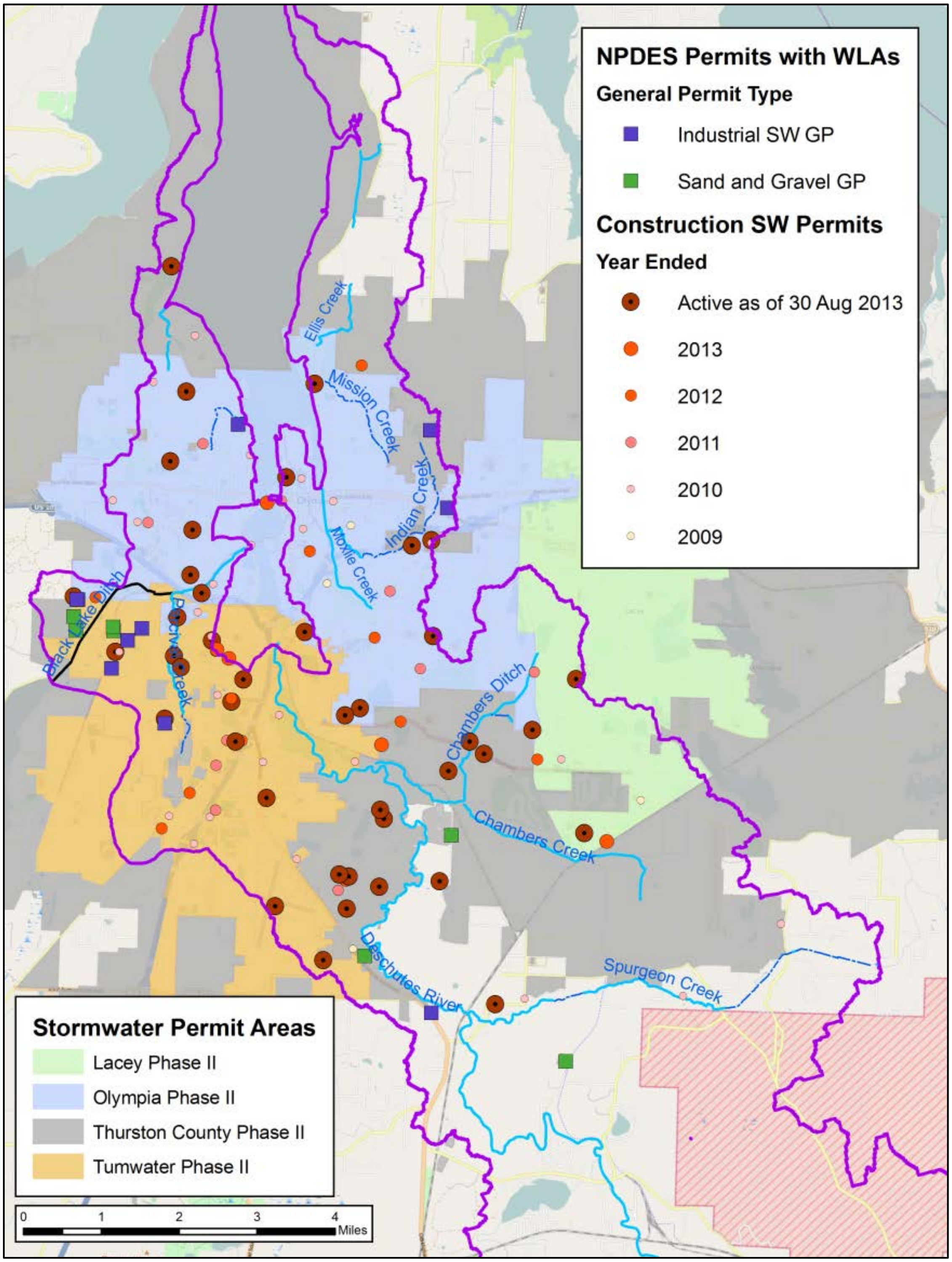

Figure 2: NPDES Permits receiving wasteload allocations (WLAs) and the Western Washington Phase II Municipal Stormwater permittees.

Construction Stormwater General Permits (CSWGP) within this area are administered by Ecology under the NPDES program. The cities of Olympia, Lacey, and Tumwater, as well as Thurston County, also have a part in administering some of the permit requirements. Construction sites sometimes contribute fine sediment and high pH water through stormwater discharges to surface water or to municipal stormwater systems. Erosion occurs when exposed soil is not stabilized by properly-installed BMPs according to a Stormwater Pollution Prevention Plan, or when runoff suspends sediment or other pollutants, and there are no controls in place to prevent the turbid water from directly discharging to a stream or stormwater conveyance.

The CSWGP is the regulatory framework for requiring BMPs and other measures to reduce or eliminate runoff from construction sites. Roberts et al (2012) identified the summer season (defined here as June through September) as the critical period when discharge of particulates (generally associated with phosphorus) can increase primary productivity and worsen the maximum pH and pH range. However, sediments are potentially transported offsite from active construction sites during storms in any month, so this permit requires year-round BMPs. The wasteload allocation requires all permittees to comply with Section S8, more specifically S8.C.2 and S8.D.1, of the permit.

Sand and Gravel facilities are potential sources of fine sediments if BMPs are not actively maintained to treat stormwater and prevent erosion, and track-out of sediments from muddy or dirty vehicle tires onto city or county roads. The WLA for any inactive mining site is zero for pH, turbidity, and fine sediments. For all active mining sites, the WLA for fine sediment is no visible accumulation of fine sediment downstream of their discharge point. Turbidity is a surrogate measure for fine sediment. Compliance with the effluent limits for pH and turbidity in the general permit, and the implementation actions identified in the Wasteload Allocation section of this report (see also Appendix C), constitutes compliance with the TMDL.

Western Washington Phase II Municipal Stormwater permittees are responsible for the discharges from their stormwater collection system and for secondary permittees that discharge to that system. Numeric WLAs for each Phase II permittee are described in the wasteload allocation section of this report, as well as Appendix C. Implementation actions identified in Tables 25, 27, 29, and 34 will be included in their Municipal General Stormwater Permit during the next permit revision cycle. In general, Phase II permittees must:

- Work with the public to reduce nutrients entering their stormwater collection systems.
- Coordinate with adjacent Phase II permittees to implement a comprehensive illicit discharge detection and elimination (IDDE) program.
- Require stormwater controls for construction projects within their jurisdiction.
- Implement low impact development BMPs in new areas of development.
- Identify locations where existing stormwater controls need to be retrofitted to meet the goals of this TMDL.

Fecal coliform bacteria reduction targets are set at the mouths of multiple Budd Inlet tributaries and for specific locations within Phase II Municipal Stormwater permit areas (see Table 12 of this report). The allocations should be used by each permittee to prioritize implementation and identify the municipal separate storm sewer system (MS4) drainage area at each point, narrow down the identification of the bacteria sources, and reduce or eliminate those sources.

Load allocations

Load allocations (LA) for stream temperature, dissolved oxygen (DO), pH, fine sediment, and fecal coliform bacteria are included in this TMDL for non-federal forest lands. In accordance with Clean Water Act (CWA) Assurances established under Schedule M-2 of the Forests and Fish Report (USFWS et al., 1999), Ecology will not require more stringent measures except through adaptive management-based changes established under the Forests and Fish Adaptive Management Program. These measures are subject to reopening in the event benchmarks are not achieved (Hicks, 2006). If achievement of the TMDL load allocations cannot be met through the forest practices regulations, the adjustment of those management practices will be through the process of adaptive management established under the state's forest practices laws and regulations. Over the long term, failure of adaptive management to meet the load allocations established in this TMDL would be a potential cause to withdraw these assurances.

Load allocations for nonpoint pollution sources (NPS) apply to all land uses within the TMDL project boundary including agriculture, residential (including non-commercial farms), forestry, and commercial uses. Each category of land use has potential effects on water quality, and there are BMP requirements to reduce or eliminate pollution from these land uses. The LA compliance area is the drainage area that contributes to the point at which water quality is measured for compliance with the LAs (see Figure 20 in this report); each LA applies to all NPS within each compliance area. When the appropriate BMPs are correctly implemented and maintained for the different land uses within a LA area, those properties will be considered compliant with the TMDL.

The compliance area for stream temperature is the riparian area surrounding the Deschutes River, Percival Creek, and Black Lake Ditch. Effective shade allocations define the percent improvement needed (see Figure 21 in this report). Establishing forested stream-side vegetation corridors and conserving existing riparian shade on these rivers and their tributaries is required to reduce the temperature of the water. The critical period for stream temperature is June through September.

Reducing stream temperatures by improving riparian and channel characteristics along the Deschutes River and tributaries would substantially improve minimum DO by 1 mg/L on average by increasing the solubility of dissolved oxygen in the water. It would also reduce maximum pH levels by reducing primary productivity (Roberts et al, 2012).

Reducing dissolved inorganic nitrogen and orthophosphate (collectively referred to here as *nutrients*) inputs to mainstems, tributaries, and groundwater through BMP implementation, will also improve minimum DO and help meet nutrient loading allocations for the Deschutes River watershed upstream of Offut Lake. The DO system potential model calls for nutrient reductions upstream of Offut Lake to meet the water quality criteria. The Phase II Budd Inlet DO TMDL will establish allocations for nutrients from freshwater tributaries (including the Deschutes River) to meet water quality standards in Capitol Lake and Budd Inlet. Implementation of BMPs to reduce nutrients in this TMDL will begin work towards meeting this and future nutrient allocations.

Sources of nutrients include: stormwater runoff from fields and lawns where fertilizers and manure are applied in excess of agronomic rates; on-site sewage systems (OSS); livestock directly accessing and defecating in streams; some types of residential landscaping and fertilizers applied adjacent to lakes and rivers; as well as erosion of stream banks that mobilizes phosphorus adsorbed to soil particles.

Fecal coliform bacteria levels do not meet the water quality standards during both the summer growing season and winter non-growing season. Load allocations are identified as the percent reduction targets for May through September, and October through April, (see Figure 25, Figure 26, and Table 12 in this report). Reductions are necessary throughout the watershed, but the highest reductions are needed in small tributaries to Budd Inlet. Urban areas include a variety of potential sources including permitted wastewater discharges, cross-connected infrastructure, OSS, domestic animals, recreational users, and homeless populations. Agricultural NPS include livestock defecating in streams, and poor manure management that does not prevent runoff to streams.

Compliance with load allocations and improvement of water quality is accomplished through the implementation of BMPs and enforcement activities described in the Implementation Plan section in this report. The implementation plan prescribes BMPs for different land use activities with the potential for generating pollution. If appropriate BMPs are installed and maintained correctly, then landowners will be considered in compliance with the TMDL. Technical assistance will be provided to landowners needing to comply with the BMPs, but Ecology reserves the authority to take action to enforce Ch. 90.48 RCW, Water Pollution Control, in situations where the pollution source is potentially impacting beneficial uses, and there is demonstrated inaction by the landowner to correct their pollution problem.

This TMDL is considered successful when:

- All impaired water bodies identified in this report meet water quality assessment listing criteria for Category 1, meeting water quality standards (including Natural Conditions criteria as determined by Ecology Policy WQP 1-11).
- Wasteload allocations (WLA) are integrated into all National Pollutant Discharge Elimination System (NPDES) permits to prevent future degradation of surface waters, and to ensure that permittees meet the conditions of the permits.
- The TMDL implementation plan is successfully implemented and there is ongoing adaptive management in the TMDL project area so that there is continuous identification and correction, through technical assistance or enforcement, of nonpoint source pollution related to poor management of land use activities.

Why this matters

The rivers, creeks, and lakes within the TMDL project boundary are affected by urbanization and the water quality problems created by polluted stormwater. Polluted stormwater runoff can send bacteria, nutrients, sediments, oil, grease, and toxic substances into surface waters. These rivers and creeks waters are also influenced by nonpoint source (NPS) pollution outside of the Olympia, Lacey, and Tumwater urbanized areas.

Fecal coliform bacteria (referred to as “bacteria”) are ubiquitous in NPS pollution as well as in stormwater. Human and animal waste often contains many kinds of bacteria, viruses or other pathogens that can make people sick. When we find fecal coliform bacteria in water, we know that human or animal waste (feces) may also be in the water. Bacteria can get into our waters from untreated or partially treated discharges from wastewater treatment plants, improperly functioning sewage systems, pets, domestic animals, and wildlife.

Salmonids depend on cool, oxygenated water to survive. If a river is too warm it cannot hold as much dissolved oxygen, and low dissolved oxygen can stress or kill juvenile and adult fish. Ecology is required to protect salmonids listed as threatened or endangered under the Endangered Species Act (ESA) or identified as a beneficial use in our state water quality standards.

pH is the measure of the acidity or alkalinity of the water body. Fish and other aquatic species thrive in water with pH values between 6.5 and 8.5 (7 is neutral). When pH values are outside this range, other contaminants in the water may become more harmful to aquatic life.

Turbidity is cloudy or muddy water, which can irritate fish gills and reduce a fish’s ability to find food. Turbidity is closely related to suspended sediment, which can carry harmful chemicals such as pesticides or other toxics into the water. When fine sediment settles to the bottom of a water body, it can suffocate spawning nests (called redds) of threatened and endangered salmon.

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What is a Total Maximum Daily Load (TMDL)

A total maximum daily load (TMDL) is a numerical value representing the highest pollutant load a surface water body can receive and still meet water quality standards. We need to reduce or eliminate any amount of pollution over the TMDL level to achieve clean water. The Washington State Department of Ecology (Ecology) also refers to a group of pollutant load allocations within a watershed as a TMDL.

Federal Clean Water Act requirements

The Clean Water Act (CWA) established a process to identify and clean up polluted waters. The CWA requires each state to develop and maintain water quality standards that protect, restore, and preserve water quality. Water quality standards consist of (1) a set of designated uses for all water bodies, such as salmon spawning, swimming, and fish & shellfish harvesting; (2) numeric and narrative criteria to achieve those uses; and (3) an antidegradation policy to protect high quality waters that surpass these conditions.

The Water Quality Assessment (WQA) and the 303(d) List

Every two years, states are required to prepare a list of water bodies that do not meet water quality standards. This is called the CWA 303(d) list. In Washington State, this list is part of the Water Quality Assessment (WQA) process.

To develop the WQA, Ecology compiles its own water quality data along with data from local, state, and federal governments, tribes, industries, and citizen monitoring groups. All data in this WQA are reviewed to ensure they were collected using appropriate scientific methods before they are used to develop the assessment. The WQA divides water bodies into five categories. Those not meeting standards are given a Category 5 designation, which collectively becomes the 303(d) list.

Category 1 – Meets standards for parameter(s) for which it has been tested.

Category 2 – Waters of concern.

Category 3 – Waters with no data or insufficient data available.

Category 4 – Polluted waters not requiring a TMDL because they:

- 4a. – Have an approved TMDL project under implementation.
- 4b. – Have a pollution control program in place that should solve the problem.
- 4c. – Are impaired by a non-pollutant such as low water flow, dams, or culverts.

Category 5 – Polluted waters require a TMDL – the 303(d) list.

Further information is available at Ecology's Water Quality Assessment website (www.ecy.wa.gov/programs/wq/303d/).

The CWA requires that a TMDL be developed for each of the water bodies on the 303(d) list.

TMDL process overview

Ecology uses the 303(d) list to prioritize and initiate TMDL studies across the state. The TMDL study identifies pollution problems in the watershed and specifies how much pollution must be reduced or eliminated to achieve water quality standards. Ecology, with the assistance of local, state, and federal governments, tribes, agencies, and the community, develops a plan to control and reduce pollution sources as well as a monitoring plan to assess effectiveness of the water quality improvement activities. This comprises the *water quality improvement report* (WQIR) *and implementation plan* (IP). The IP section identifies specific tasks, responsible parties, and timelines for reducing or eliminating pollution sources and achieving clean water.

After the public comment period, Ecology addresses the comments as appropriate. Then, Ecology submits the TMDL to the U.S. Environmental Protection Agency (EPA) for approval.

Who should participate in this TMDL process?

Nonpoint source (NPS) pollutant load targets have been set in this TMDL and described in the Load Allocation section. Because NPS pollution comes from diffuse sources, all upstream watershed areas have the potential to affect downstream water quality. Therefore, all potential NPS in the watershed must use the appropriate best management practices (BMPs) to reduce impacts to water quality. The area subject to the TMDL is shown in Figure 1 in the Executive Summary.

Similarly, all point source dischargers in the watershed must also comply with the TMDL. The list of permitted point sources is given in Tables 9 and 10. Ecology permit managers will work with the permittees to ensure they meet the conditions of their permit as well as the wasteload allocations and implementation actions prescribed in this TMDL. Permittees are required to submit discharge monitoring reports (DMRs) which include the parameters of their wasteload allocation. Municipal Stormwater permittees do not currently need to submit DMRs, but are subject to the same monitoring requirements and must submit the monitoring results with the Municipal Stormwater Permit Annual Report, as required by the permit.

Other stakeholders in the TMDL process include:

- Black Hills Audubon Society
- Capitol Lake Improvement and Protection Association (CLIPA)
- Deschutes Estuary Restoration Team (DERT)
- Environmental Protection Agency (EPA), U.S.
- Lacey, City of
- LOTT Clean Water Alliance
- Olympia, City of
- Olympia, Port of
- Squaxin Island Tribe
- Thurston Conservation District
- Thurston County

- Tumwater, City of
- Washington State agencies: Department of Agriculture (WSDA), Department of Fish and Wildlife (WDFW), Department of Health (DOH), Department of Natural Resources (WDNR), Department of Transportation (WSDOT)
- Watershed residents and interested citizens

Because the pollution problems in this watershed are primarily nonpoint in origin, watershed residents are a critical group that needs to participate in this process. The development of this TMDL includes a public process, and the implementation and success of this TMDL depends on everyone, from a sand and gravel mining facility to local governments, and ultimately watershed residents to each do their part to reduce their pollution impact on the Deschutes River and Percival Creek watersheds as well as the other tributaries that drain to Budd Inlet.

Elements the Clean Water Act requires in a TMDL

Loading capacity, allocations, seasonal variation, margin of safety, and reserve capacity

The *loading capacity* for a water body is the amount of a given pollutant that a water body can receive and still meet water quality standards. The loading capacity provides a reference for calculating the amount of pollution reduction needed to bring a water body into compliance with the standards.

The portion of the receiving water's loading capacity assigned to a particular source is a *wasteload* or *load* allocation. If the pollutant comes from a discrete (point) source subject to a National Pollutant Discharge Elimination System (NPDES) permit, such as the discharge pipes from a municipal or industrial facility, that facility's share of the loading capacity is called a *wasteload allocation (WLA)*. If the pollutant comes from diffuse (nonpoint) sources not subject to an NPDES permit, such as general residential or farm runoff, the cumulative share is called a *load allocation (LA)*.

The TMDL must also consider *seasonal variations* and include a *margin of safety* that takes into account any lack of knowledge about the causes of the water quality problem or its loading capacity. A *reserve capacity* for future pollutant sources is sometimes included as well. Therefore, a TMDL is the sum of the wasteload and load allocations, any margin of safety, and any reserve capacity. The TMDL must be equal to or less than the loading capacity.

Surrogate measures

When it is difficult to measure a pollutant allocation directly, a surrogate measure may be used to provide more meaningful and measurable pollutant loading targets. EPA regulations [40 CFR 130.2(i)] allow the use of "other appropriate measures" in a TMDL. The Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program (EPA, 1998) includes the following guidance on the use of surrogate measures for TMDL development:

> *When the impairment is tied to a pollutant for which a numeric criterion is not possible, or where the impairment is identified but cannot be attributed to a single traditional "pollutant," the state should try to identify another (surrogate) environmental indicator*

that can be used to develop a quantified TMDL, using numeric analytical techniques where they are available, and best professional judgment (BPJ) where they are not.

The surrogate measure must be designed to meet water quality standards, including both numeric and narrative criteria and the water body's designated uses. A surrogate measure can be assigned to a nonpoint source load allocation (for example, effective shade targets to reduce stream temperature) or to a point source wasteload allocation (for example, stormwater flow or percent impervious surface).

This TMDL uses effective riparian shade as a surrogate measure of solar heat flux. Effective shade is defined as the fraction of the potential solar shortwave radiation blocked by vegetation or topography before it reaches the stream surface. Turbidity is a surrogate for fine sediment since it is already a water quality monitoring requirement in NPDES general permits.

Why Ecology Conducted a TMDL Study in this Watershed

Background

Ecology began this project in 2003 to address the impaired water bodies on the 1998 303(d) list. Field data collection occurred during 2003-2004. That data was used in the TMDL analysis, along with data collected by the Squaxin Island Tribe, Thurston County, and the Thurston Conservation District. The Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report: Water Quality Study Findings (referred from herein as the Technical Report) by Roberts et al. (2012) included an analysis of pollutant loading and pollutant reduction scenarios for all rivers and streams within the Budd Inlet watershed, Capitol Lake, as well as for marine water within Budd Inlet.

Because the nature of the dissolved oxygen impairments in Budd Inlet is complex and affected by nutrient sources from outside of Budd Inlet, Ecology is taking a phased approach to this TMDL project. The first phase is represented by this TMDL WQIR/IP, which addresses the freshwater impairments identified in Table 1. Further modeling, informed by the South Puget Sound Dissolved Oxygen Study, Water Quality Model Calibration and Scenarios, (March 2014, Publication No. 14-03-004), is needed before the TMDL for the marine impairments in Budd Inlet can be completed. This study is available at: https://fortress.wa.gov/ecy/publications/SummaryPages/1403004.html. Completion of the marine TMDL, including Capitol Lake, will be the second phase of this approach.

Impairments addressed by this TMDL

The main uses to be protected by this TMDL are recreational contact, core summer salmonid habitat, and salmonid spawning, rearing, and migration. The uses will be protected by decreasing the loading of the following parameters into the water body.

Table 1: 2012 303(d) listings for pollutants addressed by this TMDL.

Water body	Parameter	WBID Code	NHD Reach Code	2012 Assessment Listing ID	Township Range Section
Budd Inlet Watershed					
Adams Creek	Bacteria	None	17110019007395	45462	19N-2W-25
			17110019007396	45695	19N-2W-26
	pH		17110019007395	50965	19N-2W-25
Butler Creek	Bacteria	None	17110019007492	45471	18N-2W-66
Butler Creek, SW Fork	Bacteria	None	17110019007492	45342	18N-2W-66
Ellis Creek	Bacteria	WA-13-0020	17110019007661	45480	18N-2W-53
Indian Creek	Bacteria	WA-13-1300	17110019020859	3758	18N-1W-18

Water body	Parameter	WBID Code	NHD Reach Code	2012 Assessment Listing ID	Township Range Section
				45213	18N-2W-24
				46410	18N-2W-52
				45026	18N-2W-41
Mission Creek	Bacteria	WA-13-1380	17110019020856	45212	18N-2W-64
				46102	18N-2W-53
Moxlie Creek	Bacteria	WA-13-1350	17110019007948	3759	18N-2W-41
				3761	18N-2W-41
				45252	18N-2W-41
				46432	18N-2W-56
Schneider Creek	Bacteria	None	17110019007705	45559	18N-2W-59
Deschutes River Watershed					
Ayer (Elwanger) Creek	Bacteria	WA-13-1015	17110016000187	5849	17N-1W-7
	pH	WA-13-1015	17110016000187	5850	17N-1W-7
	Dissolved Oxygen	WA-13-1015	17110016000187	5851	17N-1W-7
Chambers Creek	Bacteria	WA-13-1014	17110016000048	45560	18N-2W-36
Deschutes River	Bacteria	WA-13-1010	17110016000008	46499	17N-1W-7
			17110016000009	46500	17N-1W-19
			17110016000013	9881	16N-1E-18
	Dissolved Oxygen	WA-13-1010	17110016000007	10894	18N-2W-60
			17110016000008	47753	17N-1W-7
			17110016000009	47754	17N-1W-19
	Temperature	WA-13-1010	17110016000007	6576*	18N-2W-60
			17110016000010	7590	17N-1W-33
			17110016000007	48710	17N-2W-1
			17110016000008	48711	17N-1W-7
				48712	17N-2W-13
			17110016000009	48713	17N-1W-19
				48714	17N-1W-29
				48715	17N-1W-28
			17110016000011	48717	16N-1W-2
			17110016000012	48718	16N-1W-40
			17110016000013	9439	16N-1E-18
	Bacteria	WA-13-1020	17110016000014	46210	16N-2E-30
	Dissolved Oxygen	WA-13-1020	17110016000014	47756	16N-2E-30
	Fine Sediment	WA-13-1020	17110016000014	6232	16N-2E-30
	Temperature	WA-13-1020	17110016000019	7588*	15N-3E-7
			17110016000014	7592*	16N-2E-30

Water body	Parameter	WBID Code	NHD Reach Code	2012 Assessment Listing ID	Township Range Section
			17110016000016	7593	16N-2E-34
			17110016000014	7595	16N-1E-26
			17110016000013	48720	16N-1E-20
				48721	16N-1E-22
			17110016000015	48724	16N-2E-29
			17110016000026	48726	15N-3E-10
Huckleberry Creek	Temperature	WA-13-1024	17110016000085	3757	15N-3E-17
Lake Lawrence Creek	Dissolved Oxygen	None	17110016000056	47696	16N-2E-30
Reichel Creek	Bacteria	WA-13-1022	17110016000057	3763	16N-1E-27
				45566	16N-1E-26
	Dissolved Oxygen	WA-13-1022	17110016000057	47714	16N-1E-26
	Temperature	WA-13-1022	17110016000057	48666	16N-1E-26
Spurgeon Creek	Bacteria	WA-13-1016	17110016000044	46061	17N-1W-19
Tempo Lake Outlet	Temperature	None	17110016000233	48696	17N-1W-28
Unnamed Creek (Trib to Deschutes River)	Temperature	None	17110016004539	7591*	16N-1E-18
Unnamed Spring (Trib to Deschutes River)	Temperature	None	17110016000009	48923	17N-1W-28
Percival Creek Watershed					
Black Lake Ditch	Dissolved Oxygen	None	17110016007722	47761	18N-2W-21
		None		47762	18N-2W-32
	pH	None	17110016007722	50990	18N-2W-32
	Temperature	None	17110016007722	48733	18N-2W-21
				48734	18N-2W-29
				48735	18N-2W-32
Percival Creek	Bacteria	WA-13-1012	17110016007720	46103	18N-2W-55
				46108	18N-2W-21
	Dissolved Oxygen	WA-13-1012	17110016007720	48085	18N-2W-55
				48086	18N-2W-21
	Temperature	WA-13-1012	17110016007720	42321	18N-2W-21
				48249	18N-2W-28
				48727	18N-2W-55
			17110016007733	48729	18N-2W-34

The listings identified with an asterisk in Table 1 led to the development of a TMDL study in this watershed, and the other listings originate from the research and data-gathering process for this study. Additional water-body segments were found that do not meet state water quality standards (see Table 2) but do not meet the Category 5 listing criteria for impaired waters. These are Category 2 listings of waters of concern, because they did not have enough data available to qualify as a Category 5 listing as defined in Ecology's Water Quality Policy 1-11. These segments are also addressed by this TMDL.

Table 2: Category 2 listings for pollutants addressed by this TMDL.

Water body	Parameter	WBID Code	NHD Reach Code	2012 Assessment Listing ID	Township Range Section
Budd Inlet Watershed					
Butler Creek NW Fork	Bacteria	None	17110019007449	45749	18N-2W-66
Butler Creek, SE Fork.	Bacteria	None	17110019013134	45343	18N-2W-66
Ellis Creek	pH	WA-13-0020	17110019007661	40613*	18N-2W-46
Ellis Creek NF	Bacteria	WA-13-0020	17110019007581	45731	18N-2W-43
Indian Creek	pH	WA-13-1300	17110019020859	50971	18N-1W-18
				50972	18N-2W-40
Moxlie Creek	pH	WA-13-1350	17110019007948	3762	18N-2W-41
Deschutes River Watershed					
Deschutes River	Bacteria	WA-13-1010	17110016000007	16722*	18N-2W-60
			17110016000007	46209	17N-2W-1
			17110016000013	9881	16N-1E-18
	Dissolved Oxygen	WA-13-1010	17110016000013	9437	18N-1W-18
		WA-13-1020	17110016000019	47757	15N-2W-12
	pH	WA-13-1010	17110016000008	50981	17N-1W-7
			17110016000009	50981	17N-1W-19
	Temperature	WA-13-1010	17110016000010	7594	16N-1W-3
Hard Creek	Dissolved Oxygen	WA-13-1034	17110016000094	47623	14N-3E-12
Huckleberry Creek	Bacteria	WA-13-1024	17110016000085	45779	15N-3E-17
Lake Lawrence Creek	pH	None	17110016000056	50929	16N-2E-30
Reichel Creek	pH	WA-13-1022	17110016000057	50945	16N-1E-26
Percival Creek Watershed					
Black Lake Ditch	Bacteria	None	17110016007722	46082	18N-2W-21
				46090	18N-2W-32
Percival Creek	Bacteria	WA-13-1012	17110016007733	46415	18N-2W-34

This watershed has other water quality issues that are not addressed in this TMDL (Table 3). In particular, the following additional 303(d) listings for parameters other than those previously listed occur in the study area, but are not addressed with pollutant allocations in this report. As described in Roberts et al. (2012), instream flows may be determined through watershed planning under the Watershed Planning Act (90.82), but no approved plan exists for the Deschutes River watershed. This report does not establish numeric instream flows or large woody debris targets. However, the technical report evaluated the effects of flows on temperatures and channel restoration including enhancing instream large woody debris (LWD) to improve temperature and nutrient dynamics. Implementation actions to reduce channel widths and increase channel complexity (adding LWD) for the Deschutes River are included in the Implementation Plan section of this report. They can be informed by the Final Deschutes River Watershed Recovery Plan for coho salmon developed by the Squaxin Island Tribe (Anchor Environmental, LLC, 2008). Source reductions for total phosphorus in Lake Lawrence should be evaluated through direct implementation of BMPs to reduce sources due to residential land uses around the lake, as well as possible in-lake management activities. Polychlorinated biphenyls (PCBs) in Offutt and Ward lakes require additional source identification.

Table 3: Additional 2008 303(d) listings not addressed with pollutant allocations in this report.

Water body	Parameter	Listing ID	Category	Medium
Deschutes River				
Deschutes River	Instream Flow	6194	4C	Habitat
Deschutes River	Instream Flow	6195	4C	Habitat
Deschutes River	Large Woody Debris	6224	4C	Habitat
Deschutes River	Large Woody Debris	6225	4C	Habitat
Deschutes River Watershed				
Lawrence Lake	Total Phosphorus	6348	5	Water
Offutt Lake	PCB	52676	5	Tissue
Ward Lake	PCB	7022	5	Tissue

As of the finalizing of this report, Ecology has not submitted the 2014 draft Water Quality Assessment (WQA) to EPA for approval. The draft WQA included eight new Category 2 and Category 5 listings, included in Table 4. Ecology's WQP Policy 1-11 identifies the process for the assessment of new water quality data after EPA approves a TMDL. Future data indicating waterbody impairment, as defined by the Category 5 listing criteria, will be placed in Category 4a.

Table 4: Draft 2014 Water Quality Assessment Listings for Categories 2 and 5.

<table>
<tr><th>Water body</th><th>Parameter</th><th>WBID Code</th><th>NHD Reach Code</th><th>2014 Draft Assessment Listing ID</th><th>Proposed Category</th><th>Township</th></tr>
<tr><td rowspan="2">Deschutes River</td><td>DO</td><td rowspan="2">WA-13-1010</td><td rowspan="2">17110016000012</td><td>77605</td><td>2</td><td rowspan="2">16N-1E-18</td></tr>
<tr><td>Bacteria</td><td>74210</td><td>2</td></tr>
<tr><td>Butler Creek</td><td>Bacteria</td><td>None</td><td>17110019013133</td><td>74253</td><td>2</td><td>18N-2W-66</td></tr>
<tr><td>Indian Creek</td><td>Bacteria</td><td>WA-13-1300</td><td>17110019000800</td><td>74218</td><td>5</td><td>18N-2W-41</td></tr>
<tr><td>Unnamed Creek (Trib</td><td>Bacteria</td><td>None</td><td>17110019007621</td><td>74240</td><td>2</td><td>18N-2W-43</td></tr>
</table>

Water body	Parameter	WBID Code	NHD Reach Code	2014 Draft Assessment Listing ID	Proposed Category	Township
to Ellis Creek)						
Adams Creek	Temperature	None	17110019007396	73235	2	19N-2W-26
Ayer Creek (Elwanger)	Temperature	WA-13-1015	17110016000187	73229	5	17N-1W-7
Spurgeon Creek	Temperature	WA-13-1016	17110016000044	73225	2	NA

Water Quality Standards and Numeric Targets

This TMDL is based on surface water quality standards adopted in December 2006 and approved by the EPA in February 2008. Specific information on the 2008 Water Quality Standards is available at Ecology's website at www.ecy.wa.gov/programs/wq/swqs. The water quality standards are found in WAC 173-201A.

Numeric criteria are developed to protect designated uses. Individual numeric criteria are based on specific data and scientific assessment of adverse effects. The numeric criteria are numbers that specify limits or ranges of chemical concentrations such as oxygen, or physical conditions such as water temperature.

Bacteria criteria are set to protect people who work and play in and on the water from waterborne illnesses. In Washington State, Ecology's water quality standards use fecal coliform as an indicator bacteria for the state's freshwaters (for example, lakes and streams). Fecal coliform in water indicates the presence of waste from humans and warm-blooded animals. Waste from warm-blooded animals is more likely to contain pathogens causing illness in humans than waste from cold-blooded animals. The fecal coliform criteria are set at levels shown to maintain low rates of serious intestinal illness (gastroenteritis) in people.

Numeric criteria for temperature and dissolved oxygen are established to protect salmonids and other freshwater biota. Each water body has a beneficial use designation and numeric criteria. The freshwater beneficial uses for salmon and human recreation within the TMDL boundary are shown in Figure 3 and Table 5. Ecology has obligations under the Endangered Species Act (ESA) to address pollution negatively impacting threatened and endangered salmon species.

Table 5: Beneficial uses protected by water quality standards for each water body.

Water body	Uses to Protect
Deschutes River and its tributaries from the mouth to and including the tributary from Offut Lake	**Aquatic Uses**: Salmonid Spawning, Rearing, and Migration **Recreational Uses**: Primary Contact
Deschutes River and its tributaries upstream of the Offut Lake tributary to the national forest boundary	**Aquatic Uses**: Core Summer Salmonid Habitat **Recreational Uses**: Primary Contact
Percival Creek and Black Lake Ditch	**Aquatic Uses:** Core Summer Salmonid Habitat

Water body	Uses to Protect
	Recreational Uses: Extraordinary Primary Contact
Tributaries to Budd Inlet	**Aquatic Life Uses**: Salmonid Spawning, Rearing and Migration Habitat **Recreational Uses**: Primary Contact

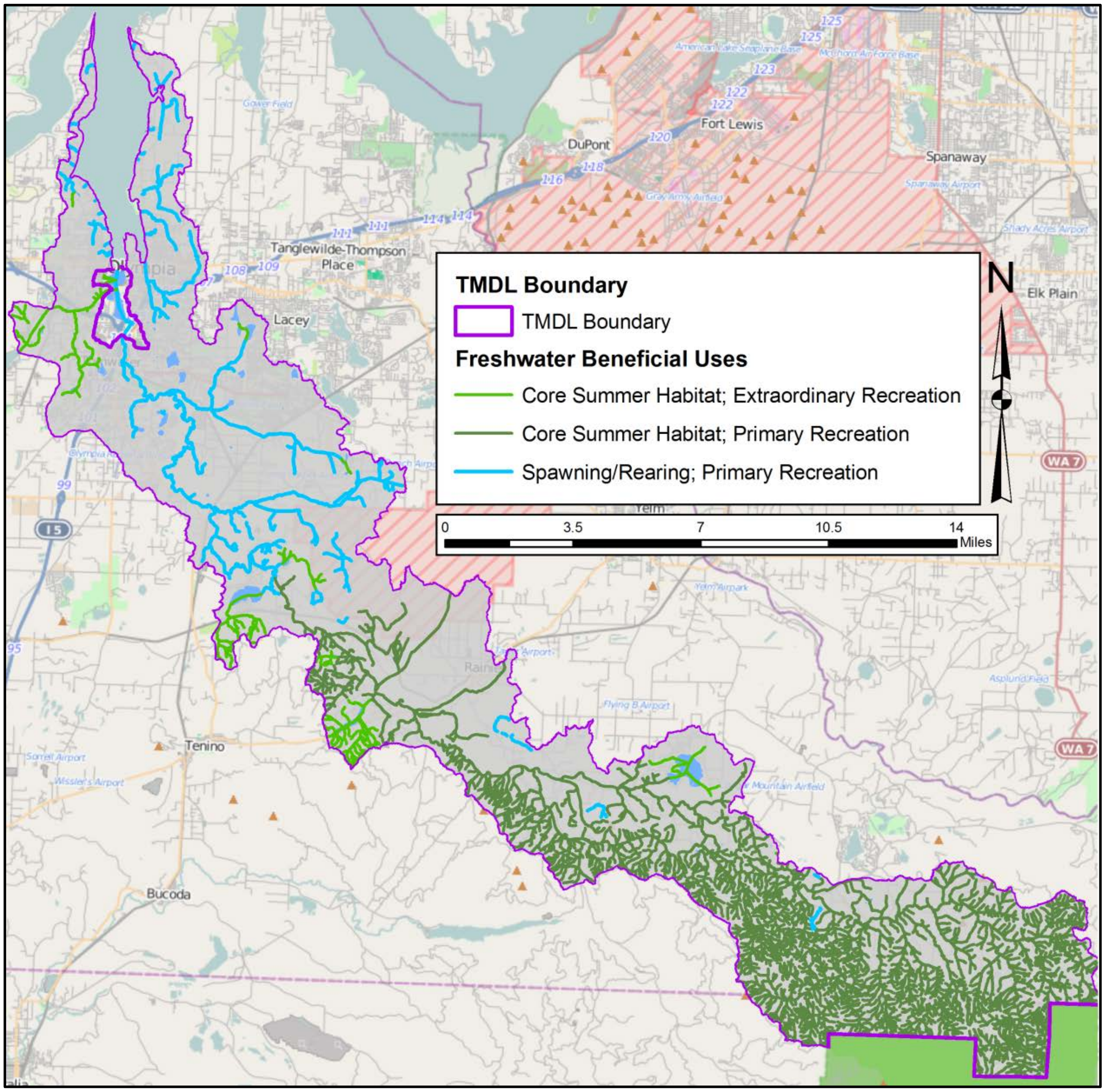

Figure 3: Freshwater beneficial uses for rivers and streams in the Deschutes River/Budd Inlet Watersheds.

Criteria for temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment apply to the water bodies with the beneficial uses identified in Table 5.

Temperature

Segments of the Deschutes River, Percival Creek, and their tributaries are identified on the Washington State 2008 303(d) list as being impaired by excess temperature (see Table 1).

Temperature affects the physiology and behavior of fish and other aquatic life. It also affects the physical and biological properties of the water body which can increase the harmful effects of other pollutants and stream characteristics. For example, the warmer a stream is, the less oxygen it can hold for the organisms the stream supports. Therefore, temperature is an influential factor which can limit the distribution and health of aquatic life.

Temperatures in streams fluctuate over the day and year in response to changes in solar energy inputs, meteorological conditions, river flows, groundwater input, and other factors. Human activities can influence each of these factors to impair the health of the water by increasing the temperature, or by improving these conditions to promote cooler temperatures.

Washington's numeric water quality criteria are based on the temperature needs of the most sensitive species supported by the water body. These cool temperature requirements are expressed as the highest allowable 7-day average of the daily maximum temperatures (7-DADMax) in a water body – or in some specified waterbodies, the allowable daily maximum temperature. The 7-DADMax temperatures represent conditions in the thalweg or main stream channel; therefore, it is assumed that aquatic species have access to cold water refugia where they can reside in water that is cooler than the 7-DADMax temperatures. The 7-DADMax temperature criterion also assumes that colder temperatures are available to protect fish at night.

In the state water quality standards, aquatic life use categories are described using key species (salmon versus warm-water species) and life-stage conditions (spawning versus rearing) [WAC 173-201A-200]. In this TMDL report, the following numeric criteria apply to the designated aquatic life uses (see Table 5 and Figure 3 for where uses apply):

(1) To protect the designated aquatic life uses of "Core Summer Salmonid Habitat", the highest 7-DADMax temperature must not exceed 16°C (60.8°F) more than once every 10 years on average.

(2) To protect the designated aquatic life uses of "Salmonid Spawning, Rearing, and Migration", the highest 7-DADMax temperature must not exceed 17.5°C (63.5°F) more than once every 10 years on average.

Washington State uses the previously-described criteria to ensure full protection for its designated aquatic life uses. The standards recognize, however, that waters display thermal heterogeneity – some are naturally cooler, and some are naturally warmer. When a water body is naturally warmer than the previously-described numeric criteria, the state limits the allowance for additional warming due to human activities. In this case, the combined effects of all human activities must not cause more than a 0.3 °C (0.54 °F) increase above the naturally warmer temperature condition.

This TMDL report estimates whether the water body is naturally warmer or naturally cooler than the criteria, using a computer model that simulates the physical and atmospheric processes affecting stream temperatures. When a water body does not meet its assigned criteria due to natural climatic or landscape attributes, the standards state that the natural conditions constitute the water quality criteria (WAC 173-201A-260 (1)(a)). This provision of the water quality standards is implemented by using the modeled natural condition as the TMDL target. Only after the allocations in this TMDL are fully implemented, or designated uses of the water body are being met will Ecology consider a formal rule change to adopt site-specific criteria, as provided by WAC 173-201A-430. At that point the natural condition, determined by empirical and modeled data, will be used to set new water quality criteria through a public rule-making process.

Temperature modeling is generally a two-step process. First, the current river temperatures are measured through field monitoring. The watershed's current physical characteristics (for example, amount of shade provided by the canopy, river geometry, sources of flows, significant cold water flows, point source inputs) are also recorded. Using this information, a river model is created that simulates current temperature conditions. The model is calibrated by comparing the simulated temperatures with in-stream measurements.

Second, the calibrated model is used to evaluate different scenarios – including a "system thermal potential" or "system potential" scenario that represents the natural condition of the river system. Physical characteristics of the river are changed in the model to simulate the natural condition. Examples of these changes include removing point source discharges, changing the channel geometry to simulate a natural channel, and increasing the riparian shade to represent a natural forest. The model provides a plausible conservative estimate of natural conditions in rivers and streams, especially in the absence of adequate data from non-disturbed reference conditions.

The water quality model provides only an estimate of the natural condition temperatures; therefore, a degree of uncertainty is inherent in the model results. Ecology addresses uncertainty in model applications using statistical measure for goodness-of-fit and incorporation of an implicit margin of safety. Thus, critical conditions that are used for the evaluation of natural conditions incorporate uncertainty in major environmental variables (for example, stream flows and meteorological conditions).

For this TMDL report, Ecology also assessed the uncertainty of the natural condition estimates on the mainstem Deschutes River by assessing the water quality model's sensitivity to the following changes, as discussed in the TMDL Analysis section from Roberts et al (2012) on "QUAL2Kw Temperature Model Sensitivity Analyses" (see Figures 47 through 54, pp. 122-128 of Roberts et al 2012).

(1) Cooler headwater and tributary temperatures.

(2) Effect of varying groundwater temperature.

(3) Effect of varying air temperature.

(4) Effect of varying channel bottom width.

(5) Increased system potential vegetation (SPV) height and density.

(6) Effect of varying Manning's n.

(7) Enhanced hyporheic exchange.

To the extent that these (non-discharge) influences on temperature have existed historically, or can be put in place now, these sensitivity analyses provide estimates of the variability associated with the natural condition estimates. This variability should be considered when making future site-specific criteria, impairment, land-use, permitting, or restoration decisions.

Global climate change

Changes in climate are expected to affect both water quantity and quality in the Pacific Northwest (Casola et al., 2005). Studies of the Pacific Northwest region's hydrology indicate a declining trend in snow water storage coupled with earlier spring snowmelt and earlier peak spring streamflows (Hamlet et al., 2005). Factors affecting these changes include climate influences at both annual and decadal scales, and air temperature increases. Increases in air temperatures result in more precipitation falling as rain rather than snow and earlier melting of the winter snowpack. Summer streamflows in the Deschutes watershed depend on the precipitation and infiltration stored during the wet season. More precipitation in winter with less snowpack in the Deschutes headwaters will mean higher winter flows and runoff. Baseflow trends will still depend on groundwater stored in the system during the wet season and higher summer temperatures will raise instream temperatures especially if a relatively dry water year occurs.

Ten climate change models were used to predict the average rate of climatic warming in the Pacific Northwest (Mote et al., 2005). The average warming rate is expected to be in the range of 0.1-0.6°C (0.2-1.0°F) per decade, with a best estimate of 0.3°C (0.5°F) (Mote et al., 2005). Eight of the 10 models predicted proportionately higher summer temperatures, with three indicating summer temperature increases at least two times higher than winter increases. Summer streamflows are also predicted to decrease as a consequence of global climate change (Hamlet and Lettenmaier, 1999).

The expected changes coming to our region's climate highlight the importance of protecting and restoring the mechanisms that help keep stream temperatures cool. Stream temperature improvements obtained by growing mature riparian vegetation corridors along stream banks, reducing channel widths, and enhancing summer baseflows may all help offset the changes expected from global climate change – keeping conditions from getting worse. It will take considerable time, however, to reverse those human actions that contribute to excess stream warming. The sooner such restoration actions begin, and the more complete they are, the more effective we will be in offsetting some of the detrimental effects on our stream resources.

As a consequence of climate change, these efforts may not be sufficient to meet the numeric temperature criteria in the entire study area or during all years. However, they will maximize the extent and frequency of healthy temperature conditions, creating long-term and crucial benefits for fish and other aquatic species. As global climate change progresses, the thermal regime of the stream itself will change due to reduced summer streamflows and increased air temperatures.

Ecology is writing this TMDL to meet Washington's water quality standards based on current and historic climate patterns. Changes in stream temperature associated with global climate change may require further modifications to the human-source allocations in the future. However, the best way to preserve our aquatic resources and minimize future disturbance to human industry would be to begin now to protect as much of the thermal health of our streams as possible.

Fecal coliform bacteria

Bacteria criteria are set to protect people who work and play in and on the water from waterborne illnesses. Ecology's water quality standards use fecal coliform as indicator bacteria for the state's freshwaters (for example, lakes and streams). Fecal coliform in water indicates the presence of waste from humans and warm-blooded animals. Waste from warm-blooded animals is more likely to contain pathogens that will cause illness in humans than waste from cold-blooded animals. The fecal coliform criteria are set at levels shown to maintain low rates of serious intestinal illness (gastroenteritis) in people. In this TMDL report, the following numeric criteria apply to the human contact uses (see Table 5 and Figure 3 for where uses apply):

1. The **Extraordinary primary contact** use is intended for waters capable of "providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas." To protect this use category: "fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 100 colonies/100 mL."

2. The **Primary contact** use is intended for waters "where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and waterskiing." The use is to be designated to any waters where human exposure is likely to include exposure of the eyes, ears, nose, and throat. To protect this use category: "fecal coliform organism levels must not exceed a geometric mean value of 100 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies/100 mL."

3. The **Secondary contact** use is intended for waters "where a person's water contact would be limited (for example, wading or fishing) to the extent that bacterial infections of the eyes, ears, respiratory or digestive systems, or urogenital areas would be normally avoided." To protect this use category: "Fecal coliform organism levels must not exceed a geometric mean value of 200 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 400 colonies/100 mL."

Compliance is based on meeting both the geometric mean criterion and the 10% of samples (or single sample if less than 10 total samples) limit. These two measures, used in combination, ensure that bacterial pollution in a water body will be maintained at levels that will not cause a greater risk to human health than intended. Bacteria sample averaging periods are based on the critical periods in Table 12.

The criteria for fecal coliform are based on allowing no more than the pre-determined risk of illness to humans that work or recreate in a water body. The criteria used in the state standards are designed to allow seven or fewer illnesses out of every 1,000 people engaged in primary contact activities. Once the concentration of fecal coliform in the water reaches the numeric criterion, human activities that would increase the concentration above the criteria are not allowed. If the criterion is exceeded, the state will require that human activities be conducted in a manner that will bring fecal coliform concentrations back into compliance with the standard.

If natural levels of fecal coliform, such as those from wildlife, cause criteria to be exceeded, no allowance exists for human sources to measurably increase bacterial pollution. While the specific level of illness rates caused by animal versus human sources has not been quantitatively determined, warm-blooded animals (particularly those that are managed by humans and thus exposed to human-derived pathogens as well as those of animal origin) are a common source of serious waterborne illness for humans.

Dissolved oxygen

The health of fish and other aquatic species depends on maintaining an adequate supply of oxygen dissolved in the water. Oxygen levels affect growth rates, swimming ability, susceptibility to disease, and the relative ability to endure other environmental stressors and pollutants. While direct mortality due to inadequate oxygen can occur, the state designed the criteria to maintain conditions that support healthy populations of fish and other aquatic life.

Oxygen levels can fluctuate over the day and night in response to changes in climatic conditions as well as respiration of aquatic plants and algae. Since the health of aquatic species is tied predominantly to the pattern of daily minimum oxygen concentrations, the criteria are the lowest 1-day minimum oxygen concentrations that occur in a water body.

In the state water quality standards, fresh water aquatic life use categories are described using key species (salmonid versus warm-water species) and life-stage conditions (spawning versus rearing). Minimum concentrations of dissolved oxygen (DO) are used as criteria to protect different categories of aquatic communities. In this TMDL, the following numeric criteria apply to the designated aquatic life uses (see Table 5 and Figure 3 for where uses apply):

(1) To protect the designated aquatic life use of **Core Summer Salmonid Habitat**, the lowest 1-day minimum oxygen level must not fall below 9.5 mg/L more than once every 10 years on average.

(2) To protect the designated aquatic life use of **Salmon and Trout Spawning, Rearing, and Migration**, the lowest 1-day minimum oxygen level must not fall below 8.0 mg/L more than once every 10 years on average.

The state uses the previously-described criteria to ensure that where a water body is naturally capable of providing full support for its designated aquatic life uses, that condition will be maintained. The standards recognize, however, that not all waters are naturally capable of staying above the fully protective dissolved oxygen criteria. When a water body is naturally lower in oxygen than the criteria, the standards provide an additional allowance for further depression of oxygen conditions due to human activities. In this case, the combined effects of all human activities must not cause more than a 0.2 mg/L decrease below that naturally lower oxygen condition.

While the criteria generally apply throughout a water body, they are not intended to apply to discretely anomalous areas such as in shallow stagnant eddy pools where natural features unrelated to human influences are the cause of not meeting the criteria. For this reason, the standards direct that one take measurements from well-mixed portions of the water body. For similar reasons, do not take samples from anomalously oxygen-rich areas. For example, in a poorly flushed embayment with nutrient problems sampling the surface layer during the mid-day may produce an anomalous high reading that is caused by the peak respiration cycle of the algae.

This TMDL study identified stream temperature as the biggest driver of DO saturation in the Deschutes River. Due to this finding, this TMDL sets load allocations for DO using temperature (solar radiation using kcal/day and effective shade) as one surrogate measure for determining TMDL compliance. A load allocation for nutrients was also established for the Deschutes River upstream of Offut Lake, where modeling suggests nutrient reductions (dissolved inorganic nitrogen and orthophosphate, both in kg/day) will also be necessary to help improve DO.

pH

The pH of natural waters is a measure of acid-base equilibrium achieved by the various dissolved compounds, salts, and gases. pH is an important factor in the chemical and biological systems of natural waters. pH both directly and indirectly affects the ability of waters to have healthy populations of fish and other aquatic species. This effect is important because the toxicity of many compounds is affected by pH. While some compounds (for example, cyanide) increase in toxicity at lower pH, others (for example, ammonia) increase in toxicity at higher pH. While there is no definite pH range within which aquatic life is unharmed and outside which it is damaged, there is a gradual deterioration as the pH values are further removed from the normal range. However, at the extremes of pH lethal conditions can develop. For example, extremely low pH values (<5.0) may liberate sufficient carbon dioxide (CO_2) from bicarbonate in the water to be directly lethal to fish.

While the pH criteria in the state water quality standards are primarily established to protect aquatic life, they also serve to protect waters as a source for domestic water supply. Water supplies with either extreme pH or that experience significant changes of pH even within otherwise acceptable ranges are more difficult and costly to treat for domestic water purposes. pH also directly affects the longevity of water collection and treatment systems, and low pH waters may cause compounds of human health concern to be released from the metal pipes of the distribution system.

Similar to dissolved oxygen (DO), pH impairments in the Deschutes River watershed are largely due to primary productivity. Water quality modeling of significant improvements in maximum daily pH will happen when there are reductions in solar radiation (kcal/day) due to increases of effective shade (percent effective shade).

In the state water quality standards for freshwater systems, two different pH criteria are established to protect aquatic life uses.

The following numeric criteria apply to protect the aquatic use designations (see Table 5 and Figure 3 for where uses apply):

(1) To protect the designated aquatic life uses of **Core Summer Salmonid Habitat**, pH must be kept within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

(2) To protect the designated aquatic life uses of **Salmonid Spawning, Rearing, and Migration**, pH must be kept within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.5 units.

Fine sediment

Fine sediment is governed by the narrative standards, and no numeric targets have been established in the water quality standards. The characteristic use to be protected is *Aquatic Life Habitat* which is impaired by harmful fine sediment levels. Salmonid Spawning, Rearing, and Migration and Core Summer Salmonid Habitat Aquatic Life uses would require healthy levels of fine sediment.

WAC-173-201A-260(2) includes protection from fine sediment levels that would be construed as deleterious. "Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters…."

The *Timber Fish and Wildlife Watershed Analysis Manual* (Washington Forest Practices Boards, 1997), Appendix F summarizes fish habitat surveys and metrics that characterize habitat quality. Table F-2 of the *Watershed Analysis Manual* presents various indices of habitat quality and establishes numerical thresholds for fines in gravel.

Table 6: Habitat quality associated with various levels of fine sediments
(Washington Forest Practices Board, 1997, Table F-2).

Percent fine sediments in gravels	Habitat quality
>17%	Poor
12 to 17%	Fair
<12%	Good

The original impairment was based on several reports documenting habitat alterations and human-caused contributions. Schuett-Hames and Flores (1994) used the *Watershed Analysis Manual* and rated fine sediment "poor" in reach 22 (RM 28.5, near Lake Lawrence). Squaxin Island Tribe data submitted by Jeff Dickison (1996) show fine sediment ranging from 15.5% to 22.5% above the threshold for good habitat. Dickison documented a stock of coho salmon, while

Baranski (1996) reclassified coho stocks as depressed. Toth (1991) documented human-caused contributions to these habitat alterations.

To address fine sediment loading to the Deschutes River, the load allocation in this water quality improvement report establishes a limit of fine sediment from anthropogenic sources throughout the Deschutes watershed. It identifies five specific reaches for focusing implementation activities to meet the level of 12% or less fine sediments in gravels. This percentage is considered good habitat quality for salmonids. Existing NPDES permits receiving wasteload allocations use turbidity as a surrogate for fine sediments. Since there are already benchmarks for turbidity in those permits (which this TMDL establishes as effluent limits) we determined they will be sufficient to meet the TMDL objectives for point sources.

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Watershed Description

Geographic setting

Ecology, in cooperation with the Squaxin Island Tribe, Thurston County, the cities of Olympia, Lacey, and Tumwater, and others, developed a water cleanup plan for the Deschutes River, Percival Creek, and Budd Inlet watersheds.

The geographic boundary for this phase of the TMDL (Figure 1) extends from the headwaters of the Deschutes River northward to Capitol Lake, entirely within Water Resource Inventory Area (WRIA) 13, the Percival Creek watershed including Black Lake Ditch, and tributaries to Budd Inlet. This TMDL project *does not* include the marine waters of Budd Inlet nor Capitol Lake. The marine waters and the lake will be addressed subsequent to the approval of this TMDL. The study area includes portions of Thurston County and Lewis County, as well as the cities of Olympia, Lacey, Tumwater, and Rainier. The Deschutes River originates within the steep, heavily-forested Bald Hills and flows generally northwest for approximately 60 miles before discharging into Capitol Lake.

Land uses

The northern part of the TMDL project boundary is urbanized and within incorporated city boundaries for Olympia, Tumwater, and a small part of Lacey. These three municipalities and Thurston County are Western Washington Phase II Municipal Stormwater general permittees. Budd Inlet tributaries outside of incorporated city boundaries include residential and small scale agricultural land uses.

The central part of the watershed is dominated by relatively low-relief woodlands and grass-covered prairies that formed upon glacial terraces, outwash plains, and other remnant features of the most recent continental glaciations. The central Deschutes River watershed supports commercial dairies, rangeland, Christmas tree plantations, and other small-scale agricultural uses.

The southern parts of the Deschutes River watershed, where the headwaters originate, include lands actively managed for commercial timber production as well as rural residential and agricultural uses. Privately-owned forest lands are managed according to the state forest practices rules and will implement this TMDL through compliance with those rules. Small portions of the headwaters are within the Gifford Pinchot National Forest but are not included in this TMDL project.

Percival Creek drains a small urban watershed that includes portions of the cities of Olympia and Tumwater. The east fork of the creek originates at Trosper Lake near Tumwater, at an elevation of approximately 150 feet, and flows generally north to its confluence with the Black Lake Ditch. The ditch was constructed in 1922 to drain water from Black Lake to Budd Inlet. Black Lake sits at the drainage divide flowing into both the Black River, tributary of the Chehalis River, to the south and Black Lake Ditch to the north. From its confluence with the Black Lake Ditch, Percival Creek trends generally east/northeast before emptying into Capitol Lake.

Although Black Lake and its tributaries are not included in this report, Black Lake Ditch was evaluated as a tributary to Percival Creek.

The Deschutes River has viable populations of resident cutthroat trout, steelhead trout, anadromous (sea-run) cutthroat trout, coho, and Chinook salmon (Haring and Konovsky, 1999). Anadromous fish distribution along the Deschutes River proper was historically limited to the reach below the lower falls at Tumwater. However, a fish ladder was installed at the falls in 1954 to provide access to spawning and rearing habitat in the upper watershed.

Climate

The study area climate is characterized by generally mild-wet winters and warm-dry summers. Throughout much of the watershed, winter air temperatures rarely drop below freezing due to the moderating effects of the Pacific Ocean and the watershed's relatively low elevation (from sea level to 3,870 feet). During most years, summer daily maximum air temperatures are typically in the mid-to-high 70s (21-26°C) and rarely exceed 80°F (26.7°C) for more than a few days at a time. Approximately 80% of Olympia's annual precipitation falls between October and March. December is typically the wettest month with an average rainfall of 8.23 inches, while July is typically the driest, with an average rainfall of 0.73 inches. The effects of global climate change in this watershed are likely to increase the number of high precipitation events during winter and spring months.

Facilities with NPDES permits

Ecology manages the National Pollutant Discharge Elimination System (NPDES) which includes the Industrial Stormwater General Permit (ISGP), the Western Washington Phase II Municipal Stormwater Permit, and the Sand and Gravel General Permit (SGGP). These permitted facilities receiving a wasteload allocation in this TMDL are shown in Figure 4 and listed in Tables 9 and 10.

This TMDL also includes a wasteload allocation for Construction Stormwater General Permit (CSWGP) discharges. Operators/owners of construction sites are required to apply for coverage under the CSWGP for clearing, grading, and/or excavation that result in the disturbance of one or more acres and that discharges to surface waters of the state. The cities of Olympia, Lacey, and Tumwater, and Thurston County are required to inspect construction sites within their respective municipal stormwater permit area, including sites under one acre. Ecology and the municipalities enforce their respective laws and codes on construction sites, which include proper BMP installation and maintenance.

Construction sites can contribute significantly to total sediment and pH pollution of rivers and streams if appropriate best management practices (BMPs) are not followed as required in the general permit.

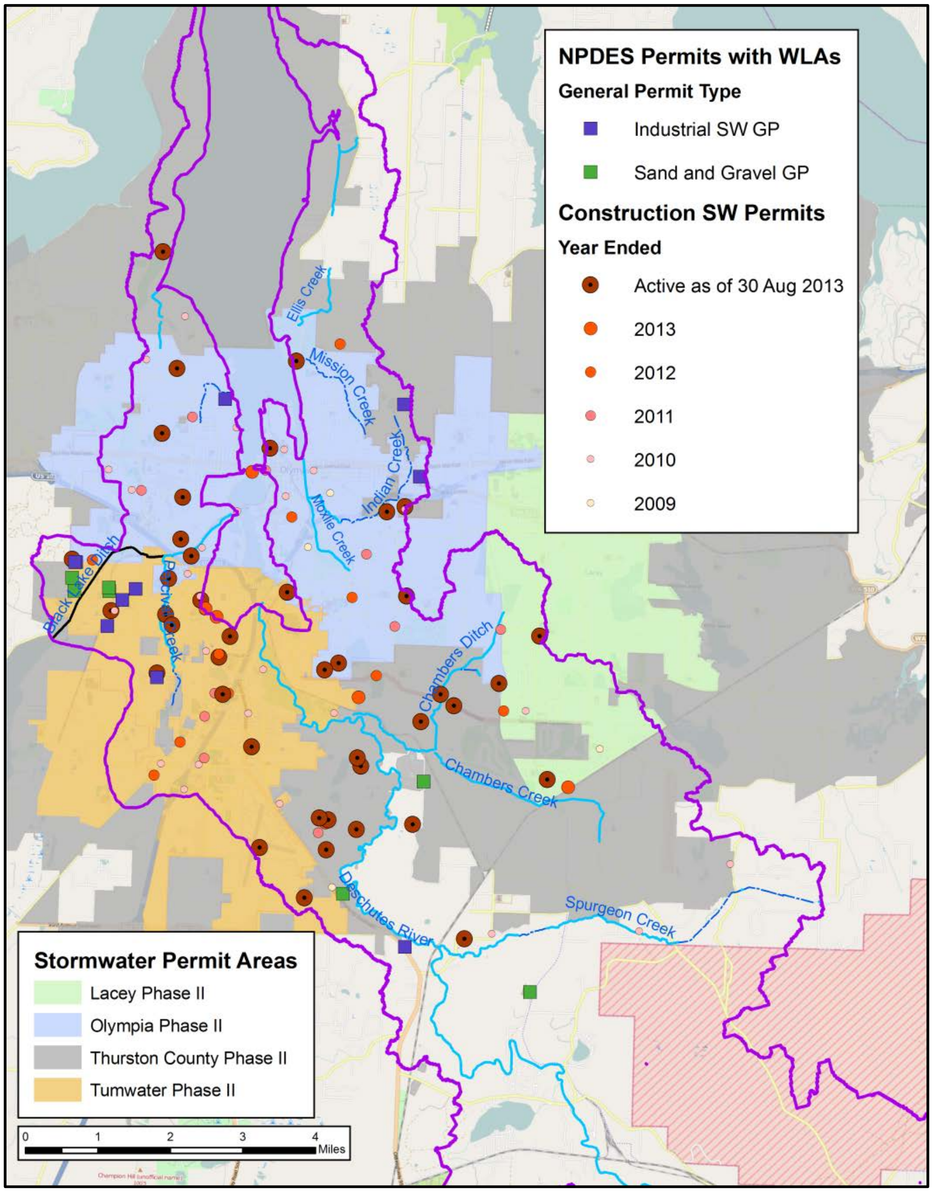

Figure 4: Map of NPDES permits within the TMDL boundary that will receive wasteload allocations (WLA).

Current Western Washington Phase II Municipal Stormwater permit boundaries are shown but are subject to revision. The WLA will apply to the all discharges within their permit boundaries from now into the future.

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Goals and Objectives

Project goals

The goals for this TMDL project are to establish pollution reduction allocations and an implementation plan for best management practices (BMPs) for land use activities and National Pollutant Discharge Elimination System (NPDES) permitted entities in the TMDL boundary. Meeting these goals is expected to result in improved water quality and protection of all beneficial uses.

Successful implementation of this TMDL means the water quality impairments in this boundary meet the water quality assessment (WQA) criteria for Category 1, meet water quality standards, and that practices and programs are established to prevent future water quality degradation. Implementation of this TMDL will happen under direction of the Water Cleanup Plan Coordinator in collaboration with local, state, and tribal governments, watershed groups, permitted stakeholders, and residents within the watershed. Financial assistance may be provided to help meet these goals.

To improve water quality, landowners with a direct impact to surface water quality (because they live adjacent to a stream, lake, or wetland) must conduct activities on their property so they do not contribute pollutants to surface or ground water. Ecology has authority under Ch. 90.48 RCW, Water Pollution Control, to protect water quality and address nonpoint sources of pollution through either technical assistance or enforcement actions.

NPDES permittees receiving a wasteload allocation and implementation actions (Tables 9 and 10) will have the conditions added to their permits during the next permit revision cycle. Wasteload allocations are established for all general and individual permit holders within the Deschutes River TMDL boundary. In cases where specific water quality data was not used to determine a numeric pollutant load, specific BMPs and other actions (in addition to those required in the permits) are specified in the Implementation Actions section of this report.

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Analytical Approach

Details on the analytical approach are presented in Roberts et al. (2012). Excerpts in this section provide an overview. The analytical approach includes data collection and analysis, as well as model calibration and application to scenarios for waters included in this phase of the TMDL.

Study area

The study area for this phase of the TMDL is the TMDL project boundary in Figure 1. The TMDL boundary is the area where the load and wasteload allocations apply for a TMDL project.

Analytical framework

Fecal coliform bacteria approach

To develop targets for fecal coliform levels, the analytical approach relies on detailed data collection programs to characterize levels geographically and seasonally. These include twice-monthly grab samples and targeted stormwater monitoring. The results are summarized statistically, and reduction factors are calculated from comparisons between data and water quality standards criteria.

Temperature approach

The temperature approach included extensive continuous temperature monitoring, stream and riparian habitat characterization, GIS analyses using LiDAR, and modeling tools:

- QUAL2Kw is a one-dimensional, steady-state stream model that includes a diurnal heat budget (Pelletier and Chapra, 2006). The model simulates diurnally varying water temperatures using the kinetic formulations described in Chapra (1997). QUAL2Kw includes sediment-water layer fluxes of water and heat to simulate the effect of hyporheic interaction. The model was applied to critical period conditions in late summer.
- Shade.xls was adapted from a program originally developed by the Oregon Department of Environmental Quality (ODEQ) and enhanced with shade calculation methods described in Chen (1996) and Chen et al. (1998a and 1998b). The program uses topographic elevations and current or potential vegetation characteristics (height, type, and density) perpendicular to the channel to calculate solar radiation attenuation through the canopy. Model output includes percent shade by stream reaches and by hour of the day for a specific day of the year. This was used as input to QUAL2Kw.
- TTools is an ArcView extension originally developed by the ODEQ (2001) to quantify stream channel characteristics, topographic details, and vegetation characteristics for shade and temperature model development. Topography and vegetation height were developed from LiDAR data provided by the Puget Sound LiDAR Consortium. Current vegetation height was verified with field observations. Results were used in the QUAL2Kw model.

Flows used in the modeling analyses were based on continuous gaging records by USGS, Weyerhaeuser, Thurston County and Ecology, as well as synoptic surveys.

All three tools were applied for the Deschutes River watershed. The TTools and Shade.xls models were applied to the Percival Creek watershed.

Dissolved Oxygen (DO) and pH approach

The DO and pH approach includes both data and models. Data collection includes continuous DO, pH, and conductivity during late-summer conditions, and grab samples collected once or twice monthly and analyzed for total phosphorus, dissolved total phosphorus, orthophosphate, total nitrogen, dissolved total nitrogen, nitrate plus nitrite, and ammonium. The QUAL2Kw model application developed for temperature was also used to simulate biological productivity as a function of nutrient inputs and light levels in the river. The model estimates diel fluctuations in primary productivity and resulting minimum and maximum DO and pH levels. In addition, the Delta Method (Chapra and DiToro, 1991; Chapra, 1997) was used to estimate stream reaeration, primary production, and respiration from continuous DO data recorded in the Deschutes River.

Fine sediment approach

The fine sediment approach used data collected by the Squaxin Island Tribe and technical analyses performed by Raines Terra (Raines, 2007) to develop fine sediment reduction targets. In situ fine sediment levels were compared with habitat quality definitions for fine sediments established in Table F-2 of the Washington Forest Practices Board (1997) to determine the percent reduction needed to meet good conditions. Source attribution was based on the Raines (2007) fine sediment inventory for three primary sources: bank erosion, landslides, and unpaved roads. Bank erosion rates were calculated by comparing aerial photographs from 1991 and 2003, supplemented with LiDAR data, to determine the horizontal area lost and field measurements or extrapolations to quantify bank height. Contributions from landslides were developed from a provisional Weyerhaeuser Company inventory for 1966 to 2001 that included sediment volume. Raines (2007) accounted for attenuation prior to reaching the mainstem of the Deschutes River based on attrition rates developed by Collins (1994).

Sediment sources from unpaved road surfaces were estimated using the empirical Washington Road Surface Erosion Model (Dube et al., 2004) that is part of the Standard Methodology for Conducting Watershed Analysis (Washington Forest Practices Board, 1997). The model uses physical road characteristics and was built in part on data collected from the Deschutes River watershed (Sullivan and Duncan, 1980; Bilby et al., 1989). Anthropogenic sources include all unpaved roads and landslides associated with roads. Landslides not associated with roads and bank erosion were assumed to be natural in origin.

Technical study methods

The primary study supporting this TMDL was conducted under an approved Quality Assurance Project Plan (QAPP) (Roberts et al, 2004) and published as Ecology publication no. 12-03-008 (Roberts et al, 2012) and publication no. 07-03-002 (Sinclair and Bilhimer, 2007). The data analysis and modeling activities used data collected from 2003-2005 by the Washington State Department of Ecology (Ecology).

Data collection

The study quality assurance project plan (QAPP) was reviewed by Ecology, the EPA Region 10, the Squaxin Island Tribe, and local stakeholders. The QAPP was approved after incorporating review comments in February 2004 (Roberts et al., 2004).

Water quality and streamflow data were collected from monitoring sites distributed throughout the study area. The study design included a combination of continuous results, grab samples, synoptic surveys, and stormwater monitoring. The part of the study assessing ground and surface water interactions in the Deschutes River and Percival Creek watersheds is described in a separate report (Sinclair and Bilhimer, 2007).

Data quality

Roberts et al (2012) and Sinclair and Bilhimer (2007) document the technical study quality assurance evaluation based on published QAPPs. In summary:

- Field meters were calibrated to manufacturers' recommendations and Ecology Standard Operating Procedures.
- All laboratory samples were analyzed by the Manchester Environmental Laboratory using standard protocols (MEL, 2005).
- Measurement quality objectives were met for all laboratory data, including blanks, control samples, matrix spikes, and replicates.
- Field replicates met data quality objectives.
- Models were calibrated and confirmed.

Other supporting analyses

The two instream temperature monitoring stations were carried over from the study and followed the same data collection protocols and instrument calibrations as the TMDL. The data was used to provide a wider climate context for the stream temperature data collected during the 2003-2004 period. The Office of the Washington State Climatologist (OWSC) also provided a description of the statewide trends during this period.

Information and data from sources outside of Ecology

As described in Roberts et al. (2012), we used data collected by the Squaxin Island Tribe (Konovsky & Puhn (2005)) and technical analyses performed by Raines Terra (Raines, 2007) to develop fine sediment reduction allocations.

Additional use of external data for this report is on-site sewage systems (OSS) survey data from Thurston County. Ecology used this data to develop OSS density maps. The maps show where high densities are located in proximity to surface water bodies and areas sensitive to groundwater nitrate loading. Thurston County's inventory was used to identify OSS within the local municipal and county urban growth area (UGA). All other residences and commercial parcels outside of the UGA, as well as parcels zoned as agriculture but that have residences included on them, were assumed to have OSS (personal communication with Sue Davis, Thurston County, 2013).

Technical Study Results and Discussion

Roberts et al.(2012) describes the results from data collection, analyses, and modeling applications for fecal coliform bacteria, temperature, DO, pH, and fine sediments in the Deschutes River, Percival Creek, and their tributaries. Summary results follow:

Meteorology and hydrology: The data collection period (July 2003 through March 2005) was warmer than average, although summer 2004 precipitation was wetter than average. Summer low flows were near 7Q10 levels in both 2003 and 2004. The 7Q10 is a statistical estimate of the lowest 7-day average flow that can be expected to occur once every 10 years on average. It is usually calculated for the months of July and August because they typically represent the critical months for temperature. Tracer studies indicated a 76-hour travel time between the Vail Cutoff Road and E Street bridge when Deschutes flows were 72 cfs at the E Street bridge between August 2 and 4, 2004. Summer is the critical time of temperature, DO, and pH. Flows increase and decrease again between the 1000 Road and State Route 507, then rise quickly in several gaining reaches further downstream. The biggest flow increases occur downstream of Henderson Boulevard where significant groundwater inflows occur.

Fecal coliform bacteria: Geometric mean concentrations are higher during the summer (growing) season than the winter. Targeted storm sampling found many sites violated the second part of the water quality standard (<10% above a threshold that varies with location in the TMDL boundary area.)

Deschutes River temperature: Highest Deschutes River temperatures occurred in July and August of 2003 and 2004. Peak temperatures in the Deschutes River reflect complicated longitudinal patterns. The 7DADmax temperatures generally range from 20 to 24°C, well above the numeric criteria. Maximum peak temperatures occurred between the 1000 Road and Vail Cutoff Road, where the valley slope decreases and widest channel widths occur. Temperatures cool downstream where groundwater enters the river. A thermal infrared survey on August 20, 2003, identified several important thermal refugia associated with cool spring water.

Ambient monitoring at Ecology station 13a060 for DO, pH, and nutrients: Total nitrogen and nitrate plus nitrite concentrations have increased over the past 20 years at Ecology's E Street bridge ambient monitoring station near the mouth of the Deschutes River. Hallock (2009) confirmed these rising trends in nitrogen. Phosphorus has been declining at Ecology Station 13A060, although a change in analytical method cannot be ruled out as a factor. Ratios of nitrogen to phosphorus >30 indicate productivity in the Deschutes River is generally phosphorus limited. Lowest DO and highest pH levels occur in July and August.

Longitudinal patterns in DO, pH, and nutrients in the Deschutes River: Continuous DO and pH measurements at five locations in August 2004 confirm the lowest DO occurs near sunrise but exhibits supersaturation (>100%) in the afternoon as a result of primary productivity. Similarly, pH reaches a maximum in late afternoon due to primary productivity, with minimum levels near sunrise. Diurnal (day-night) DO changes >3 mg/L and pH changes of 1 standard units (SU) occur over the day. Total nitrogen and nitrate plus nitrite rise between the 1000 Road and State Route 507, and then slightly increase to the E Street bridge. Total phosphorus and orthophosphate rise steadily between 1000 Road and E Street. A longitudinal survey in August 2003, when Deschutes River flows were 76 cfs at E Street, found daily variations but also rapid increases and decreases in DO and pH associated with differences in groundwater inputs.

Percival Creek temperature, DO, pH, and nutrients: Temperature, DO, and pH regimes are highly influenced by Black Lake and wetlands in the headwaters of the east fork. Black Lake Ditch temperatures are higher at the outlet of Black Lake at Belmore Road where the warm, epilimnion water enters the ditch and slightly cools in a downstream direction as flows increase from groundwater inputs. Temperatures in the east fork of Percival Creek also cool from the headwaters wetlands through the canyons, but then rise near the confluence with Capitol Lake. Limited nutrient, DO, and pH monitoring indicates lower minimum DO and higher maximum pH in Black Lake Ditch than the east fork and main stem of Percival Creek. Nutrient levels in Percival Creek are close to values in the Deschutes River.

Fine sediments in the Deschutes River: Four of five sites surveyed by Konovsky and Puhn (2005) indicated fine sediments >17% based on 69 gravel samples collected from spawning sites and riffle crests. The 2004 data were not significantly different from results collected in 1995. Raines (2007) quantified sediment yields and sources in the Deschutes River watershed. Of the 33,000-38,000 yd^3/yr discharged from the Deschutes River to Capitol Lake, 18 to 23% were attributed to human sources such as unpaved roads and landslides associated with road infrastructure.

System potential conditions for temperature, DO, and pH in the Deschutes River

The calibrated temperature and DO/pH models were used to assess the best conditions that can be achieved in the Deschutes River without human influences. These are the “system potential” conditions. For temperature, Scenario 4 of Roberts et al. (2012) is the best condition under critical conditions. This included restoration of mature riparian vegetation, narrowing of channel widths and other channel restoration, and reduced headwater and tributary temperatures.

Because the historical 7Q10 flow rates at the USGS gages were higher than the more recent flows, an additional Scenario 5 was evaluated with historical 7Q10 flows. Increasing baseflows by 20 to 40% (2 to 22 cfs throughout the system) would decrease peak temperatures by an average of 0.29°C throughout the system.

For DO and pH, the best conditions that can be achieved are represented by Scenario DO8 of Roberts et al. (2012). This scenario includes system potential conditions for temperature and also reductions in nonpoint and groundwater sources of nutrients. The load and wasteload allocations described in this report are based on these computer models (Scenario 4 for temperature and Scenario DO8 for DO and pH). These scenarios used 7Q10 flows from USGS for the period 1991-2001, 90^{th} percentile peak air temperatures, and restored riparian microclimate, in addition to mature riparian vegetation and improved channel conditions. Cloud cover and wind speeds were set to zero for worst-case conditions for heat. Ecology used existing dewpoint temperatures without adjustments. For DO and pH, Ecology also increased headwater and tributary DO and decreased tributary and groundwater nutrients to assess system potential conditions. Downstream of Offut Lake, effective shade improvements alone will result in the Deschutes River meeting DMin DO criteria. Nutrient reductions upstream of Offut Lake, along with effective shade improvements, are needed to reach the system potential conditions for DO and pH in the Deschutes River (see Figure 27 of this report).

Roberts et al. (2012) included an analysis of the dissolved oxygen (DO) problems with Capitol Lake and Budd Inlet. Due to the complex nature of sources affecting DO in Budd Inlet, and the timing of the South Puget Sound DO study, Ecology decided to address the DO listings in Budd Inlet and Capitol Lake in a separate TMDL report to be developed subsequent to this report. The "best condition" nutrient loading targets for the Budd Inlet model are used for the nonpoint load and wasteload allocations.

The groundwater assessment for the Deschutes River and Percival Creek (Sinclair and Bilhimer, 2007) was used to determine groundwater contributions of nutrients to the Deschutes River and Percival Creek as well as identified gaining, losing, and neutral stream reaches. The data was used in the TMDL Water Quality Study Findings and for the development of the implementation plan.

Supplemental technical information - 2003 and 2004 climate conditions in historical context

The following summary was provided by Karin Bumbaco at the Office of the Washington State Climatologist (OWSC) to provide context for understanding the summer weather conditions compared to climate trends in the TMDL area (personal communication, 4/28/2014). This information is in addition to Roberts et al. (2012).

Compared to the historical record, the summer climate conditions (defined as June-July-August or JJA) for 2003 and 2004 were quite anomalous. Summer temperatures for both 2003 and 2004 were warmer than normal, and precipitation was on opposite sides of the spectrum with extremely dry conditions in 2003 and wetter than average conditions in 2004.

Washington State is divided into 10 separate climate divisions that have similar average weather conditions (www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php), and the study area spans two of these divisions (Figure 5). A majority of the region resides in the Puget Sound Lowlands – or climate division 3 – and that division is used for this summary. Anomalies for climate division 4 (East Olympic/Cascade Foothills) where the rest of the study area resides, are very similar to those reported here.

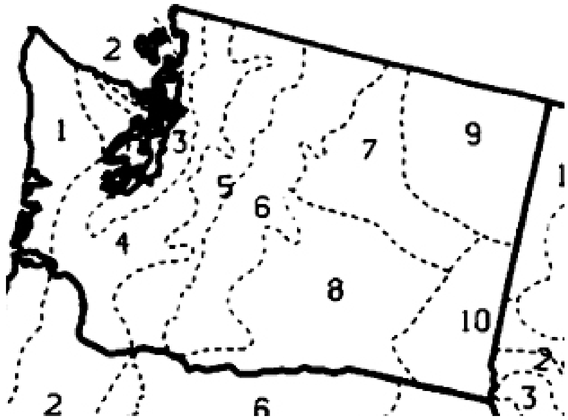

Figure 5: The NOAA climate divisions for WA State.

(www1.ncdc.noaa.gov/pub/data/cmb/monitoring-references/maps/us-climate-divisions-names.jpg). Results for division 3 are reported here.

Figure 6 shows the average JJA temperature and total JJA precipitation since 1970 for the Puget Sound Lowlands climate division compared to the 1981-2010 average. Summer 2003 was relatively warm with average temperatures 1.5°F above normal. Precipitation in 2003 was quite anomalous, with the division only receiving 31% (1.48”) of normal summer precipitation. The low precipitation in 2003 ranks as the second driest summer on record for the climate division; with rivaling amounts not seen since the late 1930s. The dry summer conditions extended throughout the entire state as well as Oregon, and Bumbaco and Mote (2010) classified it as a summer drought that impacted streamflow and forests. As reported in Bumbaco and Mote (2010), near record or record low flows were seen in western Washington for June through September 2003.

Summer 2004 was warmer than normal in this climate division, with temperature anomalies (2.4°F) that were greater than those seen in 2003. The temperatures in 2004 are the second warmest for the climate division since records began (record warmest in 1958). It is noteworthy that the 2004 summer was warmer than the 2009 summer, which featured an all-time record-breaking heat wave at the end of July. Rather than short duration events of high intensity, the 2004 summer longer events with temperatures exceeding a more moderate intensity. Olympia Airport had many days exceeding 80°F for example. For precipitation, summer totals in 2004 were much greater than usual – 131% of normal. The total precipitation was on the wetter side, but comparable to other wet years in the record.

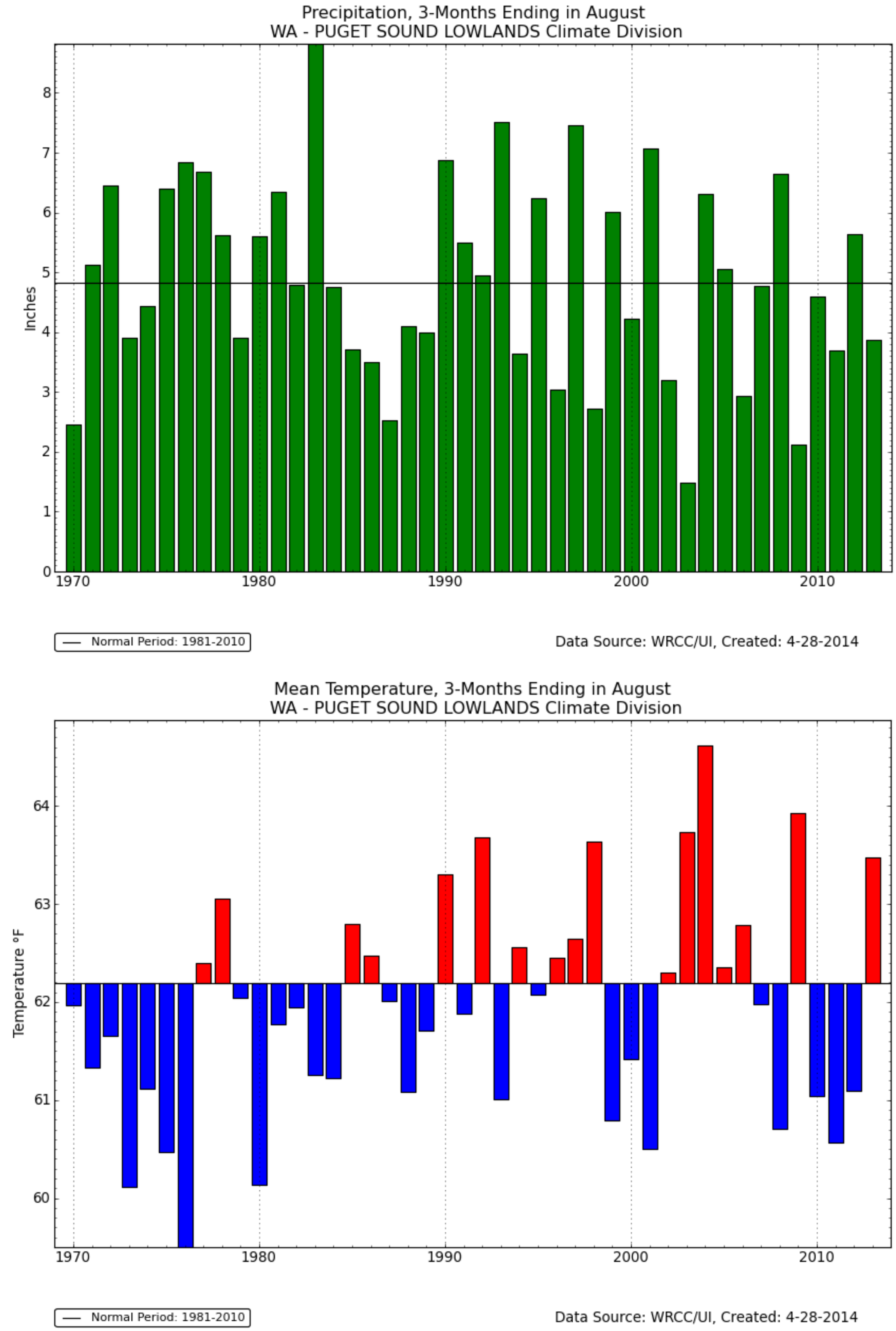

Figure 6: The average JJA temperature (top) and total JJA precipitation (bottom) since 1970 for the Puget Sound Lowlands climate division (number 3) in WA State relative to the 1981-2010 normal *(www.wrcc.dri.edu/wwdt/time/).*

Supplemental technical information – long-term continuous temperature monitoring on the Deschutes River

This information is in addition to Roberts et al. (2012), but provides additional context for the 2003 and 2004 study years. Two TMDL study stations (13DES33.5 and 13DES24.9) were kept instrumented to measure instream temperature after the 2004 data collection period ceased. These were continued through 2013. The data record for these two stations is presented in Figures 7 and 8. Two annual checks of the thermistors and data downloads found them to consistently record good quality data. Data representing the few periods when the thermistor was dewatered (due to decreasing streamflows) were removed.

The long record does not exhibit any statistically significant trend in peak temperatures and likely reflects interannual climate variability (personal communication, Karin Bumbaco, 4/28/2014). The stream temperatures match the summer temperatures in the Puget Sound Lowlands climate division fairly well; with the 2003-04 study years being warmer than the more recent years (see Figure 9). This is consistent with the water quality standards, which include assessing critical conditions that occur once every 10 years.

Temperature modeling completed and discussed in this TMDL report and in the technical study report (Roberts et al, 2012) used data that was indicative of very warm summer period temperatures and is very useful to understand the worst-case, critical temperature conditions affecting the Deschutes River. Patterns of periodic warming and cooling are expected due to the influence of the Pacific Decadal Oscillation (PDO) effect on climate in the Puget Sound Lowlands.

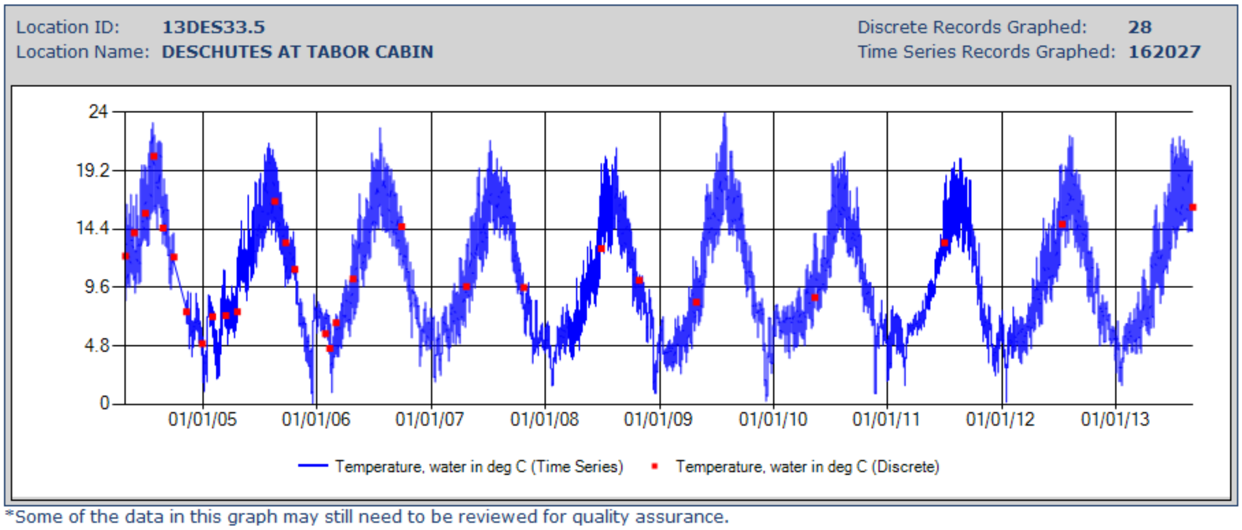

Figure 7: Deschutes River (instream) temperature data at the Tabor cabin (13DES33.5) during the period from April 2004 to September 2013.

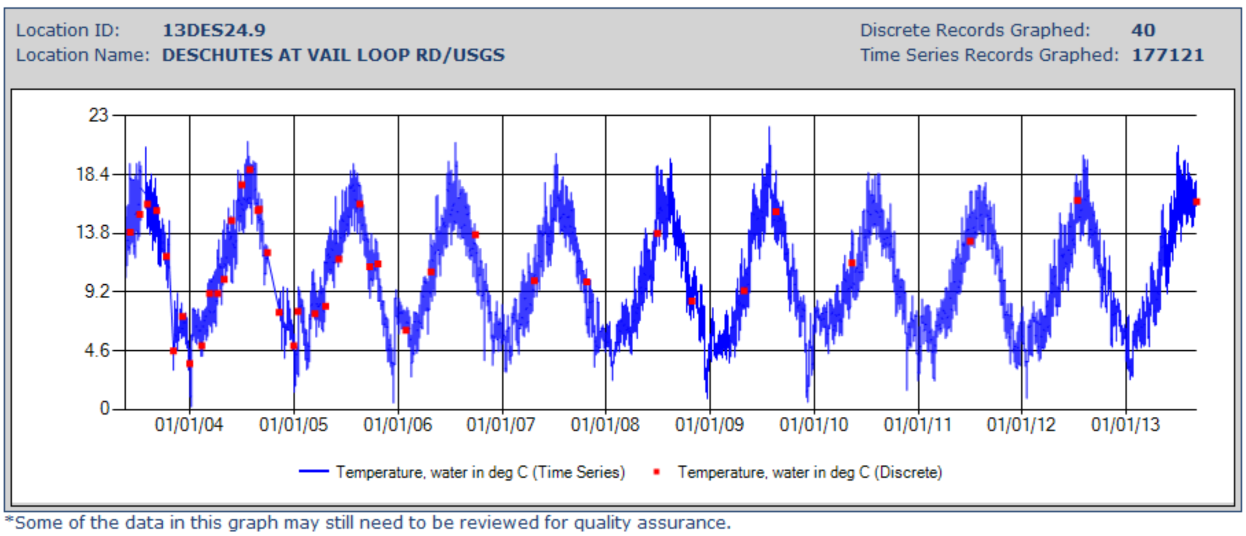

Figure 8: Deschutes River (instream temperature data at the USGS stream gage near Vail Loop Rd. (13DES24.9) during the period from April 2004 to September 2013.

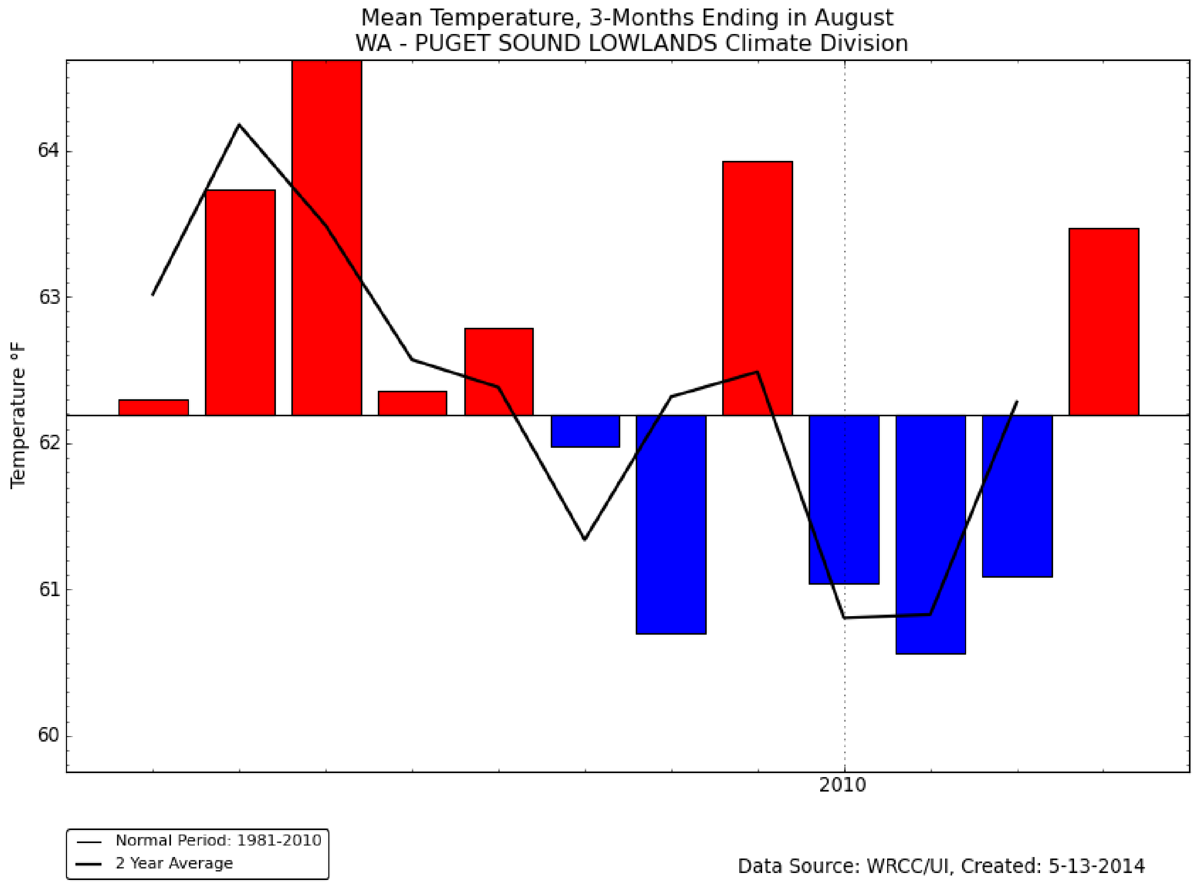

Figure 9: Mean Temperatures for Jun-Aug for the Puget Sound Lowlands Climate Division from 2002-2013. Data Source: OWSC (2014).

TMDL Analyses

Roberts et al. (2012) included the TMDL analyses for fecal coliform bacteria, temperature, DO, pH, and fine sediments. This included compliance with standards for each parameter in addition to the following:

- Analytical framework for fecal coliform bacteria in the Deschutes River and tributaries, Percival Creek system, and streams tributary to Budd Inlet
- Analytical framework, calibration of the Deschutes River temperature model, and assessment of Percival Creek temperature
- Analytical framework, calibration of the Deschutes River DO and pH model, and assessment of Percival Creek DO and pH
- Analytical framework fine sediments in the Deschutes River

This section summarizes the loading capacities established for each of these parameters. Loading capacity is the maximum load received by a water body such that the water body still meets the water quality standards. See Roberts et al. (2012) for details regarding the water quality model development, calibration, and validation that is the basis for the analyses and allocations described in the following sections.

Loading capacity for temperature

The loading capacity for temperature in the Deschutes River watershed is expressed as solar radiation heat loads based on best conditions achievable from mature riparian vegetation and channel restoration. Scenario 4 of Roberts et al. (2012) represents the system potential condition for temperature in the Deschutes River, based on the best conditions achievable using the calibrated QUAL2Kw model. Scenario 4 includes system potential effective shade based on full mature riparian vegetation, improved channel characteristics, and reduced headwaters and tributary temperatures during critical conditions. The system potential temperatures do not replace the numeric criteria. The values also do not invalidate the need to meet the numeric criteria at other times of the year and at other less extreme low flows.

Loading capacities for temperature in the Deschutes River watershed are expressed as solar radiation heat loads based on system potential vegetation. The calibrated QUAL2Kw model was used to determine the loading capacity for temperature based on effective shade for the mainstem of the Deschutes River. The system potential temperature is an estimate of the temperature that would occur under natural conditions. The system potential temperature is based on the best estimates of the mature riparian vegetation, riparian microclimate, and natural channel characteristics that do not include human influences.

Current effective shade and system potential effective shade were evaluated under 7Q10 flow and 90th percentile climate conditions. System potential effective shade is derived from the system potential mature riparian vegetation that would naturally occur in the Deschutes River watershed. Mature vegetation was represented by maximum height and densities within 100 meters to either side of the near-stream disturbance zone (NSDZ). Height was based on the tallest existing vegetation in the system (50m), excluding some very tall conifer stands (60m). Additional scenarios were evaluated to quantify the effects of various potential management strategies including: microclimate improvements, reduced channel width, reduced headwater and tributary temperatures, and increased baseflows.

Figure 10 summarizes the system-wide average maximum predicted temperature, including contributions from anthropogenic changes. The factor with the biggest reduction of stream temperature is providing shade by achieving system potential vegetation (shown in Figure 10 as the difference between the base case and scenario 1). The predicted natural condition is a system-wide average maximum temperature of 16.6°C.

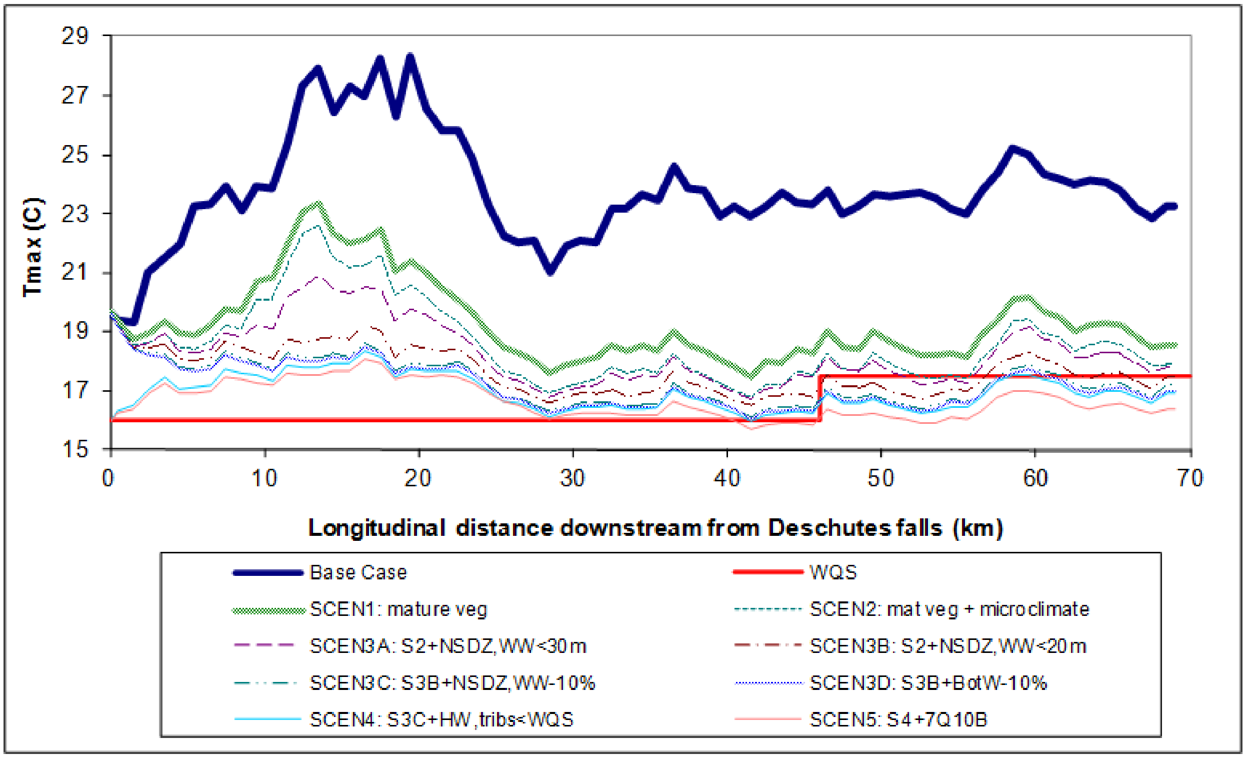

Figure 10: Predicted 7DADMax water temperature in the Deschutes River for critical conditions under current conditions and various scenarios.

Figure 11 summarizes the incremental temperature improvements possible from different management actions (scenarios are described in Table 7). Restoring the mature vegetation would reduce the temperature by 4.5°C. Other factors that would reduce temperature are improving the microclimate (0.7°C reduction), reducing channel width (1.3°C reduction), reducing headwater and tributary temperatures (0.4°C reduction), and increasing the baseflow (0.3°C reduction). Figure 12 presents the difference between each scenario and current conditions by river miles to illustrate the longitudinal pattern in potential temperature improvements.

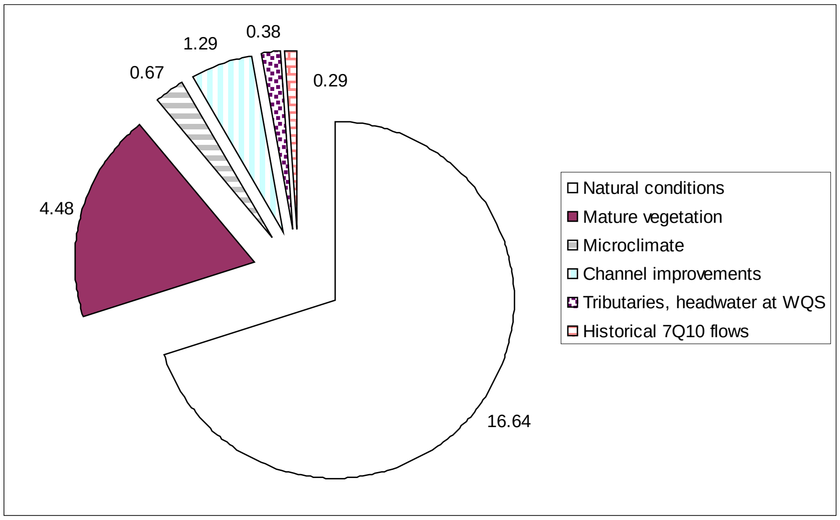

Figure 11: Temperature improvements (system-wide average Tmax °C) associated with various management strategies.

Scenario 5 included an evaluation of changes in baseflow and 7Q10 streamflow due to anthropogenic influences (domestic exempt wells) and climate change by increasing baseflows by 20-40% (2 to 22 cfs throughout the system). As seen in Figure 10 and Figure 11, increasing the Deschutes River flow to historical levels would decrease peak temperatures by an average of 0.3°C throughout the system. While the current 7Q10 flow conditions likely reflect the combined effects of climate and water withdrawals, the two cannot be distinguished. As a conservative approach, all of the change due to the decreased flow is assumed to be human-caused. The predicted natural condition is a system-wide average maximum temperature of 16.6°C.

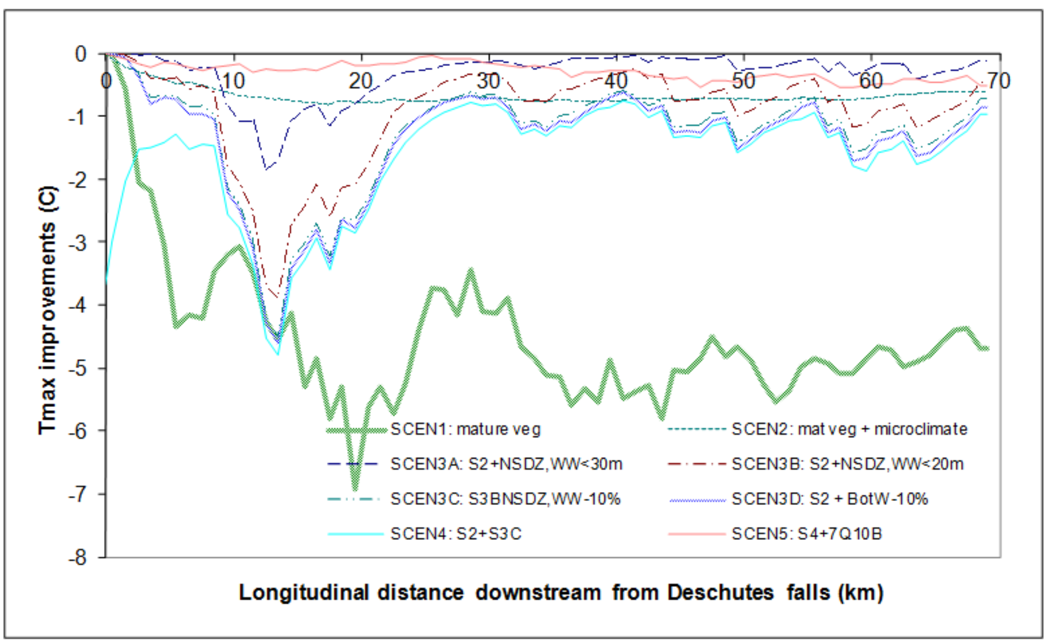

Figure 12: Decreases in peak temperature under various critical condition scenarios by river reach.

Table 7: Predicted decreases in 7-day average of daily maximum temperatures under critical conditions for current characteristics (base case) and various scenarios.

Scenario	T_{max}	Mean T_{max}	ΔT_{max}	Length of river in compliance with water quality standards				Lethality
	(ºC)	(ºC)	(ºC)	Upstream of Offut Lake (16ºC)		Downstream of Offut Lake (17.5ºC)		Portion of river above 22ºC
Base case (current vegetation, temperature, and channel widths under recent 7Q10 flows)	28.29	23.75	0.0	0 km	0%	0 km	0.0 %	63 km (91%)
Scenario 1 (mature riparian vegetation)	23.36	19.27	-4.48	0 km	0%	0 km	0 %	5 km (7%)
Scenario 2 (Scenario 1 with riparian microclimate)	22.63	18.6	-0.67	0 km	0%	3 km	4%	2 km (3%)
Scenario 3A (Scenario 2 with NSDZ and WW 30m max)	20.91	18.28	-0.33*	0 km	0%	5 km	7%	0 km (0%)
Scenario 3B (Scenario 2 with NSDZ and WW 20m max)	19.68	17.67	-0.93*	0 km	0%	15 km	22%	0 km (0%)
Scenario 3C (Scenario 2 with NSDZ and WW 20m max and reduce 10%, shade only)	19.68	17.31	-1.29	0 km	0%	19 km	28%	0 km (0%)
Scenario 3D (Scenario 2 with NSDZ and WW 20m max and reduce 10%, shade and hydraulics)	19.68	17.23	-1.37*	0 km	0%	21 km	30%	0 km (0%)
Scenario 4 (Scenario 3C with HW and tributaries = WQS)	18.34	16.93	-0.38	1 km	1%	22 km	32%	0 km (0%)
Scenario 5 (Scenario 4 + historical 7Q10)	18.07	16.64	-0.29	6 km	9%	24 km	35%	0 km (0%)

* Compared with Scenario 2. Only Scenario 3C is used to compare with Scenarios 4 and 5.
T_{max} is the highest in the system and mean.
T_{max} is the system-wide average maximum temperature.
ΔT_{max} refers to the incremental temperature benefit as the system-wide average for each scenario.

Loading capacity for water temperature in the Percival Creek watershed is expressed as solar radiation heat loads based on system potential vegetation. The loading capacity is based on achieving system potential riparian vegetation (based primarily on soil types) throughout the Percival Creek and Black Lake Ditch system (Figure 13). The system has the same loading capacity whether it discharges to a lake or to marine waters. The predicted system potential temperature within the watershed was not determined using a QUAL2Kw model application. The temperature regime is highly influenced by Black Lake and wetlands at the headwaters in both branches. Groundwater inflows to the system cool the creeks in a downstream direction.

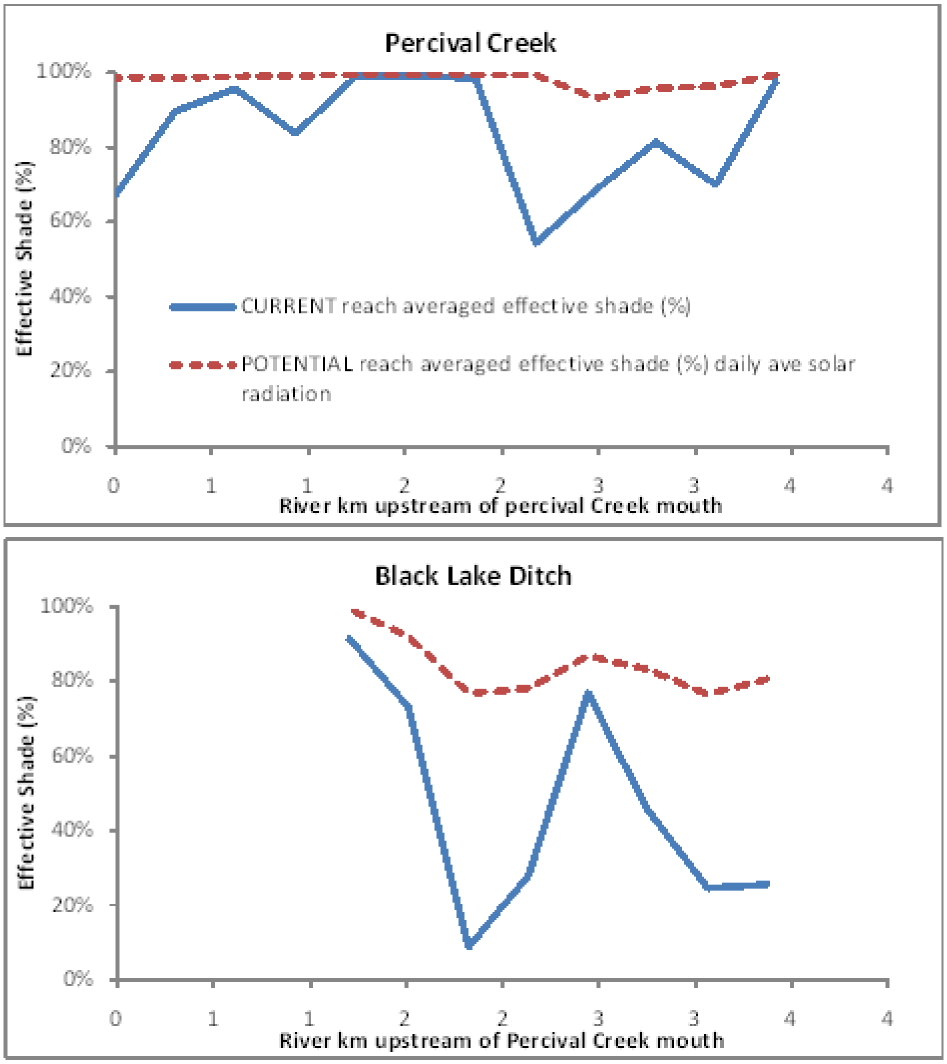

Figure 13: Loading capacity for Percival Creek and Black Lake Ditch (dashed line).

Loading capacity for fecal coliform bacteria

For fecal coliform bacteria, the loading capacity varies with the beneficial uses to be protected and is defined by the numeric criteria defined in the water quality standards which provide both a numeric geometric mean (Part 1) and the 10% of bacteria samples not exceeding the numeric criteria (Part 2). Allocations for Percival Creek are based on the criteria for discharging to a lake, since that is the current use of Capitol Lake. If the Capitol Lake dam is removed then the marine criteria would be applied to redefine the loading capacity.

The loading capacity is indicated by numeric values for Part 1 and Part 2 of the water quality standards. These are presented in Figures 33 and 34 in Roberts et al. (2012). Of the 25 stations on the Deschutes River, during the summer season 10 did not meet Part 1 of the water quality standards, and 13 did not meet Part 2 of the water quality standards. For the winter season three stations, monitored twice monthly, did not meet Part 1 of the water quality standards, and 10 stations did not meet Part 2. Percival Creek's loading capacity is based on the current, more stringent designated use of discharging to a lake. The loading capacity would change if it discharged to marine waters.

Loading capacity for dissolved oxygen (DO) and pH

The loading capacity for DO and pH in the Deschutes River is expressed as a combination of solar radiation heat loads and nutrient reductions based on best conditions achievable (see Table 29 of Roberts et al., 2012, for descriptions of various management scenarios). Scenario DO8 represents the system potential condition for DO and pH in the Deschutes River, based on the best conditions achievable using the calibrated QUAL2Kw model. Scenario DO8 includes the system potential effective shade based on temperature Scenario 4 (full mature riparian vegetation, improved channel characteristics, reduced headwaters, and tributary temperatures during critical conditions) as well as higher DO in the headwaters, and lower nutrients in the tributaries and groundwater.

The system potential for DO and pH are estimates of the levels that would occur under natural conditions during critical 7Q10 and 90th percentile meteorological conditions. In this study, the system potential for DO and pH are based in part on the system potential temperature. The system potential DO and pH values do not replace the numeric criteria. The values also do not invalidate the need to meet the numeric criteria at other times of the year and at other less extreme low flows.

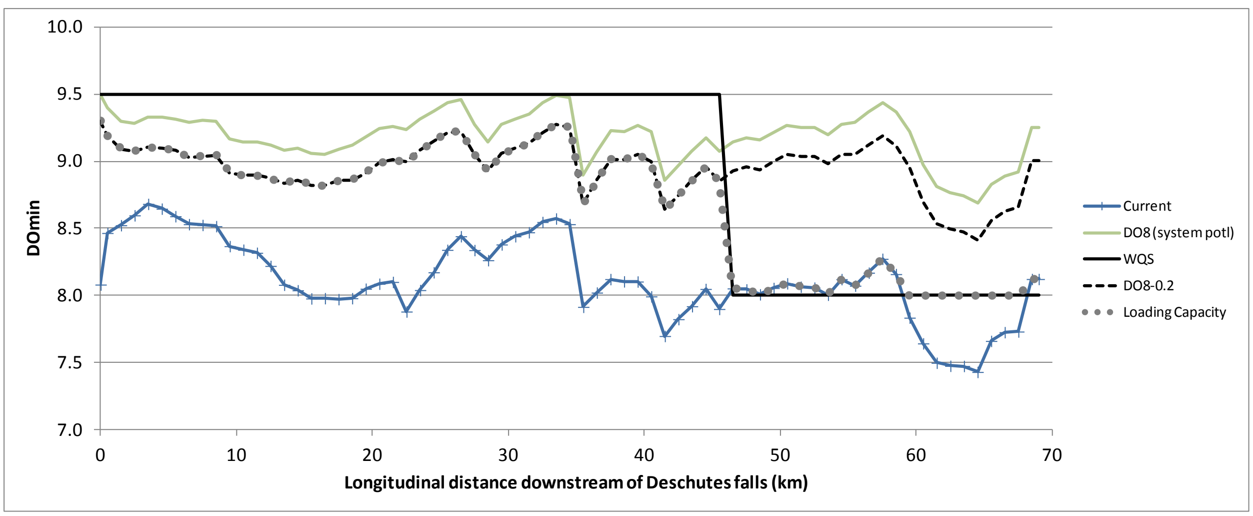

Figure 14: DO-based loading capacity for the Deschutes River, expressed as minimum DO (mg/L).

The system potential DO and pH levels estimated in Scenario DO8 (Roberts et al., 2012) is the loading capacity for the Deschutes River (Figure 14). Scenario D08 depends on system potential effective shade, improvement of channel characteristics, headwaters meeting DO standards, and tributary and groundwater nutrients set to the 10th percentile of current nutrient concentrations.

Upstream of Offutt Lake (RK 46 to RK 0, as measured from the upstream model boundary), the loading capacity for the daily minimum DO is the system potential minimum DO minus 0.2 mg/L. Downstream of Offutt Lake, the current condition is the loading capacity between river kilometer (RK) 46 (Waldrick Road) and 58 (at bend near south end of Olympia Airport), and also downstream of RK 68 (near E St. bridge). The current condition is the loading capacity because this area is already better than the water quality standards, and Tier II antidegradation protection of existing water quality applies. Between model kilometer 58 and 68, the loading capacity is 8.0 mg/L. The current condition is the loading capacity between 46 and 58 because DO conditions are already better than the water quality standards. The loading capacity for DO is shown as the dotted line in Figure 14.

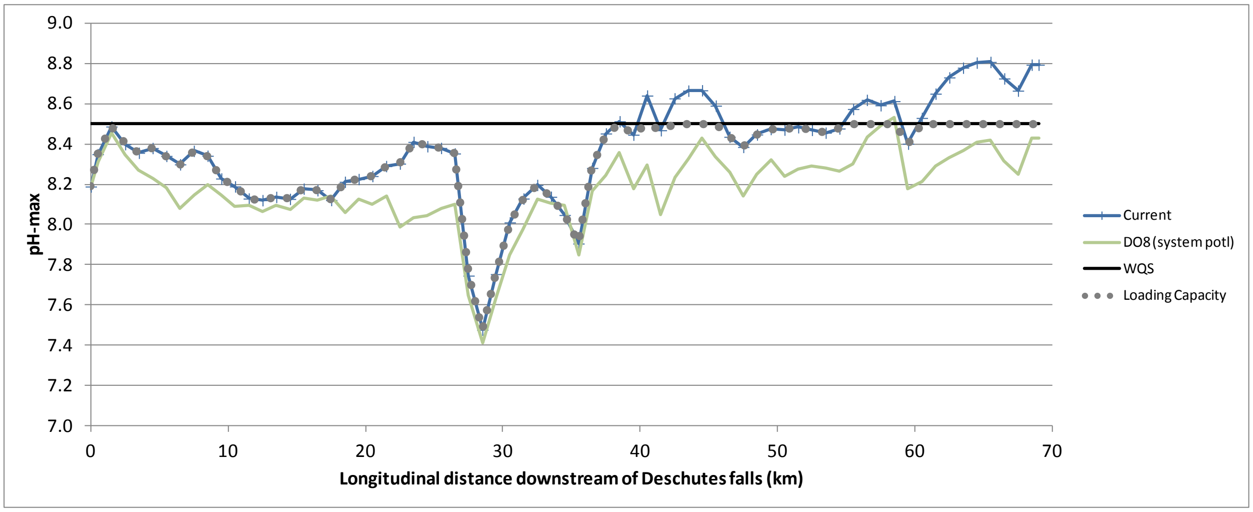

Figure 15: pH-based loading capacity for the Deschutes River expressed as maximum pH (SU)

The pH-based loading capacity for the Deschutes River is presented in Figure 15 for maximum pH and Figure 16 for pH range (both parts of the pH criteria). The loading capacity for maximum pH is the current condition between RK 0 and 40, between RK 46 and 55, and between RK 59 and 60, where the graph line representing the current pH maximum is below the water quality standards of 8.5 SU. Again, the current water quality is already better than the standards, so Tier II antidegradation protections apply. The loading capacity is 8.5 SU for RK 40 to 46, RK 55 to 59, and downstream of RK 60. In these reaches the maximum pH must be reduced below 8.5 SU.

For the pH range, the loading capacity is the current condition between RK 0 and 5.5, between RK 8.5 and 21.5, between RK 27 and 37.5, between RK 46 and 62, and downstream of RK 68. The pH range loading capacity is the system potential pH range plus 0.2 SU for RK 5.5 to 8.5, RK 21.5 to 27, and RK 37.5 to 46. The pH range loading capacity between RK 62 and 68 is the system potential pH range plus 0.5 SU.

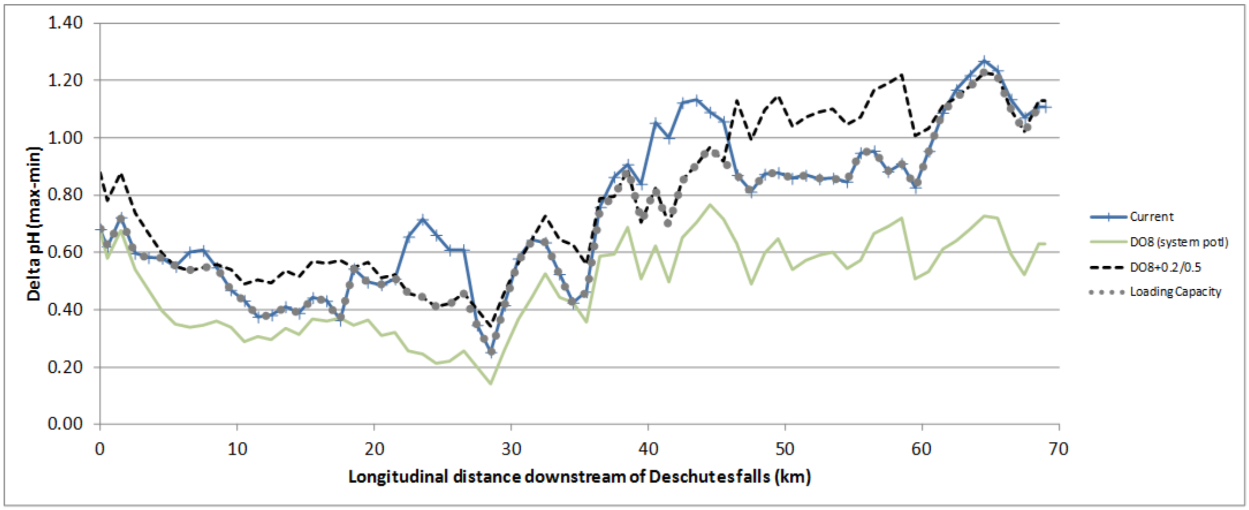

Figure 16: pH-based loading capacity for the Deschutes River expressed as pH range (pHmax - pHmin, SU).

The QUAL2Kw model was not applied to determine the system potential temperature, DO, or pH within the Percival Creek and Black Lake Ditch watersheds. Instead, the loading capacity for DO and pH in the Percival Creek watershed is expressed as the solar radiation heat loads based on system potential vegetation. The decreased temperatures that would result from mature riparian vegetation would improve the DO due to saturation effects alone, and both DO and pH due to decreased primary productivity from riparian shade. The loading capacity for pH is shown as the dotted lines in Figure 15 and 16.

The temperature, DO, and pH regimes are highly influenced by Black Lake and wetlands at the headwaters in both branches, and natural conditions may not meet the numeric criteria.

Loading capacity for fine sediment

The goal of the fine sediment portion of this TMDL project is to reduce the amount of embedded fines to meet good habitat quality criteria for salmonid aquatic life uses. The aquatic life uses to be protected in the Deschutes River include: Core Summer Salmonid Habitat upstream of Offutt Lake, and Salmonid Spawning, Rearing, and Migration downstream of the lake. Because spawning is the beneficial use to be protected throughout the system, the entire Deschutes River must provide healthy spawning habitat, including appropriate levels of fine sediment.

Raines (2007) quantified sediment yields in the Deschutes River watershed from high bank erosion, landslides, and unpaved roads for the period 1991-2003 (and compared values with historical estimates [Collins, 1994]). For the period 1972-2003, Raines (2007) accounted for on average 26,000 yd^3/yr from those sources, which includes both fine (19,500 yd^3/yr) and coarse (6,200 yd^3/yr) sediments. This accounts for most of the mean annual load to Capitol Lake, of 36,000 yd^3/yr based on historical dredging records. The difference between the accounted-for sources and mean annual load to Capitol Lake (10,300 yd^3/yr) comes from unaccounted sources that likely represent a mix of natural sources and human activities, and also coarse and fine sediments. Because we do not have a size fraction for the unaccounted sediments, we assume that the fine sediments constitute the same proportion as the total identified sources (76%). This is equivalent to 7,815 yd^3/yr of fine sediments unaccounted in the sediment source estimates (Table 12).

Of the 19,500 yd^3/yr of fine sediments of accounted for natural and human sources, human activities contributed 5,100 – 6,300 yd^3/yr from landslides associated with the road network and from unpaved roads (see Table 19 from Roberts et al, 2012), an average value for human sources of fine sediment was calculated at 5,700 yd^3/yr (Table 8).

Mean Annual load to Capitol Lake is based on 76% of the total mean load attributed to fine sediments.

Table 8: Fine sediment source loading from the Deschutes River to Capitol Lake.

Human Sources	Natural Sources	Unaccounted Sources	Mean Annual Load to Capitol Lake	Loading Capacity (Natural + Unaccounted)
5,700 yd^3/yr	13,800 yd^3/yr	7,815 yd^3/yr	27,315 yd^3/yr	21,615 yd^3/yr

The remaining contributions are natural, including bank erosion and natural landslides. The Clean Water Act Assurances covering the Forest and Fish Agreement stipulate that forestry activities work toward the goal of eliminating enhanced contributions from human activities. Reduction of identified human fine sediment sources (5,700 yd^3/yr) would reduce approximately 21% of the known fine sediment contributions in the Deschutes watershed. We acknowledge that some unknown portion of the unaccounted sources include human-caused fine sediment sources, but if the water quality improvement efforts are successful at eliminating the identified human sources that we can control, then we will meet the fine sediment load allocation.

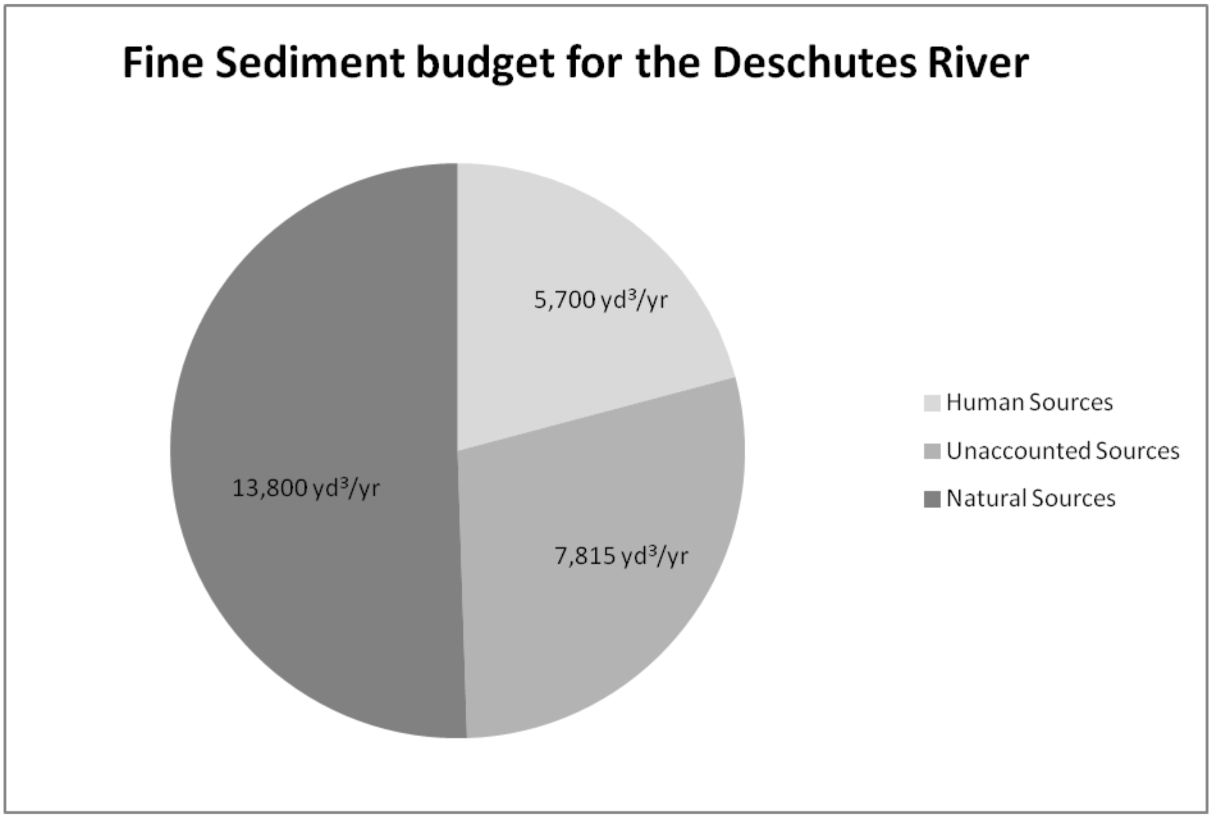

Figure 17: Fine sediment budget for the Deschutes River (yd^3/year) for all sources based on findings in Raines (2007).

It was beyond the scope of Roberts et al (2012) and Raines (2007) to calculate the fraction of the total mass loading of fine sediments that become embedded in the streambed that results in impairment of salmon spawning areas. This makes it difficult to estimate the loading capacity of embedded fines from the mean annual mass load alone. Our approach to remove known anthropogenic sources should help approach a natural sediment loading condition in this geologically “young” watershed. A load capacity is typically defined as the sum of the load and wasteload allocations prescribed to meet water quality standards, but we are not aware of any TMDL that makes a quantitative connection between the mass loading capacity and the percent embedded fine sediments levels for good quality habitat.

A reduction in watershed mass loading to meet the fine sediment load allocation is expected to result in reduction of embedded fine sediments. Therefore the loading capacity for fine sediment is equal to the load allocation for fine sediment, which is 21,615 yd^3/yr, and applies to the entire Deschutes River Watershed.

Wasteload and Load Allocations

Wasteload allocations

Wasteload allocations for general permittees are summarized in Appendix C. Information about Ecology's stormwater permit program can be found at www.ecy.wa.gov/programs/wq/stormwater/index.html.

The following tables include wasteload allocations for the Construction Stormwater General Permit (CSWGP), Industrial Stormwater General Permit (ISGP), Sand and Gravel General Permit (SGGP), Western Washington Phase II Municipal Stormwater General Permit (MSWGP), and the Washington State Department of Transportation (WSDOT) municipal stormwater permit.

Table 9 lists the NPDES general permits that occur in the TMDL boundary and the individual facilities for each general permit. Table 10 lists the MSWGP permittees with coverage in parts of the TMDL boundary. Further description of the WLAs for each permittee follows.

Table 9: Dischargers with a current NPDES general permit within the TMDL boundary.

Wasteload allocations (WLAs) for general permits apply to these and all future permittees in these categories. See Figure 20 for a map with the catchment keys.

Permit Type	Permittee Name	NPDES Permit No.	Map Catchment Key	Nearest Surface Water body Name	Critical Period
Construction Stormwater General Permit	All permits* issued after the TMDL approval date	Any new permit issued after the TMDL approval date		All surface water bodies within the TMDL Boundary	Annual**
Industrial Stormwater General Permit	Haney Truck Line Inc	WAR003106	E	Black Lake Ditch (BLD); 17110016007722	Annual**
	AmCor Packaging	WAR012411			
	Pepsi Northwest Beverage Co	WAR009988			
	Temtco Steel	WAR009171			
	Pepsi Northwest Beverages	WAR004082			
	O'Neill & Sons	WAR001404	K	Deschutes River; 17110016000008	
	Intercity Transit	WAR000084	R	Indian Creek; 17110019020859	
	Truss Components of WA Inc	WAR000758	V	Percival Creek; 17110016007720	
	Allen Auto Parts	WAR000287	R	Bigelow Lake; 17110019020881	
Sand & Gravel General Permit	Holroyd Co Tumwater Plant 6	WAG501029	E	Unnamed trib to BLD; 17110016007741	
	K & M Quarry	WAG501118		Black Lake Ditch; 17110016007722	
	Concrete Recyclers Inc.	WAG501507		Black Lake Ditch; 17110016007722	
	Cal Portland Tumwater Ready Mix Plant	WAG501199		Retention ponds at the head of unnamed trib to BLD; 17110016007741	
	Alpine Sand & Gravel*	WAG501037	J	Deschutes River; 17110016000008	
	Lakeside Industries - Olympia Airport	WAG501042	K	Deschutes River; 17110016000008	
	CW O'Neill Pit	WAG501236	L	Unnamed intermittent tributary to the Deschutes; 17110016000202	

**These permittees have specific implementation actions in addition to the general permit requirements. See the Implementation Plan section for more detail.*

*** While the allocations are based on the critical conditions, they apply year-round.*

Table 10: Municipal Stormwater Permits receiving WLAs within the TMDL Boundary.

Permit Type	Permittee Name and ID	NPDES ID	Potential Receiving Waters
Municipal Stormwater Permit	WA State Dept. of Transportation	WAR043000	I-5: potential discharges to Southern basin of Capitol Lake, Indian Creek, Moxlie Creek, the lower Deschutes River Hwy 101: potential discharges to lower Percival Creek and southern basin of Capitol Lake
Phase II Municipal Stormwater Permit	Olympia, City of	WAR045015	All receiving surface water bodies within the stormwater permit boundary
	Thurston County	WAR045025	
	Tumwater, City of	WAR045020	
	Lacey, City of	WAR045011	

Construction Stormwater General Permits

The wasteload allocations (WLA) apply year-round to all current and future Construction Stormwater General Permits (CSWGP) within the TMDL boundary. The general CSWGP requirements apply at all other times of the year. Construction sites can be sources of fine sediment, turbidity, high pH, and potentially nutrients that are adsorbed to suspended particles.

Construction site operators are required to be covered by the CSWGP if they are engaged in clearing, grading, and excavating activities that disturb one or more acres and discharge stormwater to surface waters of the state. Smaller sites may also require coverage if they are part of a larger common plan of development that will ultimately disturb one acre or more. Operators of regulated construction sites are required to:

1. Develop stormwater pollution prevention plans.
2. Implement sediment, erosion, and pollution prevention control measures.
3. Obtain coverage under this permit.

In addition to the CSWGP requirements, the following wasteload allocations apply and should be reflected in the permit as effluent limits:

- **Fine sediment**: Fine sediment is the direct pollutant to be reduced with this WLA. No visible accumulation of fine sediment in the Deschutes River or its tributaries is allowed. Turbidity is a surrogate measurement for fine sediment. All CSWGP permittees within the TMDL boundary must comply with permit requirements S8.B, S8.C (shall apply to the TMDL boundary), and S4.C "Monitoring Requirements, Benchmarks, and Reporting Triggers" for turbidity. The current CSWGP requires weekly sampling of discharges, and turbidity measurements must be less than 25 NTU; this WLA expands that limit to all CSWGP discharges within the TMDL boundary.
- **pH**: Permit requirements in S8.D apply to stormwater discharges to any surface water in the TMDL boundary. pH of any stormwater discharge must be in the range of 6.5 - 8.5 SU.
- **Temperature**: All discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.3°C due to the combined effects of all human activities.

- **Bacteria**: Discharges from stormwater systems to the Deschutes River and tributaries shall be ≤ 100 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 200 cfu/100mL. Discharges from stormwater systems to Percival Creek and Black Lake Ditch shall be ≤ 50 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 100 cfu/100mL.
- **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water due to the combined effects of all human activities.

Discharges of excessively warm temperatures, fecal coliform bacteria, and low dissolved-oxygen water are not expected in excess of the surface water quality standards for temperature, bacteria, or dissolved oxygen. This TMDL is not setting a WLA for phosphorus, but recognizes that if the turbidity surrogate measure target is met, then phosphorus bound to suspended particles will also be reduced to the lowest level possible for offsite transport.

Industrial Stormwater General Permit

The wasteload allocations apply to all current (see Table 9) and future Industrial Stormwater General Permits (ISGP) within the TMDL boundary year-round. The general ISGP requirements apply at all other times of the year. Industrial facilities can be a source of fine sediment, turbidity, high pH, and other pollutants that are mobilized by stormwater runoff over impervious surfaces where industrial activity occurs.

All current facilities were found not to have direct discharges of stormwater from their stormwater collection ponds at this time. Water generally infiltrates into the ground in stormwater ponds or is collected into a vault which must be disposed of according to the ISGP.

Compliance with the current ISGP (for example, meeting discharge limits, having a current stormwater pollution prevention plan, properly maintained BMPs, timely submission of discharge monitoring reports) will be considered compliance with the TMDL. The WLA for turbidity is equal to the current benchmark in S5, Table 2 in the permit for turbidity. The WLA for pH changes the pH range to match the water quality standard. The WLAs for pH, turbidity, and fine sediment are as follows and should be reflected in the permit as effluent limits:

- **pH**: All discharges from stormwater systems shall not raise the receiving water body pH by more than 0.5 SU within the pH range of 6.5 – 8.5 SU.
- **Fine sediment**: No visible accumulation of fine sediment in the Deschutes River or its tributaries is allowed. Turbidity is a surrogate measurement for fine sediment, and monthly average measurements should not exceed 25 NTU.

Discharges of excessively warm temperatures, fecal coliform bacteria, and low dissolved-oxygen water, or nutrients are not expected in excess of the following:

- **Temperature**: All discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.3°C due to the combined effects of all human activities.
- **Bacteria**: Discharges from stormwater systems to the Deschutes River and tributaries shall be ≤ 100 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 200 cfu/100mL. Discharges from stormwater systems to Percival Creek and Black Lake Ditch

shall be ≤ 50 cfu/100mL (geometric mean), and not more than 10% of the samples shall be > 100 cfu/100mL.

- **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water DO due to the combined effects of all human activities.

Western Washington Phase II Municipal Stormwater General Permit

Urban areas that collect stormwater runoff in municipal separate storm sewers (MS4s) and discharge it to surface waters are required to have a permit under the federal Clean Water Act. The EPA stormwater regulations established two phases – Phase I and Phase II for the Municipal Stormwater General Permit (MSWGP) program. Ecology develops and administers Phase I and II MSWGPs in Washington State.

The cities of Olympia, Lacey, and Tumwater, along with Thurston County, are all Phase II permittees under the MSWGP (see Figure 18 for their permit boundaries). The permittees are responsible for working with residents, businesses, and other organizations to reduce their pollutant loading from stormwater runoff. They are also responsible for implementation of low impact development (LID) standards for new development and redevelopment to prevent future sources of stormwater pollution.

Compliance with the TMDL will be achieved by compliance with the current water quality-based effluent limits (WQBELs), and in addition to implementation of actions and monitoring requirements described in the Implementation Plan section of this report. The critical period for the following WLAs applies year-round for any stormwater discharge from a permittee's MS4 and should be reflected in the permit as effluent limits:

- **Fine sediment**: No visible accumulation of fine sediment where MS4 discharges stormwater to the Deschutes River, Percival Creek, or Black Lake Ditch is allowed. Turbidity is a surrogate for fine sediment and discharges shall not exceed 5 NTU over background when background is ≤ 50 NTU *or* 10% increase in turbidity when background is > 50 NTU.
- **Temperature**: All discharges shall not cause more than a 0.3°C increase of stream temperature, due to the combined effects of all human activities.
- **Bacteria**: Roberts et al (2012) identified locations on tributaries where bacteria concentrations during storm events must be reduced to meet water quality standards. See Table 11 and Figure 18 for location-specific bacteria allocations on streams that receive stormwater discharges within Phase II permit boundaries. The water quality standards for fecal coliform bacteria apply.
- **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water due to the combined effects of all human activities.

The city of Olympia published an extensive characterization of watersheds within their MSWGP boundary. "The purpose of this work was to inventory and understand the condition of the city's aquatic resource base and the stormwater infrastructure system, then use the information we gain to better direct Storm and Surface Water Program focus and resource allocation" (Olympia, 2012). The city must use this information in addition to the recommendations in this TMDL report to determine an implementation strategy for retrofits of stormwater controls and homeowner education and outreach to meet their WLA.

Thurston County and the cities of Tumwater and Lacey must take a similar approach to determine a stormwater control retrofit strategy and compliance with their WLA. Because of their abutting permit boundaries, coordination between the municipalities and the county will be important for success.

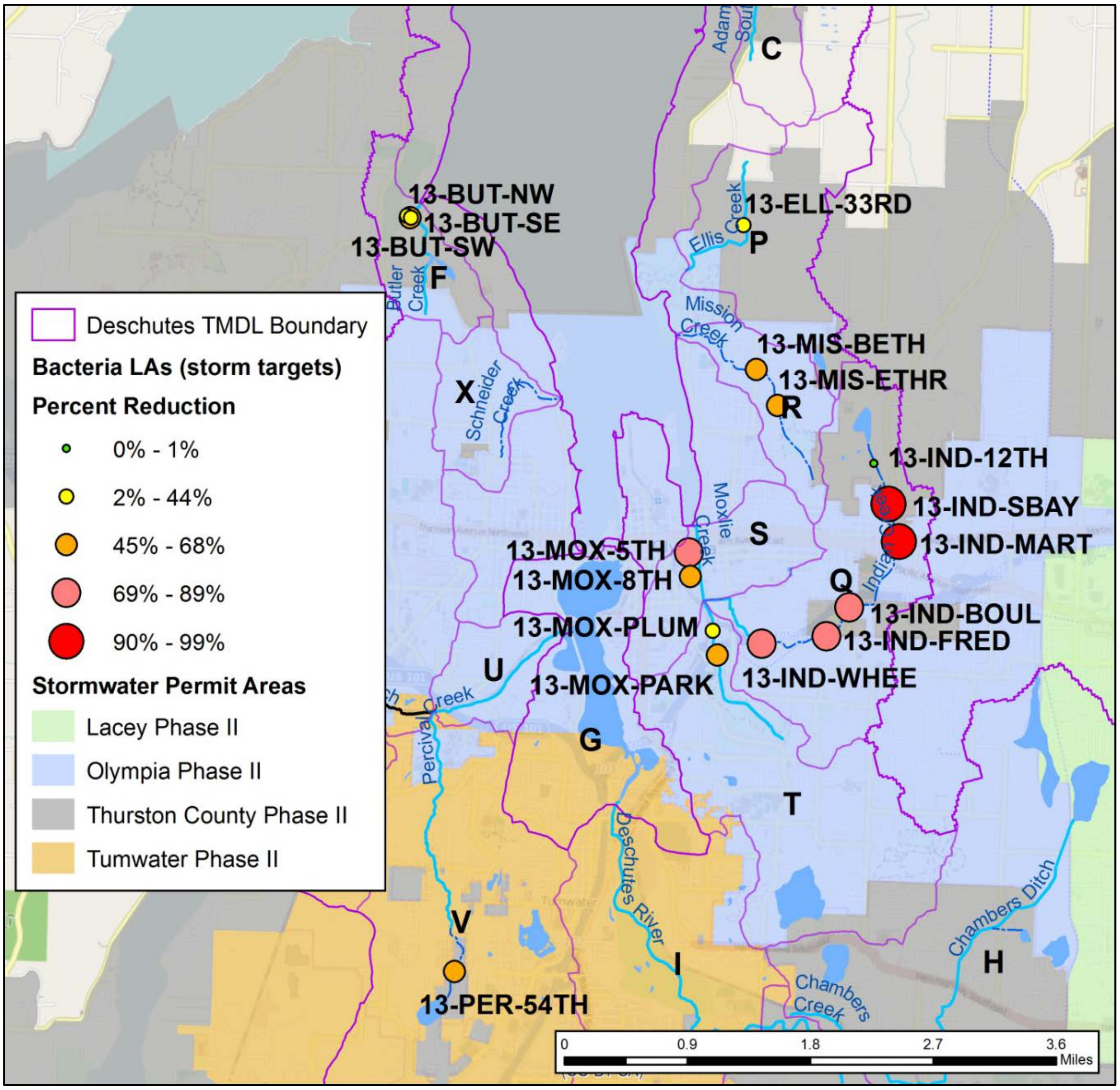

Figure 18: Load allocations (LA) for specific stormwater discharges within the TMDL Boundary.
WLA values are included in Table 9.

Sand and Gravel General Permit

The Sand and Gravel General Permits (SGGP) control the discharge of pollutants from sand and gravel mining operations and related facilities into waters of the state. The permit regulates discharges of process water, stormwater, and mine dewatering water associated with sand and gravel operations, rock quarries, and similar mining operations including stockpiles of mined materials. It also covers concrete batch operations and hot mix asphalt operations. Untreated discharge water from sand and gravel operations may harm fish, aquatic life, and water quality.

The WLAs for this TMDL apply to the SGGPs identified in Table 9. The WLA must also be incorporated into permits for inactive mining sites that are reactivated for operation or new permittees within this TMDL boundary. BMPs for stormwater controls as described in the SGGP must be maintained.

The following WLAs apply from October-May to any surface water discharge from a permitted facility and should be reflected in the permit as effluent limits:

- **Fine sediment**: No visible accumulation of fine sediment in the Deschutes River is allowed. Turbidity is a surrogate measurement for fine sediment. The effluent limit is the same as described in Tables 2 and 3 of Section S2 of the permit. Monitoring frequency is increased to weekly.
- **pH**: All stormwater discharges must not increase the receiving water pH by > 0.5 SU downstream of Offutt Lake and >0.2 SU upstream of Offutt Lake above the range of 6.5 - 8.5 SU.

Discharges of excessively warm water temperatures, fecal coliform bacteria, and low dissolved oxygen water or nutrients are not expected under normal operating conditions, but must not exceed the following limits:

- **Temperature**: All discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.3°C due to the combined effects of all human activities.
- **Bacteria**: Discharges from stormwater systems to the Deschutes River and tributaries shall be ≤ 100 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 200 cfu/100mL. Discharges from stormwater systems to Percival Creek and Black Lake Ditch shall be ≤ 50 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 100 cfu/100mL.
- **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water due to the combined effects of all human activities.

The WLA for any currently inactive mining site is zero for all pollutants covered by this TMDL. The Alpine Sand & Gravel facility (WAG501037) near the Olympia Airport became an inactive facility during the development of this TMDL. The facility has several settling ponds near the Deschutes River (see Figure 19) that could be affected by a future river avulsion. This would lead to discharge of fine sediment into the river if the site is not properly managed or restored. The Surface Mining Reclamation Plan, currently in development, must include a long-term plan for site stabilization/reclamation of settling ponds and measures to protect against avulsion into the ponds by normal river channel migration processes.

Figure 19: Alpine Sand & Gravel facility at Rixie Rd. near Deschutes River model kilometer 62.

WSDOT Municipal Stormwater Permit

State and Federal regulations require the Washington State Department of Transportation (WSDOT) to have NPDES permit coverage in the urbanized areas covered by Phase I and II of the municipal stormwater permit program. This permit also covers stormwater discharges to any water body in Washington State for which there is an EPA-approved TMDL with wasteload allocations and associated implementation documents specifying actions for WSDOT stormwater discharges.

The area of WSDOT's responsibility within this TMDL boundary includes the length of Interstate 5 (I-5), State Highway (Hwy) 101, and where State Route 507 crosses the Deschutes River near the city of Rainier. The WSDOT has stormwater discharges to the southern basin of Capitol Lake where the I-5 bridge extends over the basin and the Hwy 101 bridge over Percival Creek. Ecology determined that the current WSDOT stormwater permit requirements were sufficient to meet the goals of this phase of the TMDL.

For the purpose of this phase of the TMDL, compliance with the WSDOT Municipal Stormwater Permit will be considered compliance with this TMDL. The permit prohibits discharges that violate state water quality standards. Numeric criteria for Percival Creek are slightly different than for the Deschutes River.

The critical period for the WLAs applies year-round as follows:

- **Fine sediment**: No visible accumulation of fine sediment where WSDOT discharges stormwater to the Deschutes River is allowed.
- **Bacteria**: Discharges from stormwater systems to the Deschutes River and tributaries shall be ≤ 100 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 200 cfu/100mL. Discharges from stormwater systems to Percival Creek and Black Lake Ditch shall be ≤ 50 cfu/100mL (geometric mean), and not more than 10% of the samples shall be > 100 cfu/100mL.
- **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water.
- **pH**: All discharges from stormwater systems shall not raise the receiving water body pH by more than 0.5 SU (for Deschutes River and tributaries) or 0.2 SU (for Percival Creek) within the pH range of 6.5 - 8.5 SU.

Discharges of excessively warm water temperatures (while not expected under most normal conditions) must not exceed the following limit:

- **Temperature**: All discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.2°C due to the combined effects of all human activities.

Tier II antidegradation for new NPDES Permits

Tier II antidegradation (see WAC 173-201A-320) is used to ensure that waters of a higher quality than the criteria assigned in the water quality standards are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Any new permitted discharge to the Deschutes River or Percival Creek that will create a measureable change (as defined in WAC 173-201A-320 Section 3) for a pollutant covered by this TMDL, must meet the receiving water body's loading capacity at the point of discharge (or at a point of compliance in a mixing zone) in a location where this TMDL identifies the river or creek currently meets water quality standards.

Figures 14 and 15 of this report identify model reaches (by river kilometer) where the current water quality condition is better than the standards; either the daily minimum (DMin) DO or daily maximum (DMax) pH is better than criteria. New NPDES-permitted facilities that have discharges of low pH or pollutants that lower DO must not allow a measureable change (DO decrease of 0.2mg/L or greater and pH change of 0.1 units or greater) in the current loading capacity in the Deschutes River or Percival Creek for DO or pH.

New point sources discharging to reaches identified as meeting the water quality standards for fecal coliform bacteria must not produce a measureable change (bacteria level increase of 2cfu/100mL or greater) from the loading capacity identified in Figures 33 and 34 in Roberts et al. (2012).

None of the Deschutes River reaches surveyed meets good habitat quality conditions for fine sediments in the gravels. However, other regions not assessed may meet those condition thresholds. Specific actions and/or institutional safeguards may be necessary to prevent deterioration in fine sediment as further development or other changes occur in the watershed. Requirements and conditions placed on new NPDES permits anywhere within the TMDL boundary should not exceed the wasteload allocations specified by this TMDL.

Currently there is no part of Percival Creek or the Deschutes River meeting the temperature water quality standards. Therefore no new discharges may increase the receiving water body temperature greater than 0.3°C anywhere along those two waterbodies.

Exceptions for new permitted discharges may be allowed if Ecology determines that the lowering of water quality is necessary and in the overriding public interest as determined by Section 4 of WAC 173-201A-320.

Load allocations

Load allocations (LA) for nonpoint sources (NPS) of pollution apply to all land uses within the TMDL project boundary including: agriculture, residential (including non-commercial farms), forestry, and commercial uses. Each category of land use has potential effects on water quality, and there are best management practices (BMPs) to reduce pollution impacts in the implementation plan. The LA compliance area is the drainage area that contributes to the point at which water quality is measured for compliance with the LA (see Figure 20 and Table 11); each LA applies to all NPS within each compliance area. When the appropriate BMPs for reducing pollution are used, those activities will be considered compliant with the TMDL.

Table 11: Load allocation (LA) compliance areas for bacteria LAs.

This table is also the key for maps that include these LA compliance areas.

LA Station	Load Allocation Compliance Area Description	Map Label
13-ADA-00.5	Adams Creek east fork at Boston Harbor Rd	B
13-ADA-UNK	Adams Creek Ave S fork @ 47th Ave NE	C
13-AYE-00.0	Ayer Creek	D
13-BLA-00.0	Black Lake Ditch at mouth	E
13-BUT-00.1	Butler Creek	F
13-CHA-00.1	Chambers Creek	H
13-DES-00.5	Deschutes River at E St Bridge	I
13-DES-02.7	Deschutes River at Henderson Blvd	J
13-DES-05.5	Deschutes River below Ayer Creek	K
13-DES-09.2	Deschutes near Rich Road	L
13-DES-20.5	Deschutes at Route 507	M
13-DES-28.6	Deschutes at Vail Cutoff Road	N
13-HUC-00.3	Huckleberry Creek	O
13-ELL-00.0	Ellis Creek	P
13-IND-00.2	Indian Creek	Q
13-MIS-00.1	Mission Creek at East Bay Drive	R
13-MOX-00.0	Moxlie Creek at mouth	S
13-MOX-00.6	Moxlie Creek near Union Ave	T
13-PER-00.1	Percival Creek near mouth	U
13-PER-01.0	Percival Creek at Black Lake Ditch	V
13-REI-00.9	Reichel Creek	W
13-SCH-00.1	Schneider Creek	X
13-SPU-00.0	Spurgeon Creek	Y

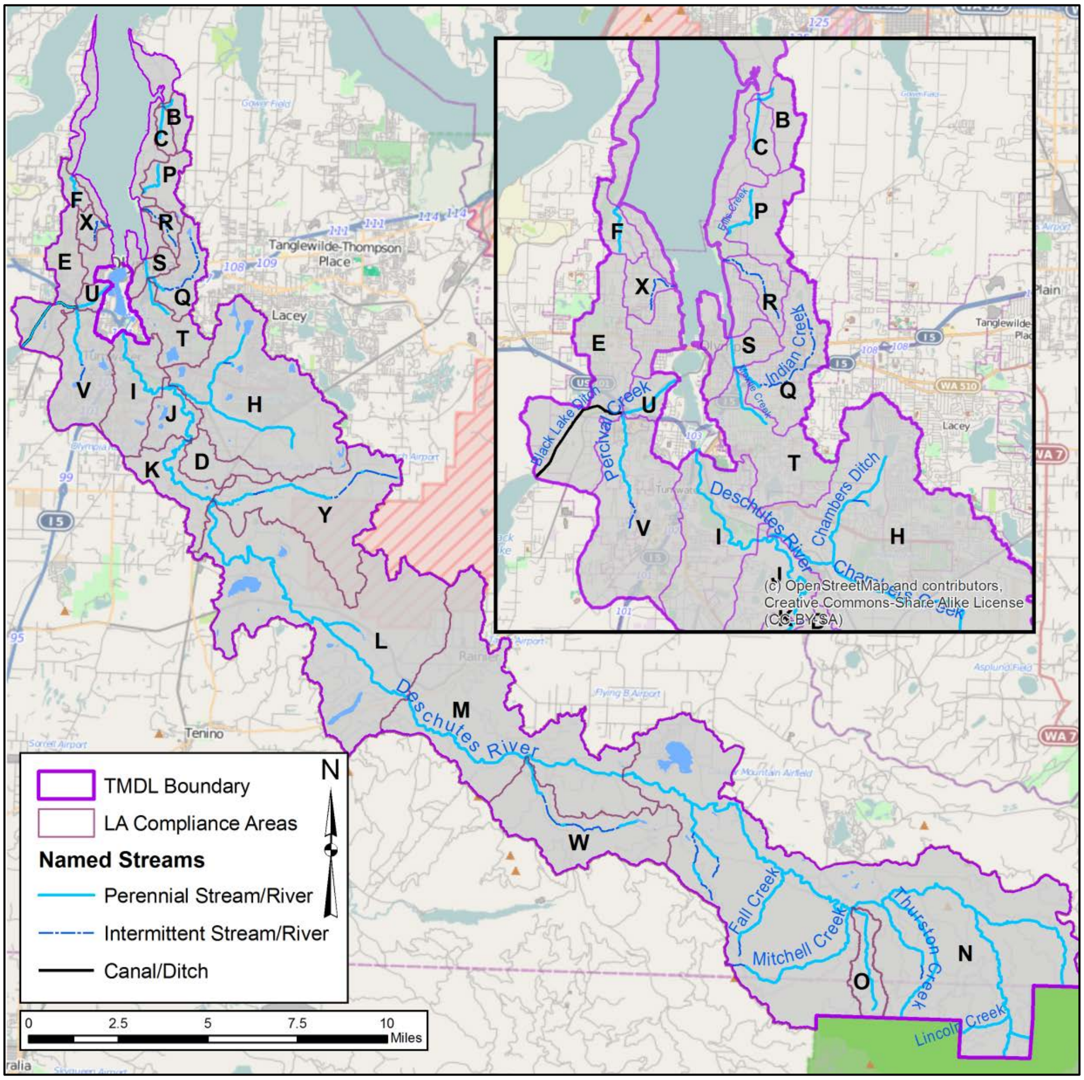

Figure 20: Load Allocation compliance areas for bacteria LAs.

Nonpoint activities within each area must meet the LA within each compliance area. See Table 11 for the map symbol keys that each letter refers to.

Temperature

LAs are recommended in this TMDL to meet both the numeric threshold criteria and the allowances for human warming under conditions that are naturally warmer than those criteria. Maximum temperatures predicted under mature riparian shade would not meet the 16 or 17.5°C numeric water quality criteria during critical conditions throughout the Deschutes River, but would substantially reduce peak temperatures below the lethality limit. Therefore, there is a need to achieve maximum protection from direct solar radiation throughout the system. The LA for the Deschutes River and all tributaries is the shade that would result from full mature riparian vegetation, microclimate, channel improvements, and decreased headwater and tributary temperatures. Figures 21 and 22 summarize the effective shade improvement allocations for potential vegetation and are detailed in Appendix E.

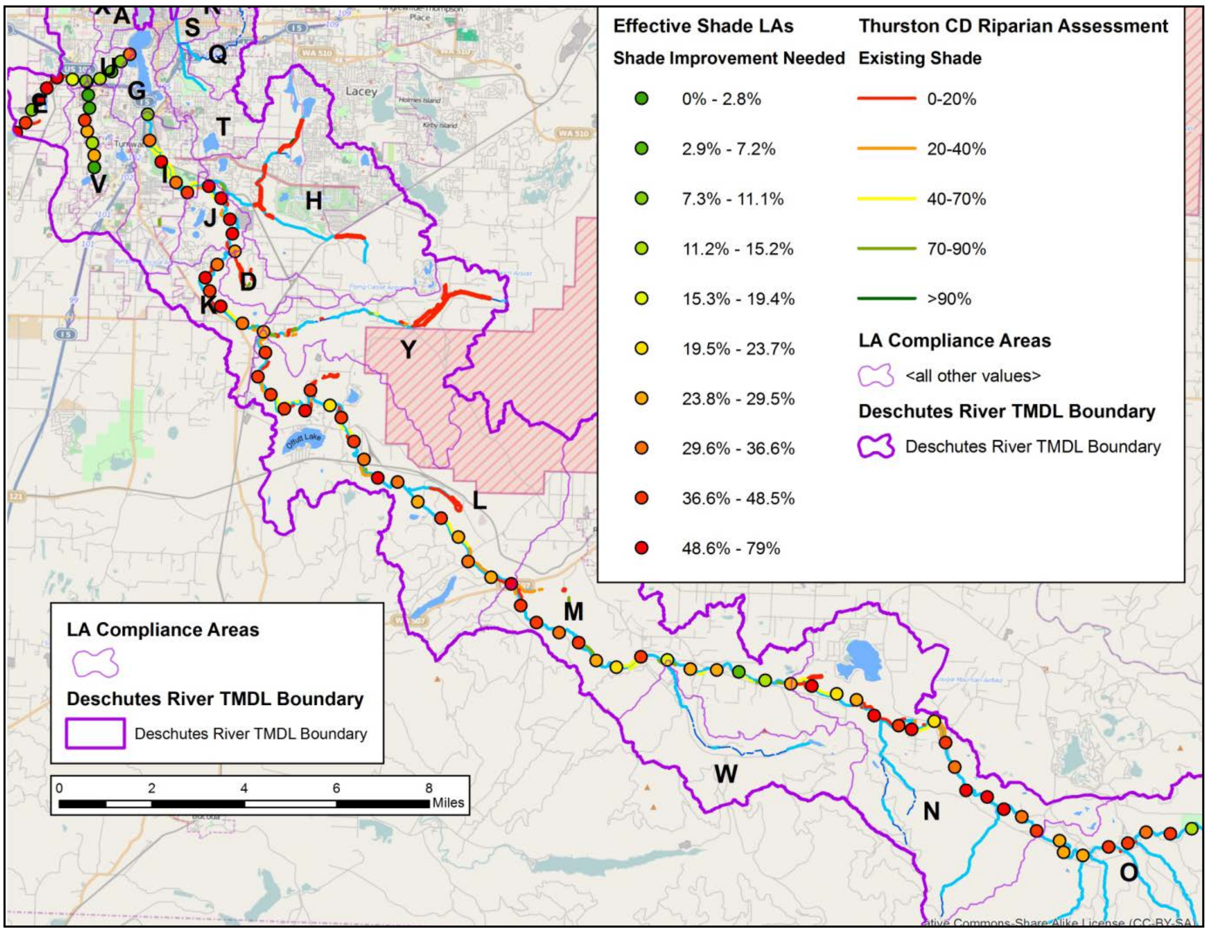

Figure 21: Effective Shade Improvement allocations for the Deschutes River, Percival Creek, and Black Lake Ditch.

Also shown are the reaches identified by the Thurston Conservation District Riparian Assessment study; improving riparian areas with low existing shade will also help improve the Deschutes River. See Table 11 for a key to the letter labels for the load allocation compliance areas.

Several tributaries to the Deschutes River do not meet the water quality standards based on 2003 7DADMax stream temperature data, including:

- Thurston Creek
- Johnson Creek
- Mitchell Creek
- Reichel Creek
- Tempo Lake outflow
- Spurgeon Creek
- Ayer Creek

To reduce temperatures in these tributaries, full mature riparian vegetation is needed. While Huckleberry Creek was on the 303(d) list in 2004, the creek did not violate water quality standards in 2003 (7DADMax was 15.6°C), but it could violate water quality standards during critical conditions. Therefore full mature riparian shade is also recommended for Huckleberry Creek (Roberts et al., 2012).

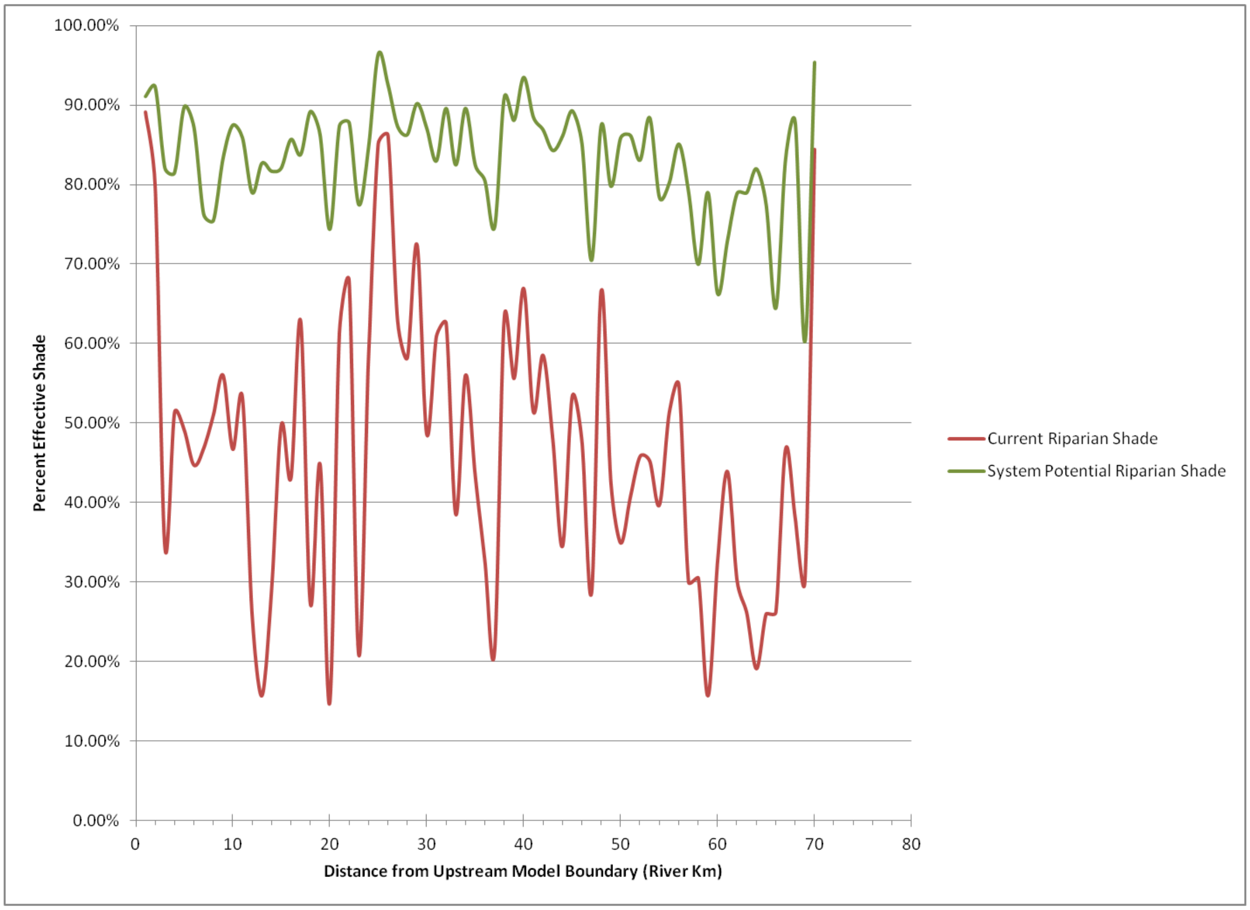

Figure 22: Chart comparing effective shade produced from system potential riparian vegetation and the current riparian vegetation.

Areas with the greatest difference between system potential shade and current shade will require the greatest increases in effective shade and highlight areas to focus on for restoration.

While meeting the load allocations for effective shade will provide the biggest reductions of stream temperature, the system potential riparian shade model includes reductions of wetted widths and near stream disturbance zone (NSDZ) widths by 10% from their current widths. A narrower and deeper river reach will be heated less than a wide and shallow reach.

The 1km model reach average widths were calculated, and the channel width improvements needed are shown in Figure 23. Ecology does not set load allocations for channel width reductions, but the reductions are part of the system potential temperature modeling assumptions and should also be considered as another implementation strategy to meet the objective for reducing stream temperatures.

Figure 24 displays percent reduction needed for average NSDZ width for each model kilometer of the Deschutes River. This can be another tool for prioritizing implementation of channel improvement activities to meet the goals of this TMDL. Areas with a higher percent reduction of NSDZ widths should be considered for implementation projects that reduce channel widths and increase channel complexity.

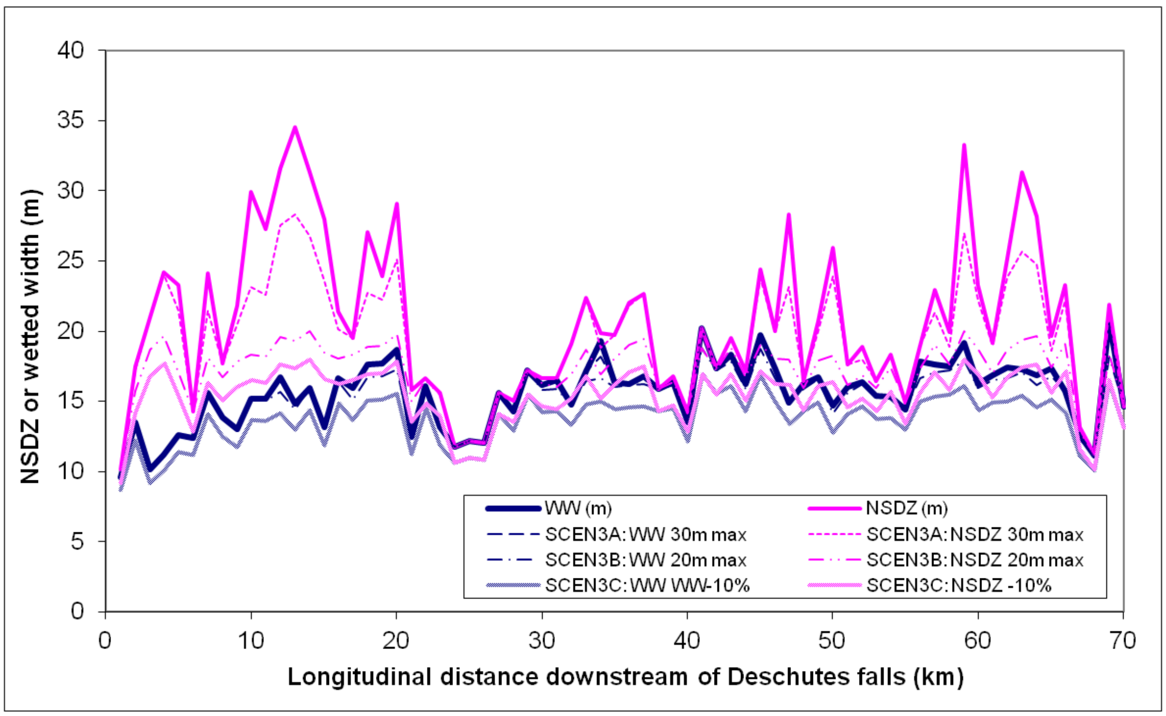

Figure 23: Temperature modeling assumptions from scenario 3C are used in the stream temperature QUAL2K analysis to determine the system potential temperature that is likely given the conditions in Scenario 4 which form the basis for the stream temperature load allocations.

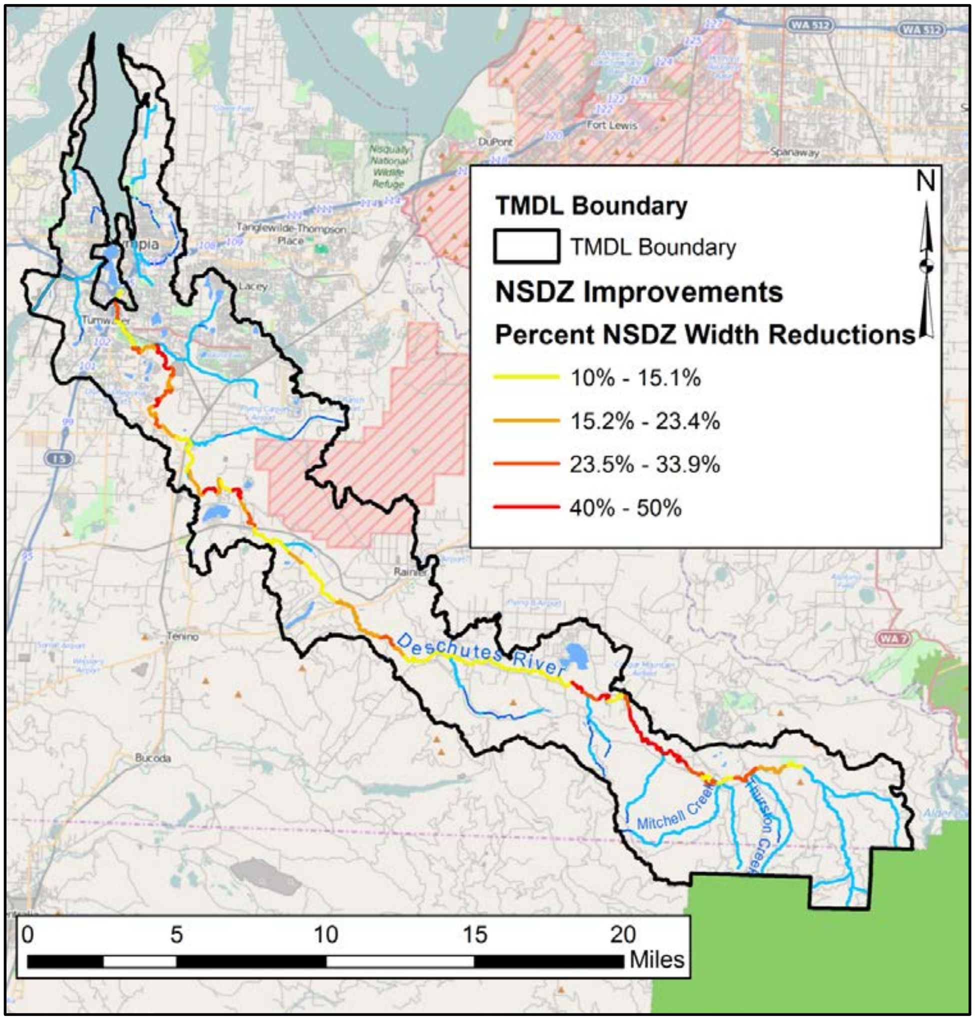

Figure 24: Map showing the percent reduction of the average NSDZ width for each model kilometer based on the QUAL2K model inputs.

Fecal coliform bacteria

The load allocations (LA) are expressed as the 90th percentile fecal coliform bacteria concentration that meets Part 2 of state water quality standards (10% of samples not to exceed) which the study identified as needing the greater reduction. A percent reduction from current conditions to meet Part 2 of the water quality standards is also included to help prioritize areas with greater reductions that are needed to meet standards. Figure 33 and 34 from Roberts et al (2013) show the measured fecal coliform concentrations and reductions needed to comply with both parts of the standards. These are depicted spatially in Figures 25 and 26, as well as Table 12 in this report. Future compliance with these targets will be based on comparison of measured data with the water quality standards. If a site meets both Part 1 and Part 2 of the water quality standards, the site will be in compliance with this TMDL.

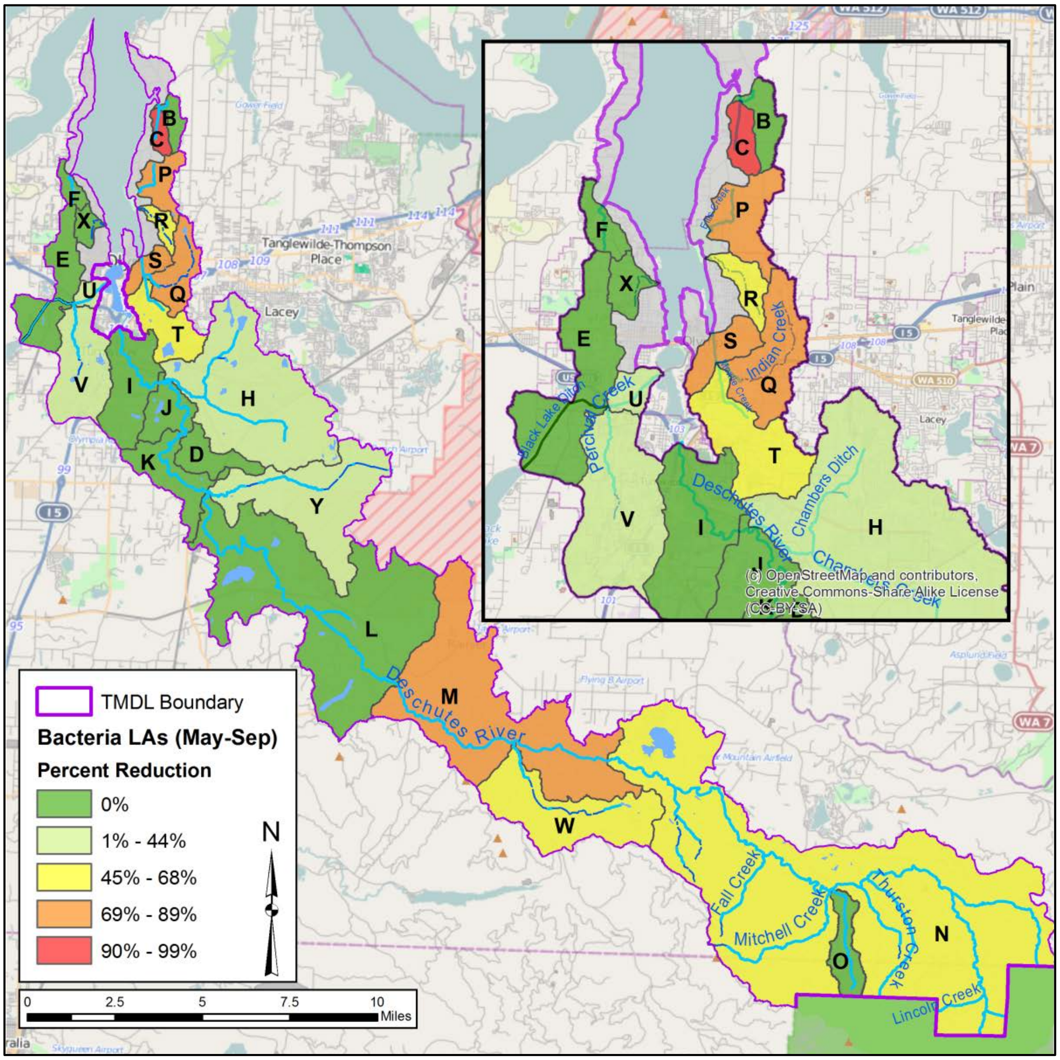

Figure 25: Fecal coliform bacteria load allocations (LA) for the May-Sep critical period.

LA compliance areas with a 0% reduction should not be degraded and reductions may be needed in these areas as well. Letters correspond to load allocation compliance areas (Table 11).

The LA is prescribed for two different periods, May-September (summer) and October-April (winter) as well as during storm events. Facilities and sources within each of the LA regions in the figure must meet the LA in the region where the facility discharges. Table 12 summarizes the load reductions necessary to meet the water quality standards during the summer season and winter season. Because Schneider Creek (13-SCH-00.1) violates Part 2 of the standards but the estimated 90th percentile is below the target, a nominal 10% reduction in bacteria loads is recommended to achieve compliance with Part 2 of the standards. In addition to the mouths of the creeks that were assessed twice monthly, the stormwater monitoring conducted upstream of the mouths provides supplemental reduction targets for the winter season only (also shown in Table 12).

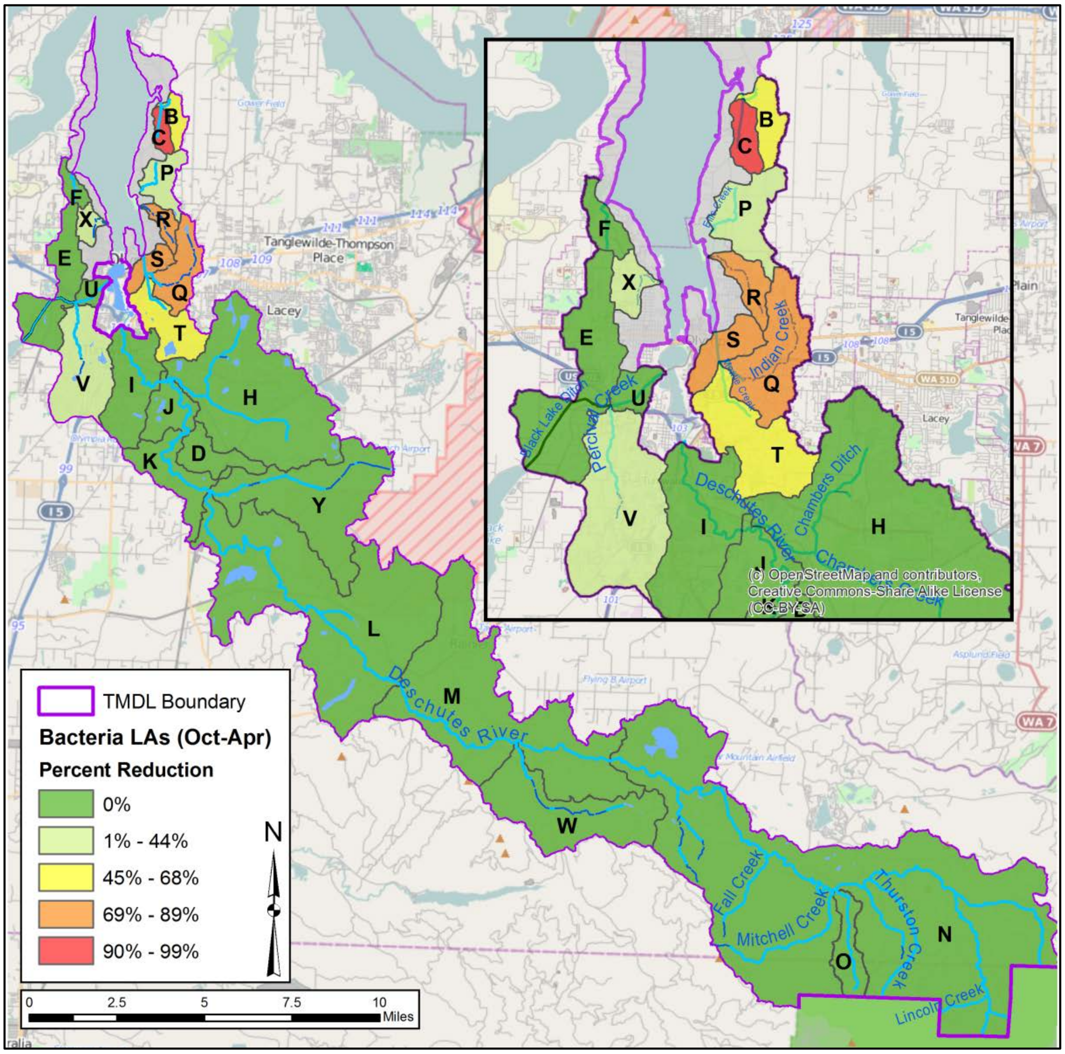

Figure 26: Fecal coliform bacteria load allocations (LA) for the October-April critical period.

LA compliance areas with a 0% reduction should not be degraded and implementation may be needed in these areas as well. Letters correspond to load allocation compliance areas (Table 11).

Table 12: Load allocations (LA) for fecal coliform bacteria.

Letters correspond to bacteria load allocation compliance areas (Table 11).

Load Allocation Compliance Area ID (and map key) and Station ID	90th Percentile* Load Allocation	Summer LA (May-Sep) (Percent Reduction)**	Winter LA (Oct-Apr) (Percent Reduction)**	Additional load reduction targets during storms	Comments
Deschutes River					
13-DES-00.5 (**I**)	200 cfu/100mL	0%	0%		E-St Bridge crossing
13-DES-02.7 (**J**)	200 cfu/100mL	0%	0%		Henderson Rd crossing
13-DES-05.5 (**K**)	200 cfu/100mL	0%	0%		Below Ayer Creek
13-DES-09.2 (**L**)	200 cfu/100mL	0%	0%		Rich Road crossing
13-DES-20.5 (**M**)	100 cfu/100mL	82%	0%		State Route 507 crossing
13-DES-28.6 (**N**)	100 cfu/100mL	53%	0%		Vail Loop Road SE crossing
Tributaries to Deschutes River					
13-AYE-00.0 (**D**)	200 cfu/100mL	0%	0%		Ayer Creek
13-CHA-00.1 (**H**)	200 cfu/100mL	35%	0%		Chambers Creek
13-REI-00.9 (**W**)	200 cfu/100mL	68%	0%		Reichel Creek
13-SPU-00.0 (**Y**)	200 cfu/100mL	44%	0%		Spurgeon Creek
Percival Creek Watershed					
13-BLA-00.0 (**E**)	100 cfu/100mL	0%	0%		Black Lake Ditch
13-PER-00.1 (**U**)	100 cfu/100mL	34%	0%		Mouth of Percival Creek
13-PER-01.0 (**V**)	100 cfu/100mL	47%	34%		Percival at Black Lake Ditch confluence
13-PER-54TH				54%	Crossing of Percival Creek and 54th Ave SE (Trosper Rd)
Budd Inlet Tributaries					
13-ADA-00.5 (**B**)	200 cfu/100mL	0%	68%		Mouth of Adams Creek
13-ADA-UNK (**C**)	200 cfu/100mL	99%	96%		Unnamed trib to Adams Creek
13-BUT-00.1 (**F**)	200 cfu/100mL	0%	0%		Mouth of Butler Creek
13-BUT-NW	200 cfu/100mL			29%	Butler Creek NW Fork
13-BUT-SW	200 cfu/100mL			49%	Butler Creek SW Fork
13-BUT-SE	200 cfu/100mL			nom 10%	Butler Creek SE Fork
13-ELL-00.0 (**P**)	200 cfu/100mL	82%	2%		Mouth of Ellis Creek
13-ELL-33RD	200 cfu/100mL			32%	Crossing of Ellis Creek and 33rd Ave NE
13-IND-00.2 (**Q**)	200 cfu/100mL	89%	69%		Mouth of Indian Creek
13-IND-WHEE	200 cfu/100mL			76%	Crossing of Indian Creek at Wheeler Ave SE
13-IND-FRED	200 cfu/100mL			76%	Crossing of Indian Creek at Fredrick St SE
13-IND-BOUL	200 cfu/100mL			85%	Crossing of Indian Creek at Boulevard Rd SE

Load Allocation Compliance Area ID (and map key) and Station ID	90th Percentile* Load Allocation	Summer LA (May-Sep) (Percent Reduction)**	Winter LA (Oct-Apr) (Percent Reduction)**	Additional load reduction targets during storms	Comments
13-IND-MART	200 cfu/100mL			97%	Crossing of Indian Creek at Martin Way
13-IND-SBAY	200 cfu/100mL			91%	Crossing of Indian Creek at South Bay Rd NE
13-IND-12TH	200 cfu/100mL			0%	Crossing of Indian Creek at 12th Ave NE
13-MIS-00.1 (**R**)	200 cfu/100mL	53%	77%		Mouth of Mission Creek
13-MIS-BETH	200 cfu/100mL			64%	Crossing of Mission Creek at Bethel St NE
13-MIS-ETHR	200 cfu/100mL			53%	Crossing of Mission Creek at Ethridge Ave NE
13-MOX-00.0 (**S**)	200 cfu/100mL	84%	85%		Mouth of Moxlie Creek
13-MOX-5TH	200 cfu/100mL			84%	Crossing of Moxlie Creek and 8th Ave SE
13-MOX-8TH	200 cfu/100mL			58%	Crossing of Moxlie Creek and 5th Ave SE
13-MOX-00.6 (**T**)	200 cfu/100mL	63%	54%		Moxlie Creek upstream of Indian Creek
13-MOX-PLUM	200 cfu/100mL			41%	Crossing of Moxlie Cree and Henderson Blvd SW
13-MOX-PARK	200 cfu/100mL			52%	Moxlie Creek at north boundary of Watershed Park
13-SCH-00.1 (**X**)	200 cfu/100mL	0%	nom 10%		Schneider Creek***
13BUDDTRIBS (**A**)	200 cfu/100mL	meet SWQS			Budd Inlet tributaries not called out with a specific LA must meet applicable freshwater criteria for bacteria.

***** The 90th percentile concentration target is the part of the criteria most often violated and is assumed the Geometric Mean is met if the 90th percentile target is also.

****** The Percent reduction of the 90th percentile reduction scores at each station that is needed to be in compliance with the surface water quality standard for fecal coliform bacteria. Ecology recognizes that significant nonpoint sources of bacteria may exist in some areas that were meeting standards during the TMDL study. Load allocation compliance areas with a zero percent reduction target must continue to meet standards and future violations will require a reevaluation of the specific load allocation.

******* The mouth of Schneider Creek (13-SCH-00.1) violates Part 2 of the standards because >10% of samples were greater than 200 FC/100mL; however, the 90th percentile estimated from the log-transformed date is below 200 FC/100mL.

While Black Lake Ditch meets the bacteria water quality standards, Percival Creek does not, and additional source identification is warranted. Potential sources include recreational users and homeless populations.

Management programs should eliminate human and domestic animal sources of fecal coliform bacteria. Homes and businesses outside of the urban growth area all use on-site sewage systems (OSS) with a high potential to be a source of bacteria and nutrients if they are failing, sited in low permeable soils, and/or within close proximity to streams. OSS systems are designed to remove bacteria from septage, but even a properly functioning system does not remove nutrients from water discharged to a drainfield.

Dissolved oxygen and pH

LAs are recommended in this phase of the TMDL to meet both numeric threshold criteria and the allowance for human impacts on dissolved oxygen (DO) and pH under conditions that are naturally inferior to the DO and pH criteria. Minimum DO would not meet the numeric DO criteria of >9.5 mg/L upstream of Offutt Lake under system potential conditions, even if all of the load allocations are met. However, load allocations for effective shade on the Deschutes mainstem and nutrients upstream of Offutt Lake, combined with channel improvements and reduction of headwater and tributary temperatures would substantially improve minimum DO during critical conditions.

Scenario DO8 (Roberts et al., 2012) represents the system potential condition for DO and pH in the Deschutes River. Scenario DO8 assumes: system potential effective shade and channel improvements, the headwaters meeting DO standards, and tributary and groundwater nutrients at estimated natural conditions (Figure 27). Where minimum DO falls below the numeric criteria, humans cannot cause more than a 0.2 mg/L decrease.

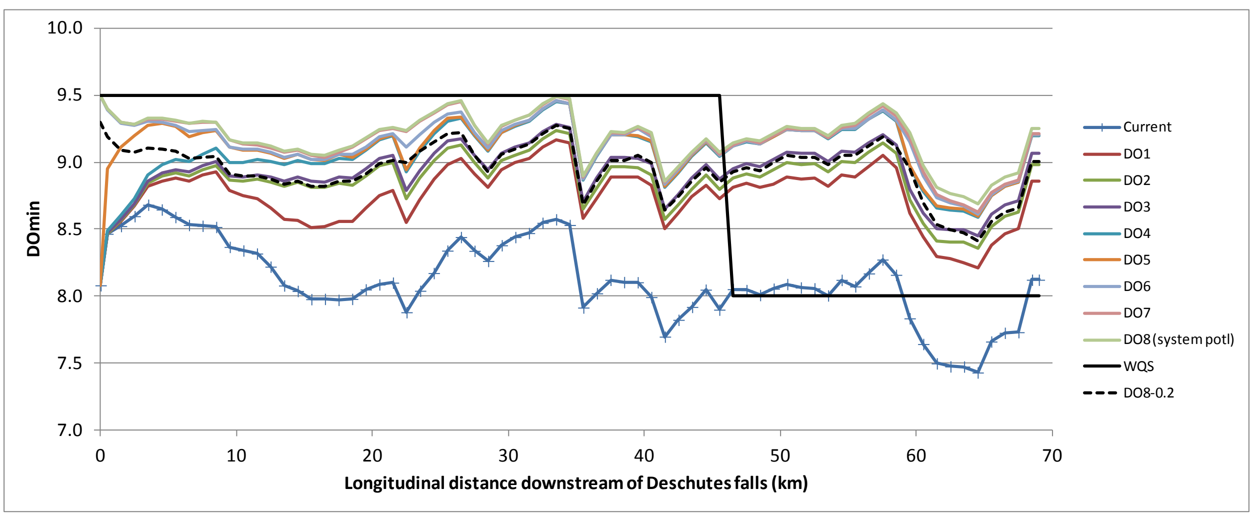

Figure 27: Predicted daily minimum DO in the Deschutes River for critical conditions under current conditions and various temperature scenarios.

Scenario DO8 was chosen as the best possible condition and requires meeting the temperature load allocations and reducing tributary and groundwater nutrient concentrations to the 10th percentile of current concentrations.

The temperature load allocation section of this report summarizes the effective shade deficit and solar heat load allocations for system potential effective shade. Temperature improvements alone would substantially improve minimum DO, but additional improvements in headwater, tributary, and groundwater quality to reduce nutrient loading will be needed in the Deschutes River upstream of Offutt Lake, where the 9.5 mg/L criteria applies. Figures 27 and 29 can be used to identify where the most improvements for DO are needed and which management activities are most influential by river reach, based on the differences between scenario lines.

Reduction of nutrients is incrementally helpful to reduce primary productivity and thus improve DO and pH in the Deschutes River above Offutt Lake. The load allocations for dissolved inorganic nitrogen (DIN), and orthophosphate (OP) are the natural condition for these two parameters, and applies to the Deschutes watershed above Offutt Lake (Table 13). These load allocations may be adjusted in the subsequent Phase II TMDL that will set nutrient allocations to meet water quality standards in Capitol Lake and Budd Inlet.

Table 13: Nutrient load allocations for tributary and groundwater nonpoint sources to address dissolved oxygen and pH in the Deschutes watershed upstream of Offutt Lake.

Pollutant	Load Allocation	Percent Load Reduction
Dissolved Inorganic Nitrogen (DIN)	25.23 kg/day	72.3%
Orthophosphate (OP)	2.06 kg/d	10.1%

Figure 28 shows the total nutrient contributions from the natural and nonpoint sources for the Deschutes Watershed upstream of Offutt Lake. Natural nutrient concentrations were estimated by setting concentrations equal to the medians from the hydrogeology study. Nitrate was back-calculated from the groundwater value for the area identified in Pitz and Sinclair (1999), and the median ammonium data in Sinclair and Bilhimer (2007) because so many of the nitrate values in the piezometers were below the reporting limit. Groundwater concentrations were capped at 0.054 mg/L for organic phosphorus, 0.052 mg/L for inorganic phosphorus, 0.616 mg/L: for nitrate, 0.034 mg/L for ammonia, and 0.007 mg/L for organic nitrogen (Roberts et al., 2012).

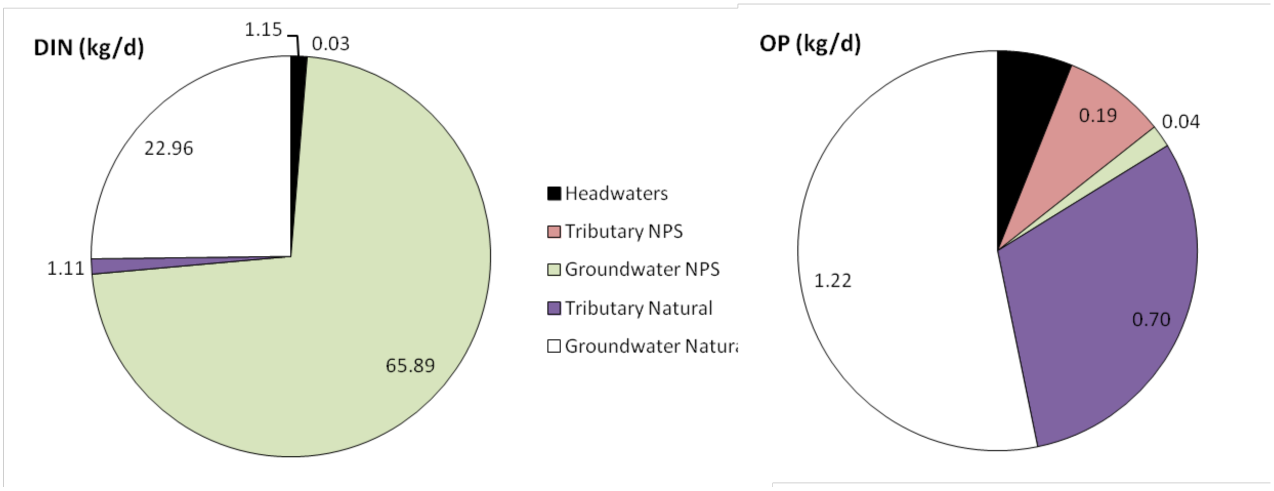

Figure 28: Sources of Dissolved Inorganic Nitrogen (DIN) and Orthophosphate (OP) and their relative load of each that are contributed to the Deschutes River upstream of Offutt Lake.

For DO, the most influential activity between river kilometer (RK) 0 and 5 would be restoring headwater DO to meet the numeric standard. Between RK 5 and 46 (Offutt Lake), restoring full mature riparian shade would have the greatest benefit to DO. Between RK 10 and 20, decreasing the near-stream disturbance zone (NSDZ) and wetted width would have the next highest impact. Achieving microclimate benefits would have the third highest benefit to the section between RK 10 and 46. Downstream of Offutt Lake, partially restoring riparian shade downstream of RK 58 would meet water quality standards, although other activities also may succeed in achieving standards.

Historical wetland complexes and current wetland soils likely influence minimum DO in Ayer and Reichel Creeks, and the creeks may not meet the numeric criteria. However, substantial increases are likely with improved water temperatures. During the winter months, Ayer Creek achieves a minimum DO of 6.7 mg/L and Reichel achieves 10.3 mg/L, when biological activity is low. Lake Lawrence influences the outlet stream DO and nutrients and should be evaluated further as part of a total phosphorus TMDL. Load targets for Ayer Creek, Reichel Creek, and the Lake Lawrence tributary should include reductions in solar radiation that would result from mature riparian vegetation to limit primary productivity to the maximum extent possible.

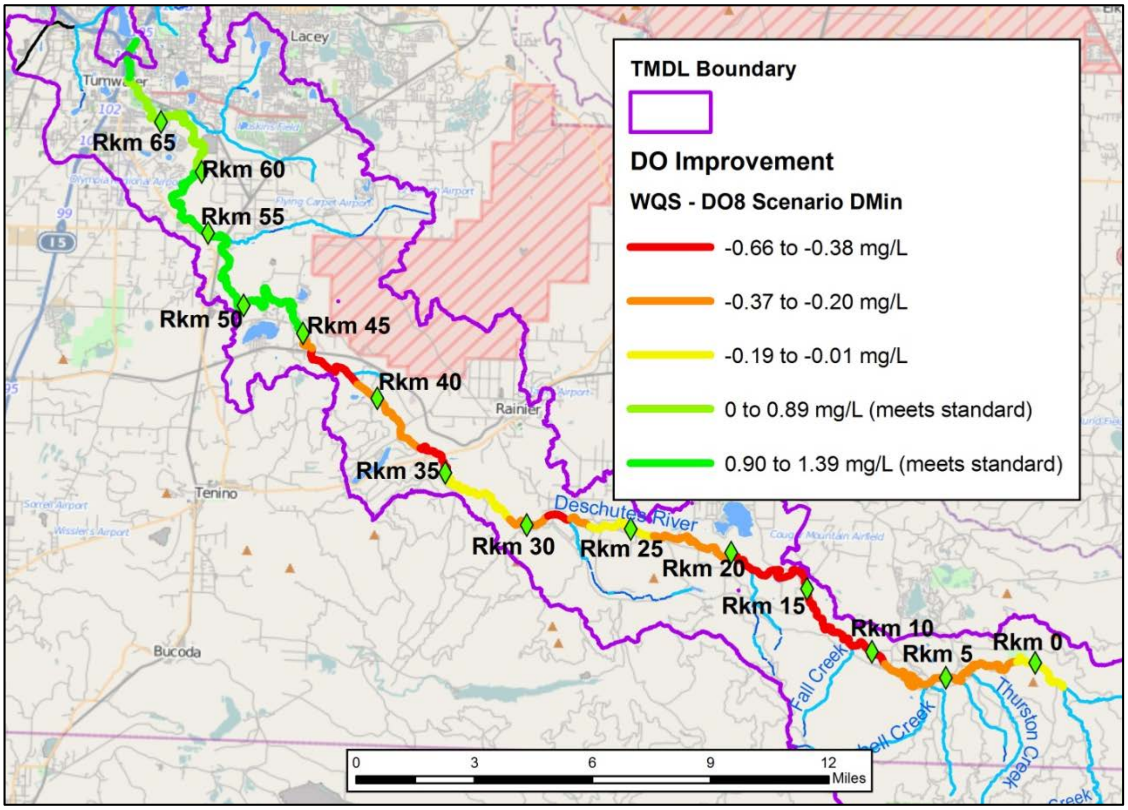

Figure 29: Map showing the difference between the DO criterion and expected DO improvement based on Scenario DO8 (system potential effective shade and nutrient reductions).

The green areas meet or are better than the DO standard, other areas will still not meet the water quality standard for DMin DO levels in the Deschutes River. River kilometers (RK) correspond with RK downstream from the model starting point and the predicted daily minimum DO values above.

High concentrations of OSS systems in areas of Vashon recessional outwash deposits can also present a risk of nutrients leaching to groundwater (see Figure 30). Erwin and Tesoriero (1997) and Tesoriero and Voss (1997) identified areas where groundwater is highly vulnerable to nitrate contamination, including parts of the Deschutes River watershed. Their study found that shallow aquifers with coarse-grained glacial deposits (like Vashon recessional outwash deposits) are vulnerable to nitrate contamination in areas with a high percentage of urban or agricultural land uses.

In addition to human health problems from excess nitrates in drinking water wells, excess nutrients in shallow groundwater can exacerbate low dissolved oxygen problems in gaining reaches of the Deschutes River and tributaries (Sinclair and Bilhimer, 2007).

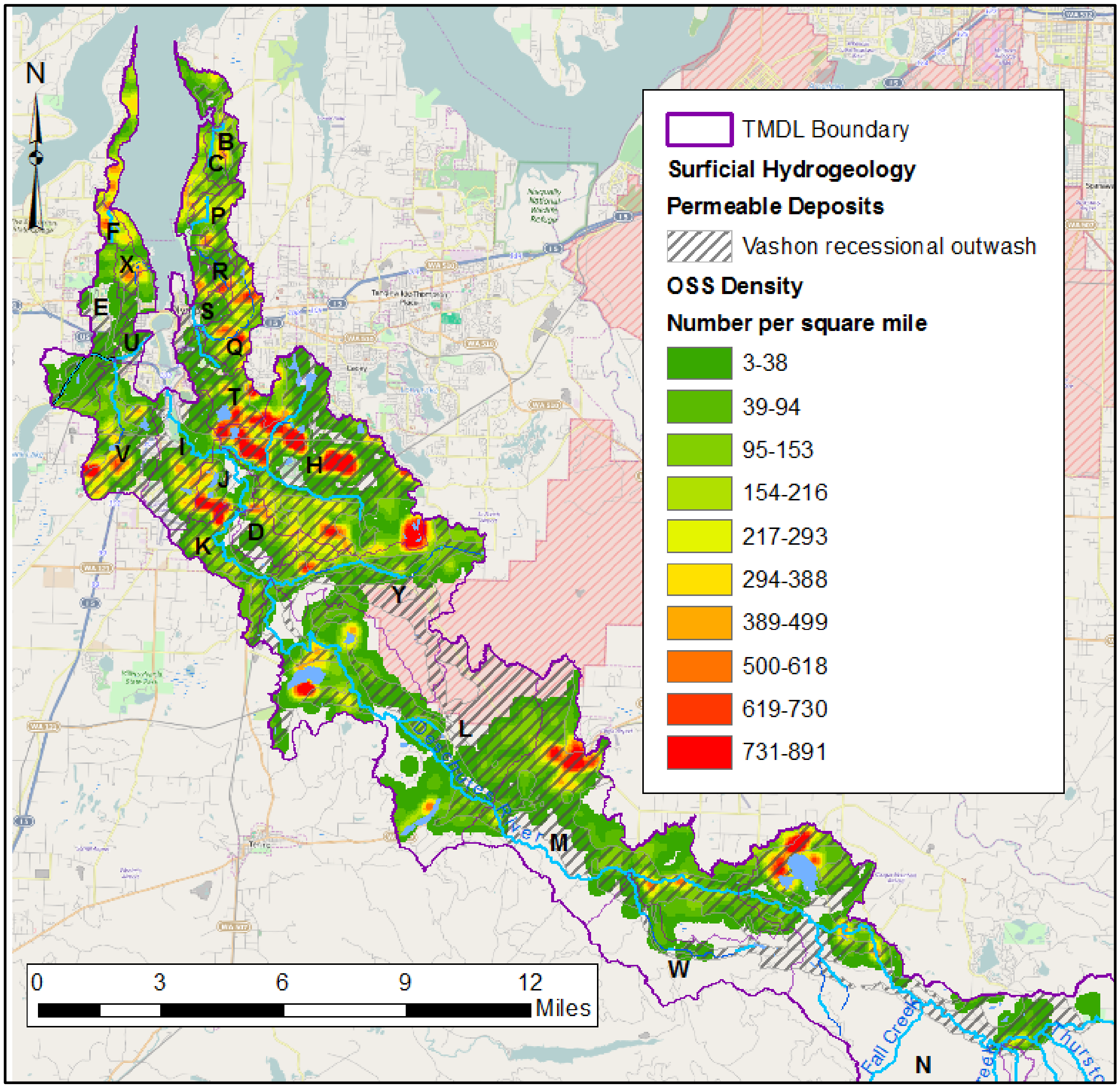

Figure 30: OSS density and the highly permeable geology associated with Vashon recessional outwash deposits.

Map Labels identify the bacteria load allocation compliance areas.

Thurston County is the permitting authority for OSS within the TMDL boundary and is the entity that works within this area to identify systems near surface water bodies and in areas where the geology is prone to nitrate contamination in groundwater. Addressing OSS will require a collaborative effort between the respective cities, towns, and county entities. Priority areas to focus OSS efforts include:

- Areas within the LOTT Clean Water Alliance service area that are served by OSS and that have been identified through the County's Urban Septic Assessment as posing risk to surface waters and/or groundwater.
- Chambers Creek sub-watershed.
- City of Rainier.
- Residential development around Lake Lawrence.

Thurston County provided Ecology with OSS information for parcels within their urbanized area based on their draft Urban Septic Assessment (draft data used in this report which was included in the recently published report by the Regional Septic Work Group, 2015). The data was used to develop the OSS density map (Figure 30) by creating a point feature of the centroid of all parcels with OSS and then creating a raster of OSS density using the kernel density spatial analyst tool.

For pH improvements, management activities are needed to reduce maximum pH between RK 40 and 46, between RK 55 and 59, and between RK 60 and 68. Restoring full mature riparian shade would have the greatest impact in all three sections. Additional actions are needed between RK 43 and 46 and near RK 58 to meet the pH standard. For the pH range, management activities are needed to reduce the pH range between RK 5.5 and 8.5, between RK 21.5 and 27, between RK 37.5 and 46, and between RK 62 and 68. Reducing tributary nutrients would strongly influence the reaches between RK 5.5 and 8.5, and between RK 21.5 and 27.5. Shade also strongly influences the section between RK 21.5 and 27.5, as well as the reaches between RK 37.5 and 46, and between RK 62 and 68.

The load allocations for nutrients in Percival Creek, Budd Inlet tributaries, and Deschutes River downstream of Offut Lake will be established in the subsequent Budd Inlet DO TMDL as the levels required for meeting the loading capacity of Capitol Lake and Budd Inlet.

Fine sediment

The LA for fine sediment is 21,615 yd^3/yr (or 59 yd^3/day), equal to the sum of natural and unaccounted for sources (see following equation) in the overall sediment budget identified in Raines (2007) and presented in Roberts et al (2012). This LA is presented as both an annual load as well as an estimated daily load to satisfy EPA requirements. Fine sediment from anthropogenic sources typically enters rivers and streams with stormwater runoff. This makes it difficult to express in a daily load due to the periodic nature of storm events. The daily load is simply the annual load divided by 364.25.

$$LA = Natural\ Sources + Unaccounted\ Sources - Human\ Sources$$

The fine sediment budget estimate of the loads generated is a reasonable proxy for fine sediment levels in the streambed gravels, although this analysis did not directly link the two. In addition, this TMDL sets target percent reduction of fine sediments for five segments identified by Konovsky and Puhn (2005) that do not meet the 12% fines target for what the *Timber Fish and Wildlife Watershed Analysis Manual* (Washington Forest Practices Board, 1997) specifies as good quality substrate.

The Deschutes River watershed is a mixed-use watershed, with non-forested land, private forests, and public forests. The load allocation in this TMDL accounts for fine sediment derived from non-federal, commercial forest lands. In accordance with Clean Water Act (CWA) Assurances established under Schedule M-2 of the Forests and Fish Report (USFWS et al., 1999), Ecology will not require more stringent measures except through adaptive management-based changes established under the Forests and Fish Adaptive Management Program and subject to reopeners (Hicks, 2006). If achievement of the TMDL load allocation cannot be met through the forest practices regulations (in addition to complete implementation on non-forest lands), the adjustment of those forest management practices will be through the process of adaptive management established under the state's forest practices laws and regulations. Over the long term, failure of adaptive management, on commercial forest lands, to meet the load allocations for this TMDL would be a potential cause to withdraw these assurances.

Konovsky and Puhn (2005) characterized the percent of fine sediments within the gravels of the heads of riffles from five reaches along the Deschutes River. The heads of riffles are particularly suited for salmonid spawning. The median values varied from 17 to 22%, higher than the maximum 12% of fine sediments identified by the Washington Forest Practices Board (1997) Table F-2 as good quality habitat. High fine sediment levels can block the exchange of water to the gravels and reduce the availability of dissolved oxygen to salmonid early life stages. Konovsky and Puhn (2005) established the existing levels, which were compared with the value of <12% indicating good conditions. To meet good conditions would require reductions of 30 to 46% in fine sediments within the gravels.

Table 14 and Figure 31 present the mainstem reaches with fine sediment percent reduction targets to focus on for implementation for the Deschutes River watershed based on the river reaches assessed by Konovsky and Puhn (2005). The target is to reduce fine sediments to no more than 12% of the substrate. Further discussion of the sediment budget and analysis can be found in Roberts et al (2012).

Table 14: Fine sediment percent reduction targets by reach for the Deschutes River watershed.

Segment	Name	River mile	1995	2004	Target	% Reduction
19	Weyerhaeuser	31.4 - 35.4	15.5%	17.7%	12%	32%
22	Lake Lawrence	28.8 - 30.4	22.5%	17.1%	12%	30%
28	State Route 507	20.8 – 24.4	19.4%	20.5%	12%	41%
31	Waldrick	14.5 – 17.2	19.9%	20.1%	12%	40%
36	Pioneer	0.5 – 2.7	22.0%	22.1%	12%	46%

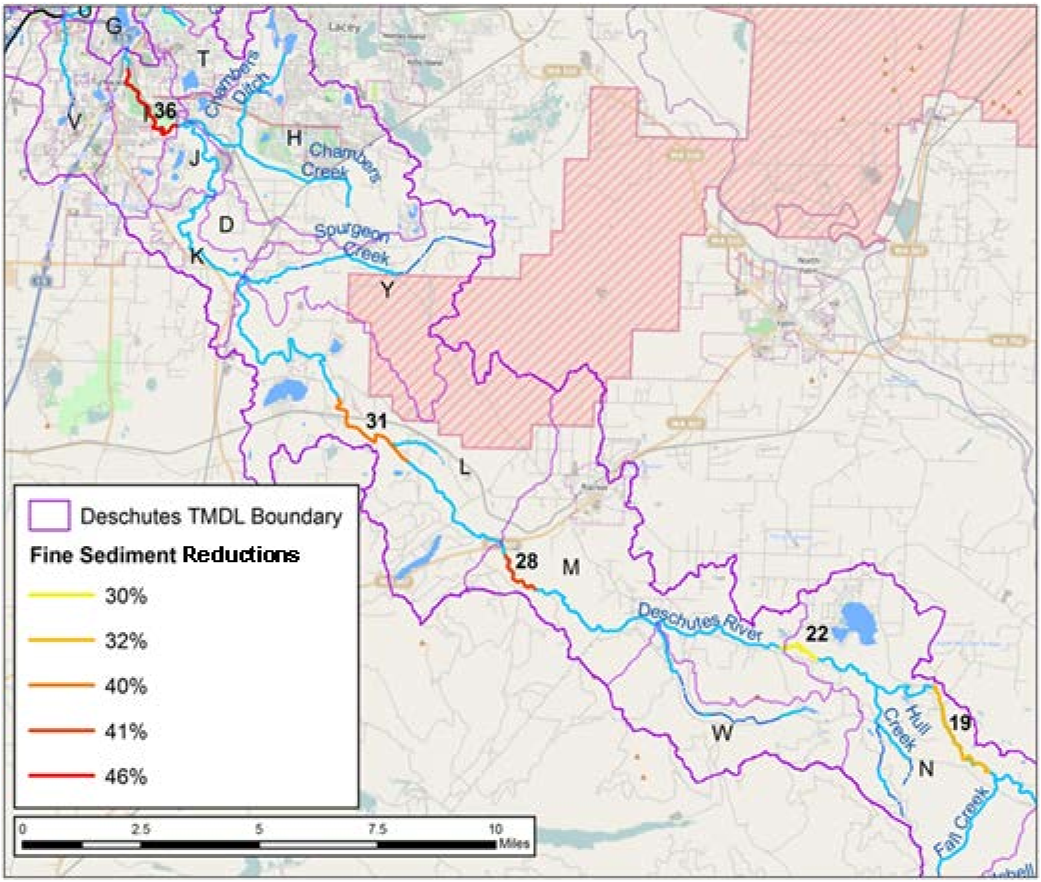

Figure 31: Deschutes River segments (labeled with segment IDs) with fine sediment reduction targets.

Land use analysis

A land use analysis was completed to determine the extent of general land use categories within each load allocation (LA) compliance area. General land use categories were based on an individual parcel's land-use category in the county's tax parcel database. The best fit category was assigned where a land-use code was not designated for a particular parcel. GIS was used to clip parcels by the LA compliance area and the area of each clipped parcel was calculated and the summarized percent coverage of land uses within each LA compliance area is shown in Table 15 and Figure 32. The percent impervious cover shown in Figure 33 is based on the 2006 Coastal Change Analysis Project (NOAA, 2009). The highest densities of impervious surfaces are generally within the municipal stormwater permit boundaries. Any of the general land use categories can have some percentage of impervious cover within them. Implementation of BMPs for each land use category might vary depending on the level of impervious cover associated with a particular location.

Parcels identified as Agriculture were those that were specifically designated as Agriculture as defined by RCW 84.34, which generally defines agricultural land as any parcel of land or multiple parcels that are contiguous, and is devoted primarily to the production of livestock or agricultural commodities for commercial purpose, or enrolled in the federal conservation program, or that meet specific gross income thresholds from agricultural uses. Parcels identified as Residential include the structure and all the land within those parcels so there are small non-commercial farms included in this category.

The Open Space (RCW 84.34) category is defined as "(a) any land area so designated by an official comprehensive land-use plan adopted by any city or county and zoned accordingly, or (b) any land area, the preservation of which in its present use would (i) conserve and enhance natural or scenic resources, or (ii) protect streams or water supply, or (iii) promote conservation of soils, wetlands, beaches or tidal marshes, or (iv) enhance the value to the public of abutting or neighboring parks, forests, wildlife preserves, nature reservations or sanctuaries or other open space, or (v) enhance recreation opportunities, or (vi) preserve historic sites, or (vii) preserve visual quality along highway, road, and street corridors or scenic vistas, or (viii) retain in its natural state tracts of land not less than one acre situated in an urban area and open to public use on such conditions as may be reasonably required by the legislative body granting the open space classification, or (c) any land meeting the definition of farm and agricultural conservation land under subsection (8) of this section" (RCW 84.34.020). The "Other Open Space" category includes undeveloped land, parks, and other parcels not defined as Open Space by RCW 84.34.

The Commercial, Industrial/Manufacturing, and Transportation/Communication/Utilities categories are split out, but represent similar types of land use concerns for water quality, mainly stormwater pollution potential from impervious surfaces. The 16% cover for the Transportation/Communication/Utilities category is primarily related to the Olympia Airport, while the other areas are railroad and energy utility uses. These land use activities are managed by the municipal storm water general permit (MSWGP) Phase II permittees or directly by Ecology through the NPDES permit programs. Permittees with wasteload allocations (WLAs) have specific implementation actions as prescribed in the implementation action section of this WQIR/IP.

The Forest category are parcels designated as "Timber land" which is also defined in RCW 84.34 as "any parcel of land that is five or more acres or multiple parcels of land that are contiguous and total five or more acres which is or are devoted primarily to the growth and harvest of timber for commercial purposes. Timber land means the land only and does not include a residential home site. The term includes land used for incidental uses that are compatible with the growing and harvesting of timber but no more than 10 percent of the land may be used for such incidental uses. It also includes the land on which appurtenances necessary for the production, preparation, or sale of the timber products exist in conjunction with land producing the products." Implementation of the TMDL LAs on forest lands are managed through the Forest Practices Act and state forest practices rules. Land use conversions from timber lands to other uses are the responsibility of local government.

Ecology's approach to nonpoint compliance with this TMDL's load allocations is to prescribe a suite of BMPs necessary for each type of land use activity to minimize its impact on water quality. The implementation plan section of this report identifies the general BMPs which apply to each land use category (see Table 23). RCW 90.48.080 makes it unlawful for any person to throw, drain, run, or otherwise discharge into any water of this state, or cause, permit, or suffer to be thrown, run, drained, allowed to seep, or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of Ecology. When landowners implement the appropriate BMPs to reduce or eliminate their land use activity's impact on water quality, they will be considered in compliance with the TMDL.

Table 15: General land use summary for LA Compliance Areas within the TMDL Boundary.

The percent cover is equivalent to the area occupied by each land use category within each LA Compliance Area estimated percent impervious surfaces includes impervious surfaces from all land use categories.

Load Allocation Compliance Area (Map ID)	**Estimated Percent Impervious Surfaces**	**Agriculture**	**Commercial**	**Forest**	**Industrial & Manufacturing**	**Open Space & Other**	**Open Space (RCW 84.34)**	**Residential**	**Transportation, Communication, Utilities**
Adams Creek Ave S fork @ 47th Ave NE **(C)**	7%	15%	1%	15%	0%	14%	0%	55%	0%
Adams Creek east fork at Boston Harbor Rd **(B)**	5%	12%	1%	1%	0%	21%	0%	64%	0%
Ayer Creek **(D)**	5%	32%	1%	19%	0%	5%	0%	42%	1%
Black Lake Ditch at mouth **(E)**	31%	0%	24%	10%	10%	29%	0%	27%	0%
Budd Inlet Tributaries *(not already specified)*	19%	6%	5%	10%	4%	20%	1%	53%	1%
Butler Creek **(F)**	9%	0%	1%	0%	0%	33%	12%	54%	1%
Chambers Creek **(H)**	17%	8%	2%	5%	1%	29%	2%	53%	1%
Deschutes at Route 507 **(M)**	3%	10%	1%	38%	0%	19%	0%	32%	1%
Deschutes at Vail Cutoff Road **(N)**	1%	3%	0%	89%	0%	3%	0%	4%	0%
Deschutes near Rich Road **(L)**	2%	14%	0%	32%	0%	29%	0%	24%	2%
Deschutes River at E St Bridge **(I)**	29%	0%	10%	0%	9%	35%	0%	31%	16%
Deschutes River at Henderson Blvd **(J)**	12%	1%	1%	1%	9%	57%	0%	30%	1%
Deschutes River below Ayer Creek **(K)**	11%	9%	7%	16%	1%	25%	2%	30%	10%
Ellis Creek **(P)**	8%	7%	1%	0%	0%	26%	0%	65%	0%
Huckleberry Creek **(O)**	1%	0%	0%	99%	0%	0%	0%	1%	0%
Indian Creek **(Q)**	28%	0%	9%	0%	0%	29%	1%	59%	2%
Mission Creek at East Bay Drive **(R)**	21%	2%	3%	0%	0%	34%	0%	61%	0%
Moxlie Creek at mouth **(S)**	57%	0%	44%	0%	0%	12%	0%	44%	0%
Moxlie Creek near Union Ave **(T)**	28%	0%	9%	0%	0%	35%	0%	56%	1%
Percival Creek at Black Lake Ditch **(V)**	24%	1%	17%	0%	1%	30%	0%	49%	1%
Percival Creek near mouth **(U)**	35%	0%	34%	0%	0%	33%	0%	32%	1%
Reichel Creek **(W)**	1%	9%	0%	86%	1%	2%	0%	2%	0%
Schneider Creek **(X)**	23%	0%	5%	0%	0%	14%	0%	81%	0%
Spurgeon Creek **(Y)**	1%	7%	1%	11%	0%	54%	0%	27%	0%
Total for the TMDL Boundary		**6%**	**2%**	**51%**	**1%**	**17%**	**0%**	**22%**	**1%**

Combined with the implementation actions in Table 23, Table 15 can be used to focus restoration efforts for different land uses based on areas with a higher percentage of a particular category. There are relatively high percentages of residential land uses within most all LA compliance areas. Activities for streamside landowners will be slightly different than for those who do not live adjacent to lakes, rivers, and streams. Restoration and conservation of riparian areas for streamside landowners will be the primary BMP for agricultural and residential land uses in addition to proper on-site sewage system (OSS) operation and maintenance. Agricultural parcels or residential parcels raising livestock for personal use (who do not meet the threshold to be designated agriculture under RCW 84.34) need to protect water quality through exclusion fencing and proper manure management. Implementation of BMPs on commercial forest lands must follow the prescriptions outlined in the Forest Practices Act.

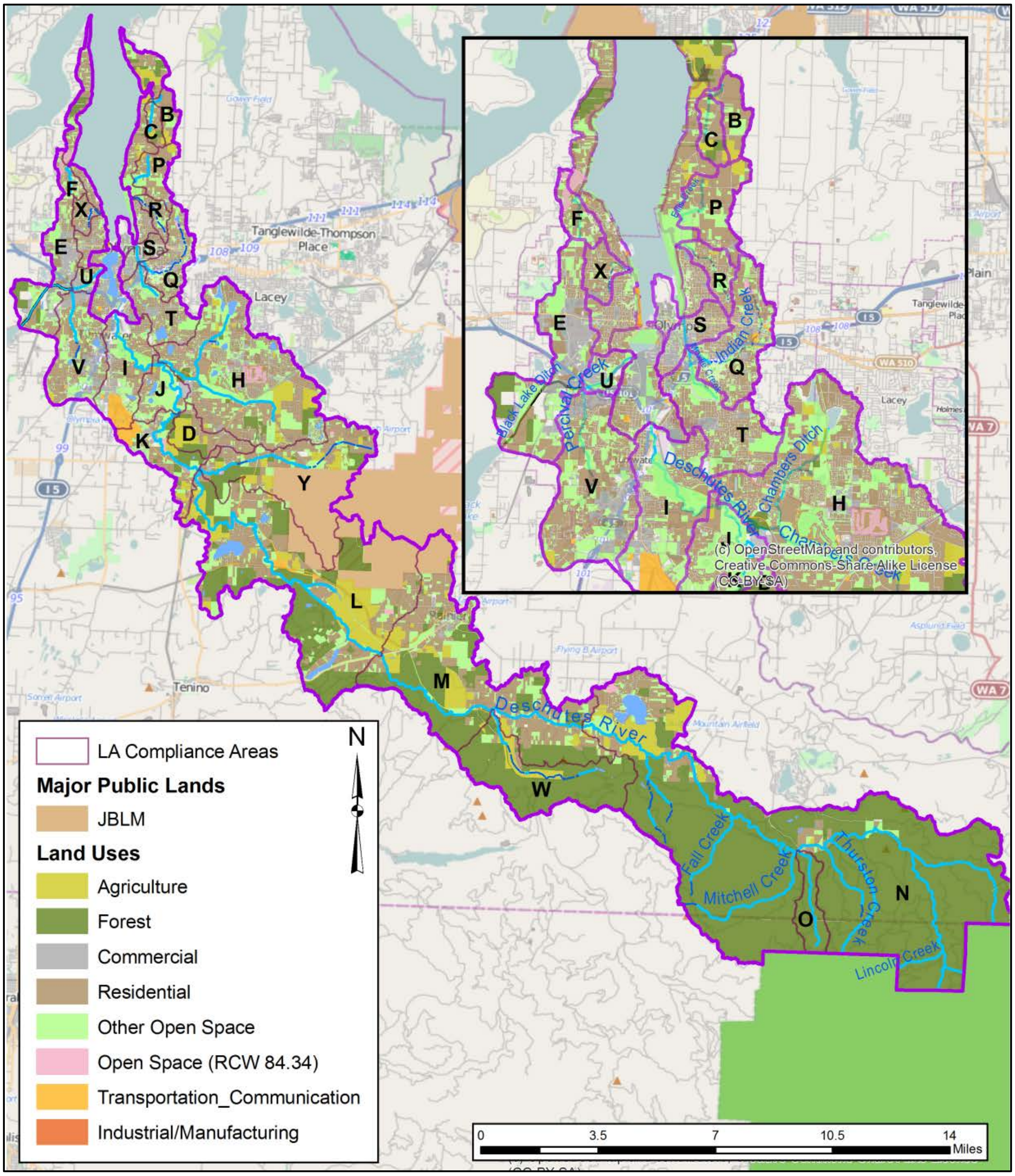

Figure 32: The extent of general land use categories within the TMDL boundary.

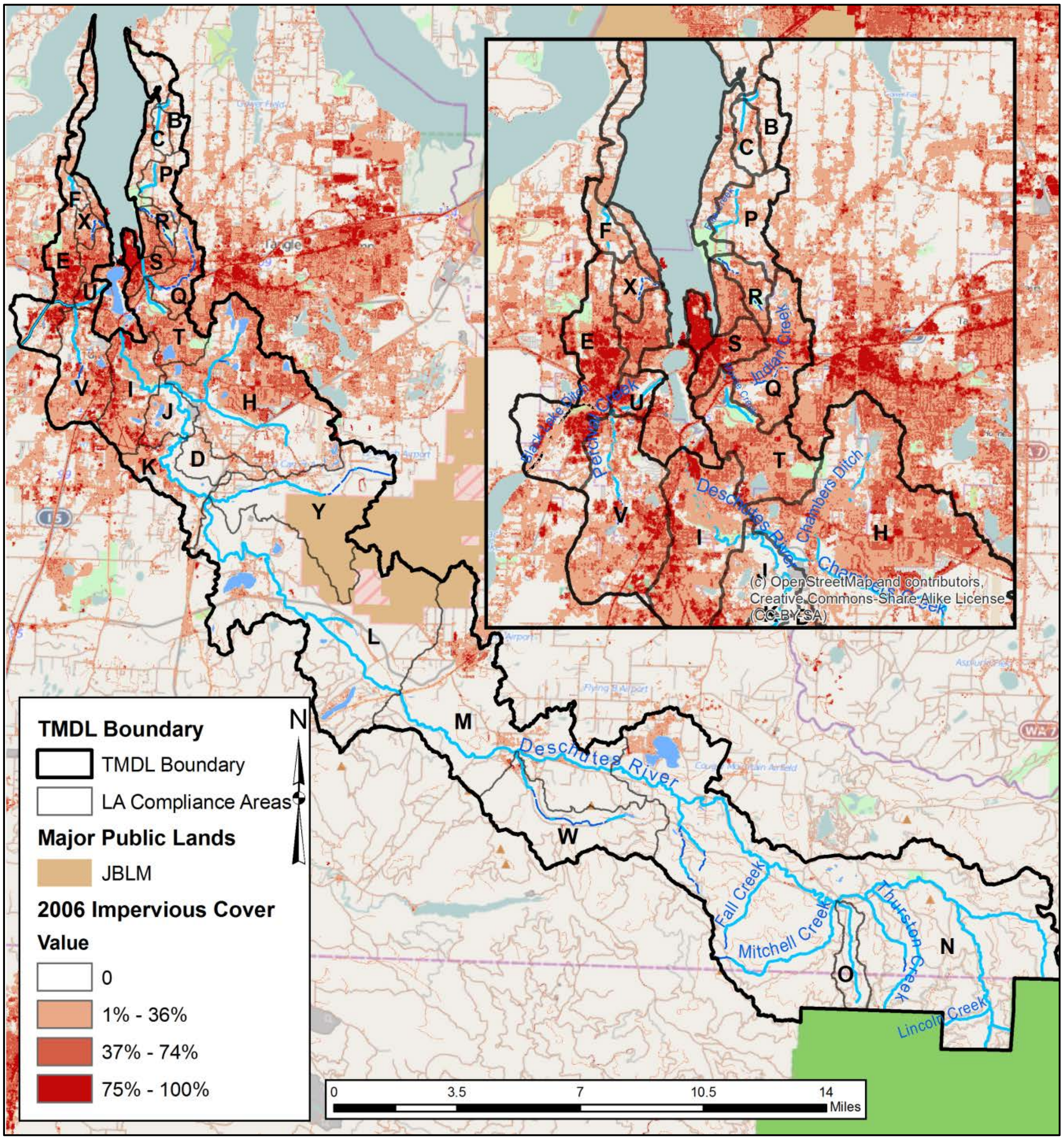

Figure 33: 2006 percent impervious cover within the TMDL boundary (NOAA, 2009).

Seasonal variation

The ambient monitoring at the mouth of the Deschutes River shows distinct seasonal variation. Peak temperature and pH coincide with minimum DO levels in the month of July for the period 1988-2007 (Roberts et al., 2012). Nutrient patterns are more complex but also show seasonal patterns. The highest monthly mean concentration of nitrate+nitrite, which is the primary component of dissolved inorganic nitrogen and total nitrogen, occurs in September, but a second peak occurs in February. Ammonium remains near the detection limit year-round, but highest levels also occur in September. Total phosphorus concentrations are highest in the winter months and likely are associated with high discharge events and particulates. Orthophosphate concentration patterns follow those of nitrate+nitrite.

DO and pH levels are governed by biological processes that vary seasonally and hourly. Based on ambient monthly data collected by Ecology at the mouth of the Deschutes River (station 13A060), the lowest DO levels and highest pH levels occur from June through August. The pattern was confirmed by detailed monitoring, which also found lowest DO and highest pH between June and August at nearly all stations. Monthly low DO coincides with the peak monthly temperature in July (Roberts et al., 2012).

Seasonal estimates for stream flow, solar flux, and climatic variables were considered in developing critical conditions for TMDL model assumptions. LAs and WLAs were developed considering critical seasonal conditions.

Reserve capacity for future growth

There is no reserve for growth to contribute to nonpoint sources (NPS) of pollution. In addition, municipal, construction and industrial stormwater permit requirements are expected to protect the impaired water bodies from further degradation due to future growth. All new development within the urban growth areas (UGAs) of the cities of Olympia, Tumwater, and Lacey and Thurston County must implement low impact development (LID) practices as a requirement of their Western Washington Phase II Municipal Stormwater Permit. New development outside of the UGAs should implement LID principles and best management practices (BMPs) to ensure that NPS of pollution are reduced to a negligible amount.

Margin of Safety

The margin of safety accounts for uncertainty about pollutant loading and water body response. In this TMDL project, the margin of safety for temperature, DO, and pH is implicit through the use of conservative assumptions for input parameters used in the water quality models as presented in Roberts et al. (2012) and repeated here.

Temperature, DO, and pH

- The 90th percentile of the highest 7-day averages of daily maximum air temperatures represents a reasonable worst-case condition for predicting water temperatures in the Deschutes River.
- The 7-day average low flows occurring on average once every 10 years based on the recent gage data by the USGS were used. This conservative assumption uses the year-round data set, including September discharges that tend to be lower than those experienced in July and August. The 7Q10 values for the entire gaging record are higher, but represent some combination of wetter climate and fewer domestic water withdrawals during the historical gaging period (1945 to 1969).
- The likelihood of both 7Q10 flows and 90th percentile air temperatures coinciding is lower than either condition occurring individually and adds to the margin of safety.
- Conservative model assumptions of zero cloud cover and wind speed were used for critical condition model runs.
- The entire 0.3°C allowance in the Deschutes River is recommended to be assigned to potential human impacts on base flow and subsequent warming.
- The 0.3°C allowance in the Percival Creek watershed is recommended as a margin of safety.
- The margin of safety accounts for uncertainty in pollutant loading or water body response, and may be either explicit or implicit. For the DO and pH TMDL, the margin of safety is both implicit through the use of conservative assumptions and explicit. Conservative assumptions include the coincident use of the 7-day average flows occurring on average once every ten years, and the 90th percentile of the highest 7-day averages of daily maximum air temperatures to simulate water temperatures in the Deschutes River.
- The Deschutes River pH model overestimated values, especially in the lower Deschutes River watershed, in both calibration and confirmation. Using the model without adjustment adds to the margin of safety that standards will be met for maximum pH and pH range.

Fecal coliform bacteria

Load allocations for bacteria generally were based on the 90th percentile of fecal coliform concentrations. The rollback method assumes that the variance of the post-management data set will be equivalent to the variance of the pre-management data set. As pollution sources are managed, the frequency of high fecal coliform values is likely to decrease, which should reduce the variance and 90th percentile of the post-management condition. In addition, the estimated targets do not account for any bacterial die-off in the water column during travel from the source.

Fine sediment

The margin of safety for the fine sediment TMDL analysis is implicit through the use of conservative assumptions and allocations. More stringent reductions were based on meeting good habitat quality conditions for fine sediment in gravels (12% fines) instead of fair (12 to 17% fines). In addition, load allocations were based on the high estimate of sediment budget inputs from Raines (2007) using the 2-mm threshold.

Conclusions and Recommendations

Mature riparian vegetation will have several secondary benefits to temperature, DO, pH, and fine sediment. Cooler water holds more oxygen, and decreased solar radiation decreases periphyton growth and primary productivity. A mature riparian forest also would provide large woody debris (LWD) that protects banks from enhanced erosion, which could improve fine sediment and phosphorus loads. LWD also increases channel complexity, enhances hyporheic exchanges, and reduces transport of fine sediment. Increased channel complexity provides more zones where biogeochemical processes decrease nutrient transport downstream (Roberts et al., 2007). Controlling anthropogenic sediment sources would benefit temperature and decrease phosphorus. Because most of the Deschutes River is phosphorus limited, decreasing phosphorus would decrease primary productivity and improve DO and pH.

Urbanization and climate change both have the potential to worsen DO and pH conditions in the Deschutes River and tributaries. In addition to the processes described in the temperature section, urbanization may lead to higher nitrogen and phosphorus levels in the watersheds from increased wastewater sources from OSS systems, land cover type, land management practices (Brett et al., 2005), and activities that enhance erosion, if development continues using previous management strategies and practices. Residential land cover produces much higher nutrient loads than do natural forest lands (Herrera Environmental Consultants, 2011). Because the Deschutes River and tributaries already violate the water quality standards, and because development will continue, both new development and redevelopment must improve DO and pH in surface waters to the maximum extent practicable.

In addition to the load allocations prescribed by this TMDL, recommendations to benefit temperature, DO, pH, bacteria, and fine sediment include the following (also included in the implementation plan section of this report):

- Low impact development (LID) should be instituted for future development in appropriate areas in the watershed, with particular attention to decreasing nutrient contributions below current levels. Future development should not worsen DO or pH.

- Preserve existing riparian vegetation, and restore areas with young or no vegetation. Plantings should include both deciduous trees and shrubs, which grow quickly, and conifer trees. Conifers follow deciduous trees in forest succession and are the dominant vegetation under natural conditions in most areas.

- Enhance channel complexity. Enhanced restoration should include LWD within the active river bed to promote bank stabilization and pool formation, and within riparian zones to provide self-armoring elements as banks are eroded. Key locations include the areas around Henderson Blvd, Waldrick Road, State Route 507, and Old Camp Lane.

- Consider a water management strategy that recognizes the benefits of maintaining summer baseflows while meeting the community's need for water. This could be developed as a more detailed plan for restoring instream flows. There are other, more effective processes for establishing instream flows rather than TMDLs. A detailed groundwater model of the

Deschutes watershed could help evaluate the effect of further groundwater withdrawals, as well as the effects of solutions such as water conservation, groundwater recharge, and low impact development.

- Maintain and enforce the current status of the Deschutes River watershed closed water withdrawal, eliminate illegal withdrawals, and quantify and mitigate the effect of exempt wells.

- Restore and protect natural wetlands in areas such as Ayer/Elwanger, Reichel, and Spurgeon Creeks. While all three tributaries also have elevated temperatures, the creek temperatures would benefit from restoration of riparian zones with plantings appropriate to the soils present.

- Septic systems, particularly those near a surface water body or sited in highly drained soils could be contributing excess nutrient loads. Existing management programs by Thurston County should continue and intensify. In addition, future efforts should examine and implement options to reduce nutrient loading from OSS systems. This includes conversion to sewer in urban areas and nitrogen reducing onsite systems in rural areas, if and when reliable and affordable technology becomes available. Sensitive areas that are high priority for this action include: the Deschutes River upstream of Offutt Lake, Chambers Lake and its outlet creek, Tempo Lake and its outlet creek, and the Ayer Creek watershed.

- Future groundwater infiltration facilities for reclaimed water should quantify the potential increases in nutrient loads to the Deschutes River and tributaries and offset any inputs by reducing other local sources so that DO and pH do not worsen.

- Agricultural operations, including livestock operations, should eliminate offsite transport of sediments, bacteria, and nutrients through implementation of BMPs to properly manage stormwater, heavy use areas, and manure generated on site. Existing operations in the Deschutes watershed should be further evaluated for facility management and manure applications through the development and implementation of nutrient management plans.

- Current tributary nutrient loads contribute to violations of the DO and pH standards in the mainstem Deschutes River. Nitrogen and phosphorus hot spots exist and should be evaluated for future nutrient reduction strategies. Tributaries with elevated nitrogen include Ayer/Elwanger Creek, Tempo Lake, Chambers Creek, and the unnamed creek at RK 64. Tributaries with elevated phosphorus include the Lake Lawrence outlet and Reichel, Spurgeon, and Ayer/Elwanger Creeks. Upstream nutrient sources in these areas should be quantified.

- While Black Lake Ditch meets the bacteria water quality standards Percival Creek does not, and additional source identification is warranted. Potential sources include recreational users and homeless populations.

In keeping with the antidegradation policy in the state's water quality standards, areas where the current water quality is better than the water quality criteria should be considered during implementation of this TMDL. Specific actions and/or institutional safeguards may be necessary to prevent a loss of current good water quality conditions in these areas as further development or other changes occur in the watershed.

Reasonable Assurance

When establishing a TMDL, reductions of a particular pollutant are allocated among the pollutant sources (both point and nonpoint sources) in the water body. For the Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Water Quality Improvement Report/Implementation Plan (WQIR/IP), also referred to as the water cleanup plan, both point sources and nonpoint sources (NPS) exist. This water cleanup plan must show “reasonable assurance” that nonpoint sources will be reduced to their allocated amount. Examples of actions to ensure the goals of this WQIR/IP are met include: education and outreach; technical and financial assistance; permit administration; and enforcement when necessary.

Ecology believes the implementation actions identified in this WQIR/IP already support this water cleanup plan and add to the assurance that the identified pollutants and parameters in the Deschutes River, Percival Creek, and Budd Inlet tributaries will meet conditions provided by Washington State water quality standards. This assumes the following activities are continued and maintained.

The goal of this TMDL project is for the waters of the basin to meet Washington’s water quality standards. There is considerable interest and local involvement in resolving the water quality problems in the water bodies identified in this report. Numerous organizations and agencies are already engaged in stream restoration and source correction actions that will help resolve the water quality issues addressed by this TMDL report. The following rationale provides reasonable assurance that the nonpoint source TMDL goals for fecal coliform bacteria will be met by 2030 and for stream temperature, DO, and pH by 2065. Reasonable assurance is based on sufficient legal authorities of Ecology and partners; technical assistance and grants and loans available to and by groups within this TMDL boundary area; education and outreach efforts that reinforce actions needed to meet water quality standards; and specific riparian restoration and Low Impact Development (LID) activities already occurring.

Legal authorities

Abbreviations

CFR	Code of Federal Regulations
Ch.	Chapter
CWA	Clean Water Act
DNR	Natural Resources, Washington State Dept. of
ECY	Ecology, Washington State Dept. of
LOTT Clean Water Alliance (LOTT)	Lacey, Olympia, Tumwater, Thurston County
MC	Municipal Code
MOA	Memorandum of Agreement
NPDES	National Pollutant Discharge Elimination System
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act

TCC	Thurston County Code
USDA	Agriculture, U.S. Department of
WA	Washington
WAC	Washington Administrative Code
WSDOT	Transportation, Washington State Department of

Table 16: Legal authorities.

Entity	Legal Authority
Lacey, City of	• ECY, Municipal Stormwater Phase II Western WA General Permit, WAR045011 • Ch. 90.58 RCW, Shoreline Management Act of 1971 • MC, Title 13, Water and Sewage • MC, Ch. 14.24, Environmental Policy • MC, Ch. 14.26, Shoreline Master Program • MC, Ch. 14.28, Wetlands Protection • MC, Ch. 14.31, Zero Effect Drainage Discharge • MC, Ch. 14.32, Tree Preservation
LOTT Clean Water Alliance	• ECY, Municipal NPDES Permit WA0037061, in compliance with the federal Clean Water Act and General Pretreatment Regulations • LOTT Discharge and Industrial Pretreatment Regulations, pursuant to 40 CFR Part 403 • Ch. 173-208 WAC, Grant of Authority Sewerage Systems
Olympia, City of	• ECY, Municipal Stormwater Phase II Western WA General Permit, WAR045015 • MC, Ch. 13.16, Storm and Surface Water Utility • MC, Ch. 14.04, Environmental Policy • MC, Ch. 14.08, Shoreline Master Program • MC, Ch. 16.60, Tree Protection and Replacement • Ch. 43.21C RCW, State Environmental Policy • Ch. 90.58 RCW, Shoreline Management Act of 1971 • Ch. 197-11 WAC, SEPA Rules
Puget Sound Partnership	• Ch. 90.71 RCW, Puget Sound Water Quality Protection • National Estuary Program
Squaxin Island Tribe	1854 Treaty of Medicine Creek
Thurston County	• ECY, Municipal Stormwater Phase II Western WA General Permit, WAR045025 • Ch. 36.89 RCW, Highways – Open Spaces – Parks – Other Public Facilities – Storm Water Control • Ch. 36.70 RCW, Planning Enabling Act • Ch. 36.70A RCW, Growth Management - Planning by Selected Counties and Cities • Ch. 43.20 RCW, State Board of Health • Ch. 43.21C RCW, State Environmental Policy • Ch. 70.05 RCW, Local Health Departments, Boards, Officers - Regulations • Ch. 70.118A RCW, On-site Sewage Disposal Systems - Marine Recovery Areas • Ch. 90.58 RCW, Shoreline Management Act of 1971 • Ch. 246-203 WAC, General Sanitation • Ch. 246.272A WAC, On-site Sewage Systems • TCC Ch. 14.38, Development in Flood Hazard Areas • TCC Ch. 17.09, State Environmental Policy Act • TCC Ch. 17.15, Agricultural Activities Critical Areas • TCC Ch. 17.20, Mineral Extraction and Asphalt Production • TCC Ch. 18.12, Preliminary Plat • TCC Title 20, Zoning • TCC Title 21, Lacey Urban Growth Area Zoning

Entity	Legal Authority
	• TCC Title 22, Tumwater Urban Growth Area Zoning • TCC Title 23, Olympia Urban Growth Area Zoning • TCC Title 24, Critical Areas • Thurston County Sanitary Code, Article III – Rules and Regulations of the Thurston County Board of Health Governing Water Supplies • Thurston County Sanitary Code, Article IV – Rules and Regulations of the Thurston County Board of Health Governing Treatment and Dispersal of Sewage • Thurston County Sanitary Code, Article VI – Rules and Regulations of the Thurston County Board of Health Governing Nonpoint Source Pollution
Tumwater, City of	• ECY, Municipal Stormwater Phase II Western WA General Permit, WAR045020 • MC, Ch. 13.04, Water Service Regulations • MC, Ch. 13.08, Sewer Service Regulations • MC, Ch. 13.12, Stormwater System • MC, Ch. 16.04, Environmental Policy
WA State Department of Agriculture (WSDA)	• Ch. 90.48 RCW, Water Pollution Control • Ch. 90.64 RCW, Dairy Nutrient Management
WA State Department of Ecology (ECY)	• Ch. 90.48 RCW, Water Pollution Control • Federal Clean Water Act (CWA), as delegated
WA State Department of Enterprise Services (DES)	• RCW 43.19.125, Capitol buildings and grounds -Custody and control • Ch. 79.24 RCW, Capitol Building Lands • ECY, Municipal Stormwater Phase II Western WA General Permit, WAR045210
WA State Department of Fish and Wildlife (WDFW)	• Ch. 77.04 RCW, Department of Fish and Wildlife
WA State Department of Natural Resources (DNR)	• Ch. 76.09 RCW, Forest Practices • Ch. 76.13 RCW, Stewardship of Non-industrial Forests and Woodlands
WA State Department of Transportation (WSDOT)	• Ch. 90.48 RCW, Water Pollution Control • Federal Clean Water Act (CWA) • ECY, WSDOT Municipal Stormwater General Permit, WAR043000
USDA Forest Service, Region 6	Memorandum of Agreement (MOA) between the USDA Forest Service, Region 6, and the WA State Dept. of Ecology, 2000
U.S. Environmental Protection Agency	Federal Clean Water Act (CWA)

Technical assistance

The following table includes examples of technical assistance provided by the various stakeholders to interested watershed residents or property owners. This assistance is for issues related to this water cleanup plan. This table is not all inclusive as new assistance will be provided during the implementation of this water cleanup plan.

Table 17: Technical assistance.

Subject/Title	Additional Information
Lacey, City of	
Subject/Title	**Additional Information**
Planning & Zoning	www.ci.lacey.wa.us/city-government/city-departments/community-development/planning-zoning
Community Development	www.ci.lacey.wa.us/city-government/city-departments/community-development/planning-commission
Water Resources – Stormwater Utility Programs & Activities	www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources/storm-and-surface-water-programs
LOTT Clean Water Alliance	
Subject/Title	**Additional Information**
Best Management Practices (BMPs) manuals to minimize toxic contaminants in wastewater and the environment.	They can assist with customized manuals for dental offices, dry cleaners, food service, cleaning services, photo processors, printers, and others. www.lottcleanwater.org
Reclaimed Water	www.lottcleanwater.org/reclaimed.htm
Water Conservation	www.lottcleanwater.org/conservation.htm
Olympia, City of	
Subject/Title	**Additional Information**
Community Planning & Development	www.olympiawa.gov/city-government/departments/community-planning-and-development.aspx
Low Impact Development	www.olympiawa.gov/city-utilities/storm-and-surface-water/Low%20Impact%20Development
Storm & Surface Water	www.olympiawa.gov/city-utilities/storm-and-surface-water
Streams & Shorelines	www.olympiawa.gov/city-utilities/storm-and-surface-water/streams-and-shorelines
Squaxin Island Tribe (SIT)	
Subject/Title	**Additional Information**
Field monitoring, modeling, prioritization, and action plans.	They assist multiple stakeholders. SIT Tribal Center, (360) 426-9781, request Natural Resources Department.
Thurston Conservation District	
Subject/Title	**Additional Information**
Forest Stewardship Program	www.thurstoncd.com/sites/default/files/u9/FSP%20Brochure%20TCD-GHCD_0.pdf (publication)
Forestry – Contacts, Organizations, and Programs	www.thurstoncd.com/sites/default/files/u9/Forestry%20Contacts%2C%20Organizations%20and%20Programs.pdf (publication)
Services Provided Brochure	www.thurstoncd.com/sites/default/files/u9/Thurston%20Conservation%20District.pdf (publication)
Thurston County	
Subject/Title	**Additional Information**
In-Lieu Fee Project	A preferred option for compensatory mitigation of impacts to freshwater wetlands in the Deschutes watershed. www.co.thurston.wa.us/waterresources/ilf-project/ilf-project-home.html
Septic Systems (Onsite Sewage Systems)	Including Septic Help Line at (360) 867-2669. www.co.thurston.wa.us/health/ehoss/index.html
Voluntary Stewardship Program	Alternative approach to protect critical areas on agricultural lands. www.co.thurston.wa.us/planning/vsp/voluntary-stewardship-home.html
Tumwater, City of	
Subject/Title	**Additional Information**

Community Development Department	www.ci.tumwater.wa.us/departments/community-development
Low Impact Development	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/low-impact-development
Public Works Department	www.ci.tumwater.wa.us/departments/public-works
Stormwater	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater
Water Conservation	www.ci.tumwater/wa/us/departments/public-works/utilities/water-conservation
Washington State Department of Agriculture	
Subject/Title	**Additional Information**
Agricultural Land Use	www.agr.wa.gov/PestFert/natresources/AgLandUse.aspx
Dairy Nutrient Management	www.agr.wa.gov/FoodAnimal/Livestock-Nutrient /
Nutrient Management Plans	www.agr.wa.gov/FoodAnimal/Livestock-Nutrient/NutrientMgmtPlans.aspx
Pesticide Management	www.agr.wa.gov/pestfert
Water Resources Protection	www.agr.wa.gov/PestFert/natresources/WaterResourcesProtection.aspx
Washington State Department of Ecology	
Subject/Title	**Additional Information**
Clean Water on Agricultural Lands	www.ecy.wa.gov/programs/wq/nonpoint/Agriculture/
Ground and Surface Water Quality Information	Includes information about water quality standards for ground water and surface water; and water quality monitoring information. www.ecy.wa.gov/programs/wq/links/standards.html
Nonpoint Pollution	Includes land use and nonpoint pollution: agriculture, forestry, urban areas, and working near the water. www.ecy.wa.gov/programs/wq/nonpoint/index.html
Permits – Point Source Pollution	Includes information about general and individual permits, and other permit information such as the Permit Writer's Manual, car wash guidance manual, water quality data, and wastewater discharge permit fees. www.ecy.wa.gov/programs/wq/permits/index.html
Reclaimed Water	www.ecy.wa.gov/programs/wq/reclaim/index.html
Stormwater	www.ecy.wa.gov/programs/wq/stormwater/index.html
Wastewater Treatment	www.ecy.wa.gov/programs/wq/wastewater/index.html
Washington State Department of Natural Resources	
Subject/Title	**Additional Information**
Small Forest Landowner Office	www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_overview.aspx
Washington State University (WSU) Extension Office	
Subject/Title	**Additional Information**
Impact Assessment – Solutions to Environmental and Economic Problems (STEEP)	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=13990&SeriesCode=&CategoryID=145&Keyword (online only publication)
Washington State Coordinated Resource Management Handbook 2006	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=13966&SeriesCode=&CategoryID=254&Keyword (online only publication)
WSU Thurston County Extension	www.ext100.wsu.edu/thurston

Grants and loans

The following table includes examples of grants and loans funded for work in the Deschutes River, Percival Creek, and Budd Inlet tributaries watersheds. This table is not all inclusive as new grants or loans could be granted during the implementation of this water cleanup plan.

Table 18: Grants and loans.

Deschutes Estuary Restoration Team (DERT)	
Project Title/Grant Number	**Comments**
Foundation grants for volunteer coordination, education and outreach, restoration activities.	Habitat restoration education and outreach focused on watershed and estuarine ecology, public access, and restoration economy. These activities are funded through private donations and memberships.
Lacey, City of	
Project Title/Grant Number	**Comments**
Chambers Lake Stormwater Treatment Facility (Grant #G1400421)	Constructed wetlands, along with buffer and habitat enhancements, will provide water quality improvement for stormwater runoff that currently discharges into Chambers Lake, which drains via Chambers Ditch to Chambers Creek and the Deschutes River. $1 million of the $2.7 million project is funded a Department of Ecology grant. Construction began in July 2014 and is scheduled for completion by July 2015.
LOTT Clean Water Alliance	
Project Title/Grant Number	**Comments**
Water Conservation Coordination Program, in cooperation with the cities of Lacey, Olympia, and Tumwater.	LOTT has invested over $7 million since 1997 to provide cost-effective rebates to customers installing indoor water efficient, appliances, and equipment. Wastewater flows were reduced by over 1 million gallons per day as of summer 2012. Cost-effective projects included toilet replacements, washing machine rebates, commercial and industrial retrofits, demonstration school retrofits, and water saving kits. Rebate programs are ongoing and offered in cooperation with the cities of Lacey, Olympia, and Tumwater.
Tumwater Reclaimed Water Pipeline	LOTT received $2.5 million in low interest loans from Department of Ecology, with 1/2 forgivable principal, to construct reclaimed water pipeline for irrigation of up to 600,000 gallons per day at Tumwater parks and golf courses. This will reduce effluent discharges to Budd Inlet by an equal amount, diverting nitrogen out of the inlet.
Primary Sedimentation Basins Project	Received low-interest loan from the Department of Ecology to build two new basins (2011-2014) replacing existing ones that are over 60 years old. The new basins remove a bottleneck that limits hydraulic capacity, provide for improved treatment during high flow events, and help avoid potential risk of treatment bypasses or catastrophic plant failure.
Funding support for Capitol Land Trust property acquisitions/easements	Provided funding support to the Capitol Land Trust to acquire selected properties and/or conservation easements in the watershed to preserve, protect, and/or restore Deschutes River and Budd Inlet water quality and habitat. (2006 to present)
Olympia, City of	
Project Title/Grant Number	**Comments**
South Sound Lawn Care (Grant #G1400449)	Public Outreach program designed to reduce over application of nitrogen fertilizer by residential property owners. Funded through a National Estuary Program (NEP) Toxics and Nutrient Prevention grant, $219.000.

Olympia, City of	
Yauger Park Regional Stormwater Pond Retrofit Expansion Phase 1 (Loan #L1000008)	Project resulted in increased active storage capacity from 64 acre-ft. to 73 acre-ft., (8) constructed rain gardens, (3) bioretention ponds or rain gardens, 1.3 acres of pervious asphalt parking lot, 1.4 acres constructed wetlands or wet pond, numerous habitat structures, passive recreation amenities and native plant restoration. Funded partially provided through an American Recovery and Reinvestment Act (ARRA), 50% forgivable loan, $2,400,000.
Pacific Avenue - Stormwater Facility	The project will provide water quality treatment for a 13-acre highly developed urban basin in East Olympia. Untreated runoff currently flows to Indian Creek and subsequently Budd Inlet, both 303(d) Category 5 impaired waters. The existing stormwater system will be retrofitted with approved technologies in accordance with state guidelines.
4th Avenue Stormwater Retrofits (Grant #G1400384)	Project will reduce stormwater contaminants associated with runoff from a heavily traveled arterial street in East Olympia. This will improve stormwater treatment in Indian Creek, Moxlie Creek, and Budd Inlet.
Maintenance Center Stormwater Retrofit (Grant #G1200537)	Project will remove contaminants associated with the heavily used industrial land uses at the City of Olympia 10.5 acre operation center. It will improve stormwater quality before release to Moxlie Creek and Budd Inlet.
Establish Riparian Forest Buffer Adjacent to Black Lake Ditch (Agreement #C1100044)	Planted 150 Western Red Cedar and Douglas Fir trees on the south side of the ditch (outer portion of the riparian zone); planted 3,500 live stakes of Hooker willow, Sitka willow, and Red Osier Dogwood, in approximately 1,860 lineal feet of riparian area (directly near the water of Black Lake Ditch.)
Black Lake Ditch Northwest Restoration Project – Phase 1 (Grant #G1300069)	Using volunteers and seasonal staff, during the summer/fall 2013, 3.2 acres of Himalayan blackberries were removed; 1300 lineal feet of beaver protection fence was installed; and 8710 black cottonwood live stakes were planted. These activities will improve water quality and aquatic habitat within the area through increased shade, as well as future large woody debris recruitment. The project primarily addressed temperature, and will result in secondary benefits to dissolved oxygen, pH, and fine sediments.
Squaxin Island Tribe (SIT)	
Project Title/Grant Number	**Comments**
Recent EPA Grants: *Coastal Conservation Initiative (Grant #PO00J101-01) *Deschutes River (Grant #PO-00J322-01) *Tribal Capacity (Grant #PA-00J3145-01) *Performance Partnership (Grant #BG-98090704)	The SIT receives funding from EPA and the Bureau of Indian Affairs (BIA).
Thurston Conservation District	
Project Title/Grant Number	**Comments**
Thurston Nutrient Reduction & Riparian Assessment Project (Grant #G0300130)	**Nutrient Reduction**: Technical assistance related to nutrient management was provided to 121 landowners per year of the grant. Workshops conducted included: Weeds (how to control them using Nutrient Management); Nutrient Management; and Pasture Management. Video, “Manure Spreading for Fun & Profit” was developed and aired on local public access television. **Riparian Assessment**: 258.2 miles of stream identified as degraded riparian areas with potential for restoration. 29.4 acres were restored, resulting in 17,925 feet (3.4 miles) of stream planted. Each site was monitored for survival, weed management, and growth. The riparian assessment data can be used to identify sites for restoration throughout the county.

Thurston County Poultry Manure Grant (Grant #G0400057)	Provided technical assistance and education to poultry operations through workshops and TV shows that cover topics such as: latest standards for manure applications, innovative uses of poultry manure, current local poultry operation regulations, and soils and their relationship to manure applications.
Thurston Conservation District	
Deschutes/McLane Technical Assistance & Implementation (WA State Conservation Commission)	Provided technical assistance within the Deschutes watershed, resulting in the implementation of 25 best management practices (BMPs), as well as water quality monitoring at several locations through the South Sound GREEN student program. Two planting plans were also completed.
Farm Plan Implementation (WA State Conservation Commission)	Provided direct technical assistance to 25 small acreage landowners and provided 44 soil tests to landowners implementing nutrient management.
Thurston County Resource Stewardship	
Project Title/Grant Number	**Comments**
*Watershed Science to Local Policy *EPA Puget Sound Watershed Management Assistance Program (Grant #PO-00J12401)	Implement watershed-based land-use plans and regulations. This project is currently developing land use recommendations for the Woodard Creek, Black Lake, and McLane Creek basins.
Thurston County Public Health	
Project Title/Grant Number	**Comments**
Financial assistance program for septic system repairs.	More information is available at www.co.thurston.wa.us/health/ehoss/pdf/LoanFlyer.pdf.
Thurston County Public Health (Participating Entity from Snohomish County Grant)	
Project Title/Grant Number	**Comments**
Natural Yard Care Public and Outreach and Evaluation - Go Green - Natural Lawn Care Ecology (Grant #G1400481)	Reduction of lawn chemicals and nutrients entering surface and ground water. More information available at www.co.thurston.wa.us/health/ehcsg/5stepslawn.html.
Tumwater, City of	
Project Title/Grant Number	**Comments**
Cleveland Avenue Stormwater Outfall Retrofit (Grant #G1200504)	Retrofit the Cleveland Avenue stormwater outfall to address pollutant loading issues to the Deschutes River, a 303(d) listed water body. The retrofit consists of day-lighting the current piped outfall and constructing green infrastructure that includes a bioretention swale designed for the infiltration and conveyance of stormwater runoff.
Deschutes/Percival Habitat & Public Education (Grant #G0300017)	Protect and enhance water quality and salmon habitat in the Deschutes River main stem through a combination of riparian buffer revegetation, bioengineering project construction and large woody debris placement, and promotion of proactive watershed stewardship in the Deschutes River and Percival Creek watersheds through the development and installation of educational signs.
E Street Stormwater Outfall Retrofit (Grant #G1200506)	Provide water quality treatment of stormwater runoff with a settling basin and constructed wetland at an existing untreated outfall prior to entering the Deschutes River.
Somerset Hill Stormwater Outfall Retrofit (Grant #G1200505)	Retrofit the Somerset Hill Drive stormwater outfalls to address pollutant loading issues to Percival Creek. The retrofit consists of retrofitting one outfall with a Filterra system and the other with a series of rain gardens. The retrofits will provide treatment via bio-retention and bio-infiltration.
Tumwater Valley Regional Stormwater Facility (Grant #G1200503)	Provide water quality treatment of stormwater runoff prior to entering the Deschutes River, maintain discharge velocities, and to enhance the outfall location into an educational and pedestrian friendly environment.

WA State Dept. of Agriculture (WSDA)	
Project Title/Grant Number	**Comments**
Dairy Nutrient Management Program (DNMP) Penalty Grant Account	Annual or as funds are available. Grants are to conduct research or education activities related to dairy operations. More information available at www.agr.wa.gov/FoodAnimal/Livestock-Nutrient/.

Education and outreach

The following table includes examples of education and outreach efforts in the Deschutes River, Percival Creek, and Budd Inlet tributaries watersheds. This table is not all inclusive as new opportunities will become available during the implementation of this water cleanup plan.

Table 19: Education and outreach.

Lacey, City of	
Subject/Title	**Additional Information**
Stream Team	www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources/storm-and-surface-water-programs/get-involved/stream-team
Stormwater Education & Action	Information on yard care, pet care, vehicle maintenance, low impact development, rain gardens, storm drains, neighborhood pet waste stations, car washes, private stormwater facilities, and spill reporting. www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources/storm-and-surface-water-programs/education-and-action
LOTT Clean Water Alliance	
Subject/Title	**Additional Information**
WET (Water Education and Technology) Center	An education center with interactive exhibits and programs about water, wastewater, wastewater treatment, reclaimed water, and water conservation. www.lottcleanwater.org/education.htm
East Bay Public Plaza	A vibrant public space featuring a water theme through artwork, interpretive elements, a wetland pond, and a flowing stream.
Reclaimed Water Infiltration Study	An extensive public information and involvement program. Activities include a Community Advisory Group, public workshops, community presentations, website, displays, informational materials, and coordinated source control education programs. The study schedule is 2012 – 2016. www.lottcleanwater.org/groundwater.htm
Olympia, City of	
Subject/Title	**Additional Information**
Clean Cars – Clean Streams	www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/education-and-action-clean-cars-clean-streams
Don't Drip and Drive	www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/Dont%20Drip%20and%20Drive
Education & Action	Includes a wide variety of subjects including water quality, backyard habitat, invasive weeds, oil leak campaign, Salmon Stewards, Puget Sound marine education. (360) 570-5841 or www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action
Gardening with a Sound Mind	www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/education-and-action-gardening-with-a-sound-mind
Go Green Lawn Care Program	www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/go-green-lawncare-prog
Pet Waste	www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/Pet%20Waste. In 2013, 9 new pet waste stations and 200 pet waste bag holders were installed.
Rain Gardens	www.olympiawa.gov/OlympiaWA/city-utilities/storm-and-surface-water/rain-gardens
Stream Team	Opportunities to learn about and participate in restoring and protecting streams, shorelines, and wetlands for a cleaner Puget Sound. (360) 570-5841 or www.olympiawa.gov/city-utilities/storm-and-surface-water/education-and-action/education-and-action-stream-team

Olympia, City of	
Subject/Title	**Additional Information**
Tree Tract and Greenbelt Stewardship: A Guide for Homeowners' Associations	www.olympiawa.gov/city-services/~/media/Files/CPD/TreeTractGreenbeltStewardshipBooklet07282011.pdf (publication)
Puget Sound Partnership	
Subject/Title	**Additional Information**
Puget Sound Starts Here: Frequently Asked Questions	www.psp.wa.gov/downloads/PSSH_Toolkit/documents/Puget%20Sound%20Starts%20Here%20frequently%20asked%20questions.pdf
Low Impact Development: Technical Guidance Manual for Puget Sound	www.psp.wa.gov/downloads/LID/20121221_LIDmanual_FINAL_secure.pdf
Stream Team	
Subject/Title	**Additional Information**
Clean Cars Clean Streams	www.streamteam.info/actions/carwashing/
Don't Drip and Drive	www.streamteam.info/actions/vehiclecare/
Habitat Enhancement	www.streamteam.info/getinvolved/plant/
Lawn Care	www.streamteam.info/actions/lawncare/
Monitoring	www.streamteam.info/getinvolved/monitor/streambugs/
Naturescaping	www.streamteam.info/getinvolved/learn/naturescaping/
Pet Waste	www.streamteam.info/actions/petwaste/
Rain Gardens	www.streamteam.info/actions/raingardens/
Salmon Stewards	www.streamteam.info/getinvolved/educate/salmon/
Storm Drain Marking	www.streamteam.info/pdf/newsletter-2015-summer.pdf
Stormwater Stewards	www.streamteam.info/getinvolved/educate/stormwater/
Stream Team Newsletter	www.streamteam.info/about/newsletter/
Thurston Conservation District	
Subject/Title	**Additional Information**
Clear Choices for Clean Water	www.thurstoncd.com/clear-choices-clean-water.html
How to Use & Compost Horse Manure	www.thurstoncd.com/sites/default/files/u9/Horse%20Manure%20Composting%20%28Updated%202011%29.pdf (publication)
Landscaping for Wildlife	www.thurstoncd.com/sites/default/files/u9/Landscaping%20for%20Wildlife.pdf
My Manure Pile is a Mountain! Waste Management Options	www.thurstoncd.com/sites/default/files/u9/My%20Manure%20Pile%20is%20a%20Mountain.pdf (publication)
Noxious Weed Information	www.thurstoncd.com/noxious-weed-info.html
Puget Sound Coastal Living	www.thurstoncd.com/sites/default/files/u9/Puget%20Sound%20Coastal%20Living.pdf (publication)
Roof Water Diversion	www.thurstoncd.com/sites/default/files/u9/Roof%20Water%20Diversion.pdf (publication)
Rural Living in Thurston County	www.thurstoncd.com/sites/default/files/u304/Rural%20Living%20in%20Thurston%20County%20revised%202013_FINAL.pdf (publication)
Small Farm Management Schedule	www.thurstoncd.com/sites/default/files/u9/Small%20Farm%20Management%20Schedule.pdf (publication)
Your Role in Deschutes Watershed Water Quality Improvement	www.thurstoncd.com/sites/default/files/u9/Deschutes%20TMDL%20Grant%20Brochure.pdf (publication)
Thurston County Public Health and Social Services	
Subject/Title	**Additional Information**
Education and Outreach Program	Includes programs on toxic materials in the home and yard, septic systems, wells and drinking water, and watershed protection. www.co.thurston.wa.us/health/ehhm/outreach.html
Educational materials/workshops for septic system owners	(360) 867-2626 or www.co.thurston.wa.us/health/ehoss/education.html
Natural Yard Care	www.co.thurston.wa.us/health/ehcsg/5stepslawn.html
Septic Help Line	(360) 867-2669
Septic Sense workshops	www.co.thurston.wa.us/health_fpforms/ehoss/ss_wrkshp.htm

Thurston County Resource Stewardship	
Subject/Title	**Additional Information**
Stormwater Education and Outreach	Information and programs on neighborhood stormwater retention pond care, polluted runoff reduction, stewardship opportunities, spill reporting, pet waste reduction, drainage technical assistance. www.co.thurston.wa.us/stormwater/
Stream Team	Stormwater Stewards and Salmon Stewards program training; classes on Naturescaping for Water and Wildlife; rain gardens; marine and riparian zone restoration planning and techniques. www.co.thurston/wa/us/stormwater/streamteam/streamteam-home.html; http://streamteam.info/
Tumwater, City of	
Subject	**Additional Information**
Barnes Lake Management District	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/barnes-lake-management-district
Go Green Natural Lawn Care	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/natural-lawn-care-973 (In partnership with City of Olympia and Thurston County)
Low Impact Development	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/low-impact-development
Public Outreach Events	Earth Day, Juvenile Chinook, 4th of July, Tum Com Day, Return of the Chinook, Tumwater Library/Schools (by request)
Stormdrains/Spill Reporting	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/storm-drains
Stormwater Education	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/stormwater-faqs
Stormwater Facilities	www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/private-system-maintenance
Washington State Department of Agriculture	
Subject/Title	**Additional Information**
Dairy Compost Workshops to improve nutrient management.	(360) 902-1800 or www.agr.wa.gov
Washington State Department of Ecology	
Subject/Title	**Additional Information**
Focus on Clean Water	Publication number 06-10-009: www.fortress.wa.gov/ecy/publications/publications/0610009.pdf
Focus on Clean Water: Getting to Clean Water	Publication number 10-10-079: www.fortress.wa.gov/ecy/publications/publications/1010079.pdf
Focus on Forests and Fish: Sustainability for Washington's Forests & Fish Program	Publication number 14-10-011: www.fortress.wa.gov/ecy/publications/publications/1410011.pdf
Focus on Livestock and Water Quality	Publication number 12-10-029: www.fortress.wa.gov/ecy/publications/publications/1210029.pdf
Focus on Low Impact Development Training	www.fortress.wa.gov/ecy/publications/publications/1310004.pdf
Focus on Riparian Buffers for Salmon Protection	Publication number 13-10-034: www.fortress.wa.gov/ecy/publications/publications/1310034.pdf
Washington State Department of Ecology	
Subject/Title	**Additional Information**
Focus on Stormwater Pollution: What is Stormwater?	Publication number 05-10-002: www.fortress.wa.gov/ecy/publications/publications/0510002.pdf
Focus on Water Quality: The Stormwater Problem	Publication number 10-10-070: www.fortress.wa.gov/ecy/publications/publications/1010070.pdf

Rain Garden Handbook for Western Washington: A Guide for Design, Installation, and Maintenance	Publication number 13-10-027: www.fortress.wa.gov/ecy/publications/publications/1310027.pdf
Vehicle and Equipment Wastewater Discharges: Best Management Practices Manual	Publication number WQ-R-95-056: www.fortress.wa.gov/ecy/publications/publications/95056.pdf
Voluntary Stewardship Program and Clean Water	Publication number 13-10-030: www.fortress.wa.gov/ecy/publications/publications/1310030.pdf
What are Riparian Areas?	Publication number 92-br-003: www.fortress.wa.gov/ecy/publications/publications/92br003.pdf
Washington State University (WSU) Extension Office	
Subject/Title	**Additional Information**
Stormwater Stewards training	(360) 867-2151 or www.ext100.wsu.edu/thurston. Volunteers are trained to assist people better manage their stormwater.
Naturescaping for Water and Wildlife workshops	(360) 867-2151 or www.ext100.wsu.edu/thurston.
Beyond Landscaping: Marine & Riparian Revegetation workshop	(360) 867-2151 or www.ext100.wsu.edu/thurston
Rain Garden Design and Installation	(360) 867-2151 or www.ext100.wsu.edu/thurston
Grass Seeding Forest Roads, Skid Trails, and Landings in the Inland Northwest	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=15475&SeriesCode=&CategoryID=145&Keyword (online only publication)
Landscaping with Native Plants in the Inland Northwest	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=14396&SeriesCode=&CategoryID=139&Keyword (online only publication)
Livestock Management and Water Quality	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=13978&SeriesCode=&CategoryID=254&Keyword (online only publication)
Natural Resources	www.pubs.wsu.edu/ListCategories.aspx?TopicID=5
Shore Stewards: Guide for Shoreline Living	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=14194&SeriesCode=&CategoryID=254&Keyword (online only publication)
Washington Groundwater: A Vital Resource	www.pubs.wsu.edu/ItemDetail.aspx?ProductID=13683&SeriesCode=&CategoryID=254&Keyword (online only publication)

Riparian restoration and low impact development

The following table includes examples of riparian restoration and low impact development activities already completed, underway, or pending funding. This table is not all inclusive. Some of the projects are already completed or underway, and additional projects will begin during the implementation of this water cleanup plan.

Table 20: Riparian restoration and low impact development.

Deschutes Estuary Restoration Team (DERT)	
Activity	**Additional Information**
Installing native plants at Quixote Village	The project goal is to help treat stormwater in the wet ponds which are 50 ft. from Percival Creek. The DERT volunteers working on this project are professional landscapers and specialists in stormwater issues.
Olympia, City of	
Activity	**Additional Information**
Mission Creek estuary restoration	2013: Blocking culvert removal, beach gravel augmentation and channel refiguration. 2014: Shoreline buffer revegetation: conifers, understory shrubs
Northern Priest Point Park shoreline restoration	2012: Derelict well and bulkhead removal and near shore restoration, beach gravel augmentation 2013: Shoreline buffer revegetation; conifers, understory shrubs
Riparian restoration at Black Lake Ditch	2011: Planted approximately 1,860 lineal feet of reed canary grass dominated stream bank with 3,500 Sitka willow, Hooker's willow and red osier dogwood live stakes. Infill planting of 150 western red cedar and Douglas fir trees (approximately 7-8') in the riparian buffer along the south side of the ditch.
Riparian restoration at Black Lake Ditch	2013: Removed 3.2 acres of Himalayan blackberries; installed 1,300 linear feet of beaver protection fence; and planted 8710 black cottonwood live stakes along the riparian area adjacent to Black Lake Ditch.
Yauger Park Restoration/LID	Increased active storage capacity from 64 acre-ft to 73 acre-ft; constructed (8) rain gardens and (3) bioretention/rain gardens; installed (1.3) acres of pervious asphalt parking lot; (1.4) acres constructed wetland/wet pond; numerous habitat structures, passive recreation amenities and native plant restoration
Squaxin Island Tribe (SIT)	
Activity	**Additional Information**
Smith Ranch restoration project	The SIT is providing funding for this project.

While Chapter 90.48 RCW authorizes Ecology to impose strict requirements or issue enforcement actions to achieve compliance with state water quality standards, it is the goal of all participants in the Deschutes River, Percival Creek, and Budd Inlet tributaries TMDL process to achieve clean water through cooperative efforts.

Implementation Plan

Introduction

This implementation plan was developed jointly by Ecology and interested and responsible parties. It describes what will be done to improve water quality. It explains the roles and authorities of cleanup partners (those organizations with jurisdiction, authority, or direct responsibility for cleanup), along with the programs or other means through which they will address these water quality issues. It prioritizes specific actions planned to improve water quality and achieve water quality standards. It expands on the recommendations made in the technical study.

This implementation plan describes how temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment pollutant levels will be reduced to meet water quality standards. The implementation plan provides detail on how implementation will occur, a specific framework for implementing the TMDL reductions and targets, and documents ongoing and planned actions designed to bring the Deschutes River, Percival Creek, and Budd Inlet tributaries into compliance with the state water quality standards.

The most critical implementation actions are to establish forested stream-side vegetation corridors and conserve existing stream-side vegetation corridors on the Deschutes River and other streams. Establishing these stream-side vegetation corridors is required to make significant progress on problems related to temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment. This will take a concerted effort on behalf of land owners, non-profit organizations, and governments in the watershed.

Ecology’s technical study shows that nitrogen from the Deschutes River and other fresh water negatively affects water quality in Budd Inlet. A future TMDL will set the appropriate numeric allocations for nutrients on other Budd Inlet tributaries besides the contribution from the Deschutes River above Offut Lake. While implementing actions to address other parameters, stakeholders should aim to reduce nitrogen loads to the Deschutes River.

Who needs to participate in implementation?

This section describes government agencies, citizen groups, educators, and the Tribe who have regulatory authority, influence, information, resources, or other involvement in activities to protect and restore the health of the Deschutes River, Percival Creek, and Budd Inlet tributaries watersheds. A summary and description of implementation actions is provided in the Activities to Address Pollution Sources section.

Federal, tribal, and state entities

U.S. Environmental Protection Agency

The United States Environmental Protection Agency (EPA) is responsible for the implementation of the federal Clean Water Act. A 1997 Memorandum of Agreement between the EPA, Region 10, and Ecology requires both agencies to jointly evaluate the implementation of TMDLs in Washington. These evaluations address whether interim targets are being met, whether implementation measures such as best management practices (BMPs) have been put into effect, and whether NPDES permits are consistent with TMDL wasteload allocations. The EPA approves TMDL Water Quality Improvement Reports (also referred to as water cleanup plans).

The EPA provides water quality-related loan and grant funding opportunities to states and tribes to implement the Clean Water Act. For example, the EPA's Clean Water Act Section 319 grants, combined with Ecology's grant and loan funds, are made available to stakeholders through Ecology's annual Water Quality Grant and Loan process.

Puget Sound is part of the National Estuary Program (NEP), a designation established by Congress in 1987 to protect estuaries of national significance that are threatened by degradation caused by human activities. Puget Sound was given priority status in the 1987 amendments to the Clean Water Act (CWA) and became one of the original programs of the NEP. This funding source can help local, state, and tribal governments implement applicable actions identified in an EPA-approved TMDL water cleanup plan. The EPA oversees NEP activities, including the efforts of state and tribal lead organizations administering grants.

Region 10 of the EPA oversees the Pacific Northwest, which consists of Alaska, Idaho, Oregon, Washington, and Native Tribes. More information about the EPA Region 10 is available at www.epa.gov/Region10.

USDA Forest Service

The U.S. Congress assigned the Forest Service the responsibility for managing the National Forest Service (NFS) lands. A Memorandum of Agreement between the USDA Forest Service, Region 6, and the Washington State Department of Ecology, signed in 2000, indicates the cooperation and coordination between these two organizations.

Squaxin Island Tribe

This TMDL boundary area lies within the Usual and Accustomed lands of the Squaxin Island Tribe (SIT), known as the "People of the Water". Tribal members historically resided in the seven inlets of southern Puget Sound. Now the tribal headquarters and trade center are located in Mason County, six miles south of Shelton, in Kamilche at Little Skookum Inlet. The SIT is responsible for co-managing fisheries within the Deschutes River system.

The SIT is a historic steward and a conscientious co-manager and protector of natural resources, working in cooperation with numerous federal, state, and county government agencies and organizations. The SIT participates in natural resources enhancement and protection programs with the Northwest Indian Fisheries Commission, the Puget Sound Partnership, the Washington Department of Fish and Wildlife, and other groups and agencies to ensure that today's decisions provide for a healthy future. More information about the Squaxin Island Tribe is available at www.squaxinisland.org.

Washington State Department of Ecology

The Washington State Department of Ecology (Ecology) has the responsibility by delegated authority from the EPA to establish water quality standards, coordinate water cleanup projects (commonly referred to as TMDLs or water cleanup plans), and enforce water quality regulations. The EPA delegated authority to Ecology to implement many aspects of the federal Clean Water Act. These include the National Pollution Discharge Elimination System (NPDES) permitting and the TMDL program. Ecology also has state authority to regulate nonpoint sources of pollution and to issue state waste discharge permits to point sources not covered by the national NPDES permitting system. The Deschutes River watershed, located in Water Resources Inventory Area (WRIA) 13, is within the jurisdictional area of Ecology's Southwest Regional Office.

Ecology helps local governments, tribes, and conservation districts with funding for water quality projects through the Centennial Clean Water Fund, 319 Fund, and State Revolving Loan Fund. These funds are used to development and implement stream restoration and water quality improvement projects. This report discusses the full range of Ecology funding opportunities under the section "Funding Opportunities".

More information about the Department of Ecology is available at www.ecy.wa.gov.

Washington State Department of Agriculture

The Washington State Department of Agriculture (WSDA) serves the people of Washington by supporting the agricultural community and promoting consumer and environmental protection. The major goals of the WSDA are:

- Protect and reduce the risk to public health by ensuring the safety of the state's food supply.
- Ensure the safe and legal distribution, use, and disposal of pesticides and fertilizers in Washington.
- Protect Washington State's natural resources, agricultural industry, and the public from selected plant and animal pests and diseases.
- Facilitate the movement of Washington agricultural products in domestic and international markets.

The WSDA manages Washington's Dairy Nutrient Management program associated with licensed dairies, provides technical assistance and enforces the Dairy Nutrient Management Act. It also works with Ecology to manage and address agriculture related inspections and complaints associated with NPDES permits for concentrated animal feeding operations (CAFOs). More information about the Washington State Department of Agriculture is available at www.agr.wa.gov.

Washington State Department of Enterprise Services

The Washington State Department of Enterprise Services (DES), formerly known as General Administration (GA), provides stewardship, oversight and planning of state facilities. The DES is responsible for maintaining the historic capitol in Olympia, including 435 acres of grounds, more than 50 buildings, four parks, and Capitol Lake. Challenges to the lake include the presence of invasive species such as Eurasian milfoil and New Zealand mud snails, water quality, and sediment management. The DES oversees public works projects throughout Washington and provides guidance for the long-term design and maintenance of public facilities. It also negotiates and manages leases on behalf of state government. Implementation actions associated with DES will be included in the Capitol Lake and Budd Inlet marine phase of this project. More information about the Washington State Department of Enterprise Services is available at www.des.wa.gov.

Washington Department of Fish and Wildlife

The Washington Department of Fish and Wildlife (WDFW) is responsible for preserving, protecting, and perpetuating the state's fish and wildlife resources. Their legislative mandate includes protecting and enhancing fish and wildlife and their habitats and providing sustainable, fish-related and wildlife-related recreational and commercial opportunities. A key responsibility involves construction, land use, and environmental permits, including hydraulic project approval (HPA). Major types of activities in freshwater requiring an HPA include, but are not limited to: stream bank protection; construction or repair of bridges, piers, and docks; pile driving; channel change or realignment; conduit (pipeline) crossing; culvert installation; dredging; gravel removal; pond construction; placement of outfall structures; log, log jam, or debris removal; installation or maintenance of water diversions; and mineral prospecting. Any construction activity or other work that uses, diverts, obstructs, or changes the natural flow or bed of state waters requires an HPA.

More information about the Washington State Department of Fish and Wildlife is available at www.wdfw.wa.gov.

Washington State Department of Health

The Washington State Department of Health (DOH) is responsible for protecting public health by promoting the safe treatment and disposal of domestic and other non-industrial wastewater in areas not served by municipal wastewater treatment. The DOH can provide assistance to local health jurisdictions for residential on-site wastewater issues on large on-site sewage (LOSS) plan reviews (Chapter 246.272B WAC). Chapter 246-272A WAC establishes minimum on-site requirements.

- Individual On-site Sewage System (OSS): Individual and small (up to 3,500 gallons/day) OSS are permitted and regulated by local health jurisdictions. For this watershed, the Thurston County Public Health and Social Services Department, Environmental Health Division, is responsible for oversight and implementation.
- Large On-Site Sewage System (LOSS): The DOH reviews and approves plans for LOSS designed to handle wastewater flows from 3,500 to 100,000 gallons/day and issues annual operating permits to all LOSS.
- Water Reclamation and Reuse: The DOH works with Ecology on public health aspects of permitted and proposed reclaimed water facilities. They directly work with those proposing minimum or zero discharge reuse and reclamation facilities and developments.
- Technical support: The DOH provides technical assistance, guidance, and social marketing tools for local health jurisdictions to implement and build upon operation and maintenance (O&M) programs for on-site sewage systems.

More information about the Washington State Department of Health is available at www.doh.wa.gov.

Washington State Department of Natural Resources

The Washington State Department of Natural Resources (DNR) is responsible for protecting Washington's natural heritage. Their conservation and restoration programs help to ensure the health of the state's landscapes for the benefit of the people, plants, and animals that live here. Active management and long-term stewardship are needed to maintain or restore ecological quality and function to native habitats, and to prevent forestlands and other native landscapes from conversion to other uses. They gather information and find better ways to sustainably manage diverse forested state trust lands and natural areas in their care. Key areas they address include:

- Aquatic Land Habitat Conservation Plan (HCP)
- Aquatic Lands Management and Stewardship
- Climate Change
- Forest Health & Ecology
- Forest Research
- Natural Areas Program
- State Trust Lands Forest Management
- Trust Lands Habitat Conservation Plan (HCP)
- Urban Forestry

More information about the Washington State Department of Natural Resources is available at www.dnr.wa.gov.

Washington State Department of Transportation

The Washington State Department of Transportation (WSDOT) implements their National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge Municipal Stormwater General Permit, WAR043000, and Stormwater Management Program Plan (SWMPP) in all applicable Phase I and Phase II coverage areas. The WSDOT's current permit was issued in March 2014. Implementation of the permit includes, but is not limited to, the following:

- Discharge inventory and mapping.
- Illicit Discharge Detection and Elimination (IDDE).
- Stormwater design per the WSDOT Highway Runoff Manual (HRM). (The WSDOT revised the HRM in 2014 to maintain equivalency with Ecology's Stormwater Management Manual).
- Water quality monitoring (at selected sites statewide per the permit requirements).
- Stormwater BMP retrofit program.
- Highway maintenance program.

The WSDOT actively participates in TMDL development and implementation in cases where WSDOT is assigned a WLA or action items in an EPA approved TMDL.

More information about the Washington State Department of Transportation is available at www.wsdot.wa.gov.

Puget Sound Partnership

The Puget Sound Partnership (PSP) is a state agency whose main focus is the recovery of Puget Sound health by 2020. The PSP coordinates the efforts of citizens, governments, tribes, scientists, businesses and nonprofits to set priorities, implement a regional recovery plan, and ensure accountability for results. They have created a 2020 Action Agenda establishing science-based goals to achieve recovery and protection. The agenda addresses habitat protection, toxic contamination, pathogen and nutrient pollution, stormwater runoff, water supply, ecosystem biodiversity, species recovery, and capacity for action. It prioritizes cleanup and improvement projects, coordinates with federal, state, tribal, and private resources to ensure all work cooperatively.

The Alliance for a Healthy South Sound (AHSS) was established by the PSP Leadership Council as a local integrating organization to support coordinated and collaborative decision-making aimed at restoring and protecting the ecological and socio-economic health of South Puget Sound. It consists of local governments, tribes, non-profit organizations, watershed, marine resource, and salmon recovery groups, and citizens. They develop and coordinate the implementation of Action Agenda priorities.

More information about the Puget Sound Partnership is available at www.psp.wa.gov.

Local government resources

Lacey, City of

The Community Development Department is responsible for the City's full range of community planning, land use development, environmental protection policies and construction code compliance. Their Public Works Department is responsible for designing, operating and maintaining the City's transportation, water, sewer and stormwater systems to protect critical water resources. More information about the City of Lacey is available at www.ci.lacey.wa.us**.**

LOTT Clean Water Alliance

. "LOTT" stands for its four government partners – Lacey, Olympia, Tumwater, and Thurston County. The LOTT Clean Water Alliance (simply referred to as LOTT) is a non-profit corporation responsible for wastewater management services for the urban area north of Thurston County, Washington. Their mission is to preserve and protect public health and the environment by cleaning and restoring water resources for its communities. Its services include wastewater treatment, reclaimed water production, and long-range planning. Functioning as a local government, LOTT is governed by a Board of four elected officials appointed from its partner jurisdictions and operates under the authority of an intergovernmental agreement. Joint facilities include a large centralized treatment plant, a satellite treatment plant, three major pump stations, major sewer interceptor pipelines, and reclaimed water distribution pipelines. More information about the LOTT Clean Water Alliance is available at www.lottcleanwater.org.

Olympia, City of

Their Water Resources division is responsible for drinking water, storm and surface water, and wastewater. The Storm and Surface Water Utility maintains over 130 miles of underground pipe, over 6,300 storm drains, and 40 stormwater ponds that carry stormwater runoff from roads and rooftops to local streams and Budd Inlet. They work on many levels to protect water quality and prevent flooding. Issues related to Low Impact Development (LID) fall within the responsibility of the Storm and Surface Water Utility. LID is an approach to land development or redevelopment that works with nature to manage stormwater as close to where it falls as possible. It employs principles such as preserving and re-creating natural landscape features, and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource rather than a waste product. By implementing LID principles and practices, stormwater can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem.

Protecting streams and shorelines is another responsibility of the Storm and Surface Water Utility. Much of this work done is through maintaining the city's stormwater system. The system includes over 130 miles of pipe, 3,000 storm drains, 40 public ponds, 60 privately-owned ponds, many miles of roadside ditches, and a stream that runs thousands of feet through a pipe downtown. All of the water running through the city's systems drains into one of three inlets:

Eld Inlet, Budd Inlet, or Henderson Inlet. Most of Olympia drains to Budd Inlet, as does the Deschutes River and Capitol Lake. While some waters are still healthy, many in the urban area are not due to human-related causes such as new roads and buildings. Stormwater runoff is a major contributor of nonpoint source pollution.

The city of Olympia published an extensive characterization of watersheds within their municipal stormwater permit boundary. "The purpose of this work was to inventory and understand the condition of the city's aquatic resource base and the stormwater infrastructure system, then use the information we gain to better direct Storm and Surface Water Program focus and resource allocation" (Olympia, 2012). The city should use this information in addition to the recommendations in this TMDL report to determine an implementation strategy for retrofits of stormwater controls and homeowner education and outreach to meet their WLA.

More information about the city of Olympia Public Works is available at www.olympiawa.gov/city-government/departments/public-works.

Olympia, Port of

Their environmental programs include:

- Implementation of best management practices (BMPs) and ongoing improvement of their marine terminal stormwater management program.
- Incorporation of sustainable practices, such as recycling of materials and energy and water conservation in Port operations.
- Partnerships with tenants to improve environmental practices at the Port.
- Remediation of historic industrial contamination to benefit the environment, facilitate redevelopment and improve cargo efficiency.

Port of Olympia

Implementation actions associated with the Port will be included in the Capitol Lake and Budd Inlet marine phase of this project. More information about the Port of Olympia's Environmental Programs is available at www.portolympia.com/index.aspx?NID=112.

Rainier, City of

Rainier is a small city in Thurston County, with the estimated population recorded in 2013 as 1,923 residents. It encompasses 1.73 square miles and is located 15 minutes south of the Olympia area. In terms of land cover, 18% (179 acres) of the city is urban, 27% (267 acres) is forested, and 55% (540 acres) is covered with non-forest vegetation and soils.

CITY OF RAINIER

More information about the city of Rainier is available at www.cityofrainierwa.org.

Thurston Conservation District

The Thurston Conservation District (TCD) is a non-regulatory organization assisting land owners and managers in implementing conservation practices. The TCD educates landowners about water quality problems and steps they can take to help reduce pollutants reaching streams. They provide technical assistance, outreach, and education to Thurston County residents related to developing and implementing farm conservation plans. They also provide assistance for the design and installation of BMPs. Ecology normally refers farmers who have received a Notice of Correction to the TCD for assistance. The TCD assists with conservation planning and provides technical and cost-share assistance to landowners. They receive annual base operational funding from the Washington Conservation Commission.

More information about the Thurston Conservation District is available at www.thurstoncd.com.

Thurston County Government: Departments of Public Health & Social Services and Resource Stewardship

Thurston County Public Health and Social Services

This department addresses gravel mines, health codes/regulations (for example, sewage disposal and nonpoint source pollution), land use review, septic systems (on-site sewage), surface water (lakes, rivers, and streams), and solid waste permitting and enforcement, Group B and single family drinking water supplies. Surface Water Protection (also known as Resource Protection) activities include elements to protect and maintain the quality of the natural environment. Specific activities include surface water protection activities such as sanitary surveys on marine and freshwater shorelines, ambient monitoring of streams and lakes, surface water quality data management and analysis, nonpoint pollution source identification, stormwater sampling and investigations, septic system dye-tracing along shorelines, effectiveness of BMPs for pollution prevention, agriculture and solid waste complaint response, and education.

More information about the Thurston County Public Health and Social Services is available at www.co.thurston.wa.us/health/default.htm.

Thurston County Resource Stewardship Department

The Resource Stewardship Department is comprised of several divisions, including Environmental Review/Permitting, Long-Range Planning, Water Resources, and Community Services. The Community Services division includes WSU Thurston County Extension and the Thurston County Fair. They work together to protect Thurston County's natural and built environment, and to engage residents in programs that inspire them to enjoy and protect the County's natural resources. More information about this department is available at www.co.thurston.wa.us/resource/index.htm.

The Long-Range Planning division develops policies and programs related to sustainable land use and development within unincorporated areas of the county. Key projects include critical area and prairie protections, shoreline master planning, watershed planning, and preservation of working lands. More information is available at www.co.thurston.wa.us/planning/.

The Water Resources Program performs a wide array of activities to protect the health of streams, lakes, and Puget Sound. Much of their work is focused on reducing pollution and erosion caused by stormwater runoff – from the time rainwater hits pavement, to the time it enters a body of water or the ground. Their work is guided by basin plans and watershed characterizations that take into account the unique characteristics and challenges in each watershed. More information about this department is available at www.co.thurston.wa.us/waterresources/.

The Thurston County Storm and Surface Water Utility is responsible for protecting the county's water resources. Stormwater Facility Maintenance includes: managing stormwater runoff to improve water quality, maintaining stormwater facilities, reducing stormwater pollution, and providing guidance on rain gardens and drainage problems on or near properties. Stormwater pollution from urban runoff can be a serious health risk and significant environmental health to the quality of the county's rivers, lakes, and streams. This division provides programs and projects to reduce flooding, erosion and pollution caused by stormwater runoff, while protecting and enhancing aquatic habitat. More information about this department is available at www.co.thurston.wa.us/stormwater/.

The Environmental Monitoring Program is another part of the Water Resources Program. The county operates monitoring stations across the county to keep a close watch on the condition of its water resources. The Environmental Monitoring Program collects data on streamflow, groundwater conditions in flood-prone areas, rainfall, and atmospheric data. Monitoring in Lacey, Olympia, and Tumwater is performed in partnership with city stormwater programs. Thurston County and its cooperating agencies use the data to track water quality in streams and water bodies, plan for development, and monitor changes in watershed characteristics after development has occurred. More information about this program is available at www.co.thurston.wa.us/monitoring/ and www.co.thurston.wa.us/waterresources/.

Thurston Public Utility District

The Thurston Public Utility District (TPUD) owns and operates water systems and connections for water systems owned by towns, private companies, and homeowner associations. They provide water planning and utility services to the citizens of Thurston County. They have three districts, with the Deschutes River watershed located in District 1. More information about the TPUD is available at www.thurstonpud.org.

Tumwater, City of

The city of Tumwater (Tumwater) is a non-charter code city with a mayor-council form of government. The Mayor and seven Council members are elected by the registered voters of the city to staggered four-year terms. Tumwater provides general government services authorized by state law, including public safety, highways and streets, parks and recreation, planning and zoning, permits and inspections, general administration and water, sewer and stormwater services. The Community Development Department provides permitting services, plan review, inspections, code enforcement, and long-range comprehensive planning. The Public Works Department is comprised of two divisions: Engineering and Operations and Maintenance. The Engineering Division is responsible for the overall management of the capital projects in the Capital Facilities Plan and the administrative aspects of the transportation and utility systems. Water Resources is also under this division, responsible for the implementation and management of water-related programs, such as the NPDES Phase II permit, utilities planning, water quality, water conservation, wellhead protection, and associated education and outreach functions. The Operations and Maintenance Division is responsible for the operation, maintenance, and repair of the transportation and utility infrastructure, and the maintenance and repair of city-owned vehicles and rolling stock. City parks and the Tumwater Valley Municipal Golf Course are maintained by the Parks Department. More information about the city of Tumwater is available at www.ci.tumwater.wa.us.

Washington State University Thurston County Extension

The Washington State University (WSU) Thurston County Extension is an educational resource to Thurston County residents. They assist forest owners, shoreline residents, community members, and decision makers to gain easy access to information and resources related to natural resource management and ownership. Their Water Resources programs provide outreach and educational services. They develop research-based publications and educational workshops to offer practical guidance for protecting natural resources associated with streams, rivers, lakes, wetlands, estuaries, and marine waters, and the resources these water bodies provide. Topics of special interest include: landscaping and water quality; rain gardens; Low Impact Development (LID); realtor education; septic systems; and shoreline living. Other activities include outreach at local public events, and developing and submitting newspaper articles and radio spots about water quality issues. More information about the Washington State University (WSU) Thurston County Extension is available at www.ext100.wsu.edu/thurston/nrs/.

Nonprofit, educational, and volunteer organizations

Black Hills Audubon Society

The Black Hills Audubon Society (BHAS) is a chapter of the National Audubon Society, representing Lewis, Mason, and Thurston counties. It is a volunteer-based, non-profit organization whose members share interests in birds and other wildlife, their habitats, and natural history. Their goals are to promote environmental education and recreation and to maintain and protect ecosystems for future generations. More information about the BHAS is available at www.blackhills-audubon.org.

Capitol Lake Improvement and Protection Association

The Capitol Lake Improvement and Protection Association (CLIPA) is a 501(c) non-profit advocacy group. They represent the interests of local environmentalists, government activists, business owners, and community leaders. They provide an alternative platform for input for the public-at-large on the future management of Capitol Lake. More information about CLIPA is available at www.savecapitollake.org.

Capitol Lake Improvement & Protection Association
'CLIPA'
SaveCapitolLake.org

Deschutes Estuary Restoration Team

The Deschutes Estuary Restoration Team (DERT) is a 501(c) non-profit advocacy group. They represent the interests of the natural environment and a community that values wildlife, water quality, ecosystem services, economic opportunities, and natural beauty. More information about DERT is available at www.deschutesestuary.org.

Stream Team

Stream Team is an education-to-action program for citizens interested in protecting and enhancing water resources in Thurston County watersheds. The program is cooperatively sponsored and funded by the storm and surface water utilities of the cities of Lacey, Olympia, and Tumwater and Thurston County. Stream Team began in 1990 as a way for local governments to involve citizens in the basin (watershed) planning process for a few local creeks. They have since found a niche in the South Sound for providing free quality environmental education programs and activities and hands-on action projects. Stream Team volunteers perform a variety of actions for clean water, such as planting native trees, monitoring local streams, and marking storm drains with the important message: "No Dumping – Flows to Waterways." They provide information about car washing, natural yard care, pet waste, vehicle care, and rain gardens. Stormwater runoff and management is a primary focus of many of these actions. More information about Stream Team is available at www.streamteam.info/.

Local businesses

Local businesses are responsible for taking actions to prevent pollution their activities may generate. They in turn can be partners in increasing public awareness on local water quality issues in the Deschutes River, Percival Creek, and Budd Inlet tributaries. Examples of businesses include those with activities related to forestry or agriculture; automotive shops; golf courses; turf, berry, or tree farms; shopping centers; garden centers; or stockyards. Commercial forestry businesses are responsible for following the Forest Practices Rules to protect public resources such as water, fish, and wildlife. Other businesses may require coverage under one of the National Pollutant Discharge Elimination System (NPDES) permits or a state waste discharge permit for discharge of process water or stormwater to waters of the state.

Watershed residents and property owners

Local residents and property owners play a critical role in improving the water quality of the Deschutes River, Percival Creek, and Budd Inlet tributaries. They implement actions to improve or protect the watershed. Examples include increasing or protecting the riparian vegetation along streambanks, appropriately managing pet and livestock waste, excluding livestock from surface waters, appropriately disposing of household hazardous waste and other toxic substances, properly maintaining and operating on-site septic systems, and restoring and protecting natural wetlands.

Pollution sources and organizational actions, goals, and schedules

Through research conducted for the *Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Technical Report,* publication no. 12-03-008, and discussions with the Deschutes TMDL Advisory Group, the tables in this section identify specific actions needed to improve the water quality in the Deschutes River, Percival Creek, and Budd Inlet tributaries. This information expands on the technical report and describes the roles and authorities of cleanup partners (the organizations with the jurisdiction, authority, or direct responsibility for cleanup) and the programs or other means through which they will address the water quality issues.

Activities to address pollution sources

The following tables outline specific actions, priority areas, and schedules. They are presented in alphabetical order by entity.

Table 21: Commercial Forest Landowner actions

Action	Comments	Schedule
Implement Forests and Fish Law	This includes environmental protections to restore riparian habitat to support harvestable levels of salmon; meet requirements of the Endangered Species Act for aquatic species; meet requirements of the Clean Water Act for water quality; and ensure forest industry economic viability.	Ongoing

Table 22: Construction Stormwater General Permittees (CSWGP) (new and existing)

Action	Comments	Schedule
Note: These permits are temporary and for the appropriate duration of the construction process. The number and name of permittees varies from month to month and year to year.	*See Appendix C for specific requirements for each permit. The critical period for fine sediment, turbidity, and pH is from June-September and applies to any stormwater discharge from a permitted facility.*	
Comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Construction Activity	This is generally referred to as the Construction Stormwater General Permit (CSWGP). The permit applies within the NPDES coverage area.	The current permit is in effect until December 31, 2015
Where applicable, implement additional monitoring or source controls to prevent pollutants released into the watershed.	See Appendix C for specific requirements for each permit.	As needed

Table 23, addressing general land uses, identifies the best management practices (BMPs) necessary for each type of land use activity to minimize its impact on water quality. All landowners and residents throughout the watershed must implement BMPs to protect water quality to meet the TMDL. Landowners and activities within the watershed must not cause any discharge of pollutants to state waters (according to RCW 90.48). To meet the requirements of the TMDL, these actions must be completed by 2030. Ongoing actions must be in place and continue past 2030. Property owners, watershed residents, and organizations implementing and maintaining the specified BMPs will be presumed in compliance with water quality standards. If landowners or users are applying all specified BMPs to reduce or eliminate their land use activity's impact on water quality, and violations of water quality criteria remain, it may be necessary for landowners and users to modify existing practices or apply additional water pollution control measures to achieve compliance with water quality standards. Table 23 does not apply to entities who are assigned specific actions in Tables 24 through 44.

Table 23: General land use category Implementation Actions

Subject	Actions
All-Terrain Vehicle (ATV) Use – Illegal	Eliminate the illegal use of all-terrain vehicles (ATVs) within riparian areas. Potential actions could include the forest landowners installing gates to limit access, placing "No Trespassing" signs at main access points, and notifying local law enforcement to remove trespassers. **Priority areas**: All riparian areas along the Deschutes River, particularly those on Weyerhaeuser property near 1000 Rd.
Domestic Animal Confinement and Feeding Areas	Implement BMPs to prevent discharge of pollutants from facilities concentrating or boarding domestic animals, including cats, dogs, and horses.
Flow	Increase groundwater inflows to streams in the watershed. Develop strategies to increase summer base flow while addressing projected future growth and increases in water demand.
	Maintain the current closed status for further Deschutes River watershed withdrawals, eliminate illegal withdrawals, and quantify and mitigate the effect of exempt wells. Conserve water throughout the watershed, particularly users of exempt wells.
	Enhance groundwater recharge through low impact development (LID) practices for new development and redevelopment; infiltrate stormwater and reclaimed water wherever possible, ensuring that surface water nutrient levels are not impacted as a result of that infiltration; and use reclaimed water for irrigation and other beneficial purposes such that surface water nutrient levels are not impacted.
Forest Practices	All timber harvests and other forestry-related work must comply with the state forest practices rules. Applies to state and privately owned forest lands.
	Comply with Memorandum of Agreement (MOA) between the USDA Forest Service, Region 6, and the WA State Department of Ecology (2000). Applies to all National Forest System lands.
	Restore riparian areas and river channels in private non-commercial forests not managed by the U.S. Forest Service (USFS) or subject to the state forest practices rules. Applies to the Deschutes River watershed system-wide, including the areas within the USFS boundary. **Priority area**: Between river kilometers (RK) 12 and 20.
Golf Courses	Recommended use of "salmon safe certified" program or equivalent to ensure environmental protection of urban water quality. Include assessment of management issues including irrigation efficiency, stormwater management, pesticide reduction, and stream and wetlands area management. More information is available at www.salmonsafe.org/getcertified/golf-courses and www.stewardshippartners.org/programs/salmon-safe-puget-sound/. (Inclusion of these resources does not represent endorsement by Ecology.)

Groundwater and Water Conservation	Increase groundwater and surface water inflows to streams in the watershed.
	Enhance groundwater recharge through low impact development (LID) practices for new development and redevelopment, infiltration of existing stormwater, and reclaimed water such that surface water nutrient levels are not impacted.
	Consider a water management strategy recognizing the benefits of maintaining summer baseflows while meeting the community's need for water. Strategies should consider projected future growth and increases in water demand.
	Maintain the current status that the Deschutes River watershed is closed to further withdrawals, eliminates illegal withdrawals, and quantifies and mitigates the effect of exempt wells.
	Conserve water throughout the watershed and particularly by residents served by exempt wells.
Infrastructure	Identify and fix potential bacteria pollutant sources such as cross-connected infrastructure, recreational users, and homeless populations.
Irrigation Water Management	Apply only the amount of water needed by the crop in a manner to limit waste, prevent surface losses of nutrient and soil, and prevent nutrient leaching.
Land Conservancy and Restoration	Seek opportunities to acquire land or easements for conservation, preservation, and riparian and channel restoration efforts within the Deschutes River and Percival Creek watersheds. Prioritize based on sensitive areas identified in this water cleanup plan.
Lawn and Garden	Apply lawn and garden chemicals sparingly and according to directions. Use best management practices when using and disposing of fertilizers, weed killers, and pesticides. *For example: Applications used on turf, berry, or Christmas tree farms.*
Livestock Confinement and Feeding Areas - Heavy Use Area Protection	Set back confinement and feeding areas at least 100 feet from surface waters. Place animal confinement and feeding areas away from locations that will concentrate runoff or increase the potential for polluted runoff to reach surface water such as steep slopes, unstable or erodible soils, natural or constructed drainages, or topography that concentrates runoff. Stabilize confinement areas with compacted gravel or concrete to allow for manure collection and prevent erosion. Divert clean water from confinement areas through the use of gutters, berms, roofs, or other means of conveyance to prevent contact with manure.
Livestock Exclusion Fence	Exclude livestock from stream-side vegetation corridor and flooded or seasonally inundated areas during periods of saturation. **Priority areas**: Old Camp Lane and Lake Lawrence tributary. *Note: The area near the Lake Lawrence tributary was completely fenced in 2011.*
Livestock Off-Stream Water Facility	Set back off-stream water facilities at least 100 feet from surface waters. **Priority areas**: Deschutes River between Rainier and Old Camp Lane.
Manure Management	Collect, store and use livestock manure in a manner preventing contamination of runoff and leaching to groundwater.
	Collect manure from confinement areas and other areas where manure has accumulated, and store it in a waste storage facility. Set back waste storage facilities at least 100 feet from surface waters. Design waste storage facilities to provide adequate storage based on the volume of manure generated at the site. Cover the waste storage facility and install it on an impermeable surface. Divert clean water from waste storage facilities through the use of gutters, berms, roofs, or other means of conveyance to prevent contact with manure.
	Use manure in a manner preventing contaminating runoff and leaching to groundwater. Apply manure to fields consistent with the Nutrient Application best management practices (BMPs).
Nutrient Application	Do not apply manure within stream-side vegetation corridors. Consider all nutrient sources when determining recommended application rates for crops. Base nutrient applications on soil testing by field. Apply nutrients at rates and times commensurate with crop-specific removal and growth patterns, and consistent with university recommendations or standard agricultural practices. To prevent surface or leaching losses, apply nutrients at times closest to plant uptake, and do not spread manure from late fall through winter. Additionally, do not apply nutrients and manure to saturated, frozen, or snow covered soils, in flood prone areas during seasons when flooding or inundation is likely, or prior to forecasted precipitation that will lead to nutrient loss from runoff or leaching.
On-Site Sewage System (OSS)	Properly operate and maintain on-site septic systems. Regularly inspect the OSS including the septic tank and drain field. Inspect and pump OSS per local or state requirements (at least every three years for standard gravity systems and annually for all other system types).

Pet Waste	Properly dispose of pet waste. Bag it securely and put in the garbage. Keep the pet waste out of on-site sewage systems (OSS).
Riparian and Channel Restoration	Enhance channel complexity. Enhanced restoration includes large woody debris within the active river bed to promote bank stabilization and pool formation, and within riparian zones to provide self-armoring elements as banks are eroded. **Priority areas**: Henderson Blvd., Waldrick Rd., State Route 507, Old Camp Lane
	Evaluate strategies including control of instream fine sediment. Channel and riparian restoration will have multiple environmental benefits. **Priority areas**: Between river kilometers (RK) 12 and 20.
	Plant, enhance, and maintain native riparian vegetation, including both deciduous trees and shrubs, and confer trees. Prevent the removal of existing riparian vegetation and restore distressed reaches. Applies to the Deschutes River system-wide, including the area within the U.S. Forest Service (USFS). **Priority areas**: Between RK 12 and 20; Henderson Blvd., Waldrick Rd., State Route 507, Old Camp Lane.
Sediment and Erosion Control	Cultivate cropland so it minimizes soil and nutrient loss. Control soil erosion on property by planting ground cover and stabilizing erosion-prone areas.
Storm Drains	Keep litter, pet wastes, leaves and debris out of street gutters and storm drains.
Stormwater Runoff *(outside of the Phase II Municipal Stormwater permit boundary)*	Use best management practices (BMPs), as applicable, from the 2012 Stormwater Management Manual for Western Washington, amended December 2014, and referred to as the 2014 SWMMWW, available online at www.fortress.wa.gov/ecy/publications/documents/1410055.pdf.
Stream-side Vegetation Corridors	Establish forested stream-side vegetation corridors with native plants at least 75 feet wide on perennial waters and 35 feet wide on constructed ditches, intermittent streams, and ephemeral streams. Maintain existing stream-side vegetation corridors to the maximum extent possible and at least 75 feet wide. Priority areas: Deschutes River between Rainier and Old Camp Lane, Thurston Creek at 3000 Rd.*, Johnson Creek at 3000 Rd.*, Huckleberry Creek at 3000 Rd.*, Mitchell Creek at 3000 Rd.*, Reichel Creek at Vail Loop Rd., Spring near Cowlitz Dr., Tempo Lake outflow at Stedman Rd., Spurgeon Creek at Rich Rd., Ayer Creek off Sienna Court; Percival Creek; and Black Lake Ditch. *These areas are subject to the Forest Practice Act rules for riparian buffer widths.
	For project proposals seeking grant funding, review the Riparian Buffer Width Map and Ecology's Funding Guidelines for water quality grants. More information on the map and guidelines are available on Ecology's Water Quality Grants & Loans website at www.ecy.wa.gov/programs/wq/funding/funding.html.
	Larger stream-side vegetation corridors may be required under the Thurston County Critical Areas Ordinance.
Wetlands	Restore and protect natural wetlands. **Priority areas**: Ayer/Elwanger, Reichel, and Spurgeon Creeks

Table 24: Industrial Stormwater General Permittees (ISGP) (New and Existing)

Action	Comments	Schedule
Comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Industrial Activity	This is generally referred to as the Industrial Stormwater General Permit (ISGP). The permit applies within the TMDL coverage area.	The current permit is in effect until 12/31/14. The new permit is expected to become effective 1/1/15.
Where applicable, implement additional monitoring or source controls to prevent pollutants released into the watershed.	See Appendix C for specific requirements for each permit.	Ongoing

Table 25: Lacey, City of

Stormwater Related		
Action	**Comments**	**Schedule**
Comply with the Municipal Stormwater Phase II Western Washington General Permit, #WAR045011 to implement the permit obligations that address the TMDL-listed pollutants for the Deschutes TMDL. This includes, but is not limited to, public education and outreach; illicit discharge detection and elimination (IDDE); controlling runoff from new development, redevelopment, and construction sites; and municipal operations and maintenance.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) within the National Pollutant Discharge Elimination System (NPDES) coverage area. See Appendix C for specific requirements.	The current permit is in effect until 7/31/18.
Construct stormwater treatment facility to address untreated stormwater discharges to Chambers Lake.	This facility has been planned for many years, and was made possible by grant funds awarded by Ecology in 2013. **Priority areas**: Chambers Lake and ditch	Construction of the facility began in 2014 and will be completed in 2015.
Require erosion control plans prior to issuance of any clearing or grading permits in the Chambers Creek sub-basin.	Most property in the Chambers basin in Lacey has already been developed, but what is left will have drainage challenges. Priority areas: Chambers Lake and ditch	Current requirement for the city to complete by end of 2016
Work with existing commercial businesses to identify pollution sources and best management practices (BMPs) needed to prevent discharge of TMDL pollutants of concern to the MS4.	Continue to implement local source control plans for new development.	Ongoing
General		
Action	**Comments**	**Schedule**
In coordination with regional partners, develop and implement a strategy for converting on-site sewage systems (OSS) in high priority/high density neighborhoods within the urban area to sewer.	This includes examining wastewater treatment, disposal, and management alternatives **Priority area**: High priority areas identified in an adopted strategy within the city and the Urban Growth Area (UGA).	Planning: 2011-2016 Implementati on start date: 2017
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed

Table 26: LOTT Clean Water Alliance

Action	Comments	Schedule
Work with the cities of Lacey, Olympia, and Tumwater, and Thurston County, to support implementation of a regional strategy for converting on-site sewage systems (OSS) in high priority/high density neighborhoods within the urban areas to sewer.	This includes examining wastewater treatment, disposal, and management alternatives **Priority area**: High priority areas within the cities of Lacey, Olympia, and Tumwater, Thurston County and applicable Urban Growth Areas (UGA).	Planning: 2011-2016 Implementation start date: 2017

Table 27: Olympia, City of

Stormwater Related		
Action	**Comments**	**Schedule**
Comply with the Municipal Stormwater Phase II Western Washington General Permit, #WAR045015 to implement the permit obligations that address the TMDL-listed pollutants for the Deschutes TMDL. This includes, but is not limited to, public education and outreach; illicit discharge detection and elimination (IDDE); controlling runoff from new development, redevelopment, and construction sites; and municipal operations and maintenance.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) within the National Pollutant Discharge Elimination System (NPDES) coverage area.	The current permit is in effect until 7/31/18.
Stormwater control and management: Develop a plan to reduce bacteria and sediment loading with a schedule of prioritized projects prior to expiration of the permit on July 31. 2018. The prioritized projects will need to be implemented in the priority areas during subsequent permit cycles.	Implement projects as funds are available. Projects could include: Provide stormwater treatment for currently untreated impervious surfaces; require stormwater retrofits as a condition of property development; develop targeted pollutant source control program; develop a street sweeping program. **Priority areas**: *Budd Inlet tributaries*: Ellis, Indian, Mission, Moxlie, and Schneider Creeks; *Percival Creek watershed*: Percival Creek; *Deschutes River watershed*: Chambers Creek	Start plan developmen t: 2016 Plan will be rolled into next permit cycle: 2018
Conduct source identification of potential bacteria pollutants consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.c.i. Possible sources include agricultural operations, recreational use, and homeless encampments. If results indicate there are areas exceeding state water quality standards, develop a plan to identify sources consistent with the Phase II Municipal Stormwater Permit Special Condition S4.F.	Olympia city limits (regulated and jurisdictional boundary). **Designated priority areas** for illicit discharge detection and elimination routine field screening include: *Budd Inlet tributaries*: Butler, Ellis, Indian, Mission, and Percival Creeks; *Percival Creek watershed*: Near Black Lake Ditch confluence.	Implementat ion start date: As needed
Work with existing commercial businesses to identify pollution sources and best management practices (BMPs) needed to prevent discharge of TMDL pollutants of concern to the MS4.	Continue to implement local source control plans for new development in the NPDES permit coverage area.	Ongoing
Continue to develop and implement pet waste reduction programs through existing education and outreach efforts; including installing pet waste stations at established pet recreation areas to prevent or reduce bacteria released into local water bodies. Work with other jurisdictions on a regional pet waste control program.	**Priority areas**: Ellis, Indian, Mission, Moxlie, and Schneider Creeks	Ongoing
Reduce anthropogenic sources of heat through implementation of the City of Olympia Drainage Design Manual. Actions include: where feasible, retain runoff and encourage infiltration; evaluate runoff from large areas of impervious surface, with focus on on-site retention and infiltration; or where feasible, increase native vegetative cover in sensitive areas.	**Priority area**: City of Olympia's permit area within the TMDL boundary	Analysis & project identification : 2017-2018

On-Site Sewage System (OSS) Related		
Action	**Comments**	**Schedule**
In coordination with regional partners, develop and implement a strategy for converting on–site sewage systems (OSS) in high priority/high density neighborhoods within the urban area to sewer.	This includes examining wastewater treatment, disposal, and management alternatives. Priority area: High priority areas identified in an adopted strategy within the city and the Urban Growth Area (UGA).	Planning: 2011-2016 Implementation Start Date: 2017
General		
Action	**Comments**	**Schedule**
Condition future shoreline development permits to maintain or enhance riparian condition in the priority area.	The city has limited access to the priority area because of the existing railroad line. Priority areas: Percival Creek below the Black Lake Ditch confluence	Ongoing
Scope, vet, prioritize, and implement riparian and channel restoration projects on properties owned by the City of Olympia as funding is available.	There are existing railroad right-of-way limitations which could make this work difficult or infeasible. Priority areas: Black Lake Ditch and Percival Creek	Scope, vet, and prioritize in 2016. Fund and implement 2016 – 2030.
Comply with Section 5, City of Olympia's Mitigation Program, for the Smith Ranch property. This includes, but is not limited to, implementing the habitat restoration plan, including adding exclusion fencing to keep sheep off the property.	The Smith Ranch property was purchased by the cities of Olympia, Lacey, and Yelm in 2011. This is part of the McAllister Wellfield development project. For more information, refer to the City of Olympia and Nisqually Indian Tribe McAllister Wellfield Mitigation Plan, December 2010, available at www.olympiawa.gov/city-utilities/drinking-water/~/media/Files/PublicWorks/Water-Resources/McAllister_Mitigation_Plan_12-02-10.ashx.	Compliance Activities: 2013 – 2016
Identify and implement projects to improve or restore riparian and channel conditions or reduce sediments released into the watershed. Use existing programs to identify projects which will improve or restore riparian and channel conditions, or reduce sediments released into the watershed, and implement in partnership with restoration organizations.	Apply for National Estuary Program (NEP) or other sources to fund this type of work. It is currently done on a case-by-case basis as grant funds are available.	Ongoing as funding is available.
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed

Table 28: Puget Sound Partnership (PSP)

Action	Comments	Schedule
Provide funding through the National Estuary Program (NEP) for projects to protect and restore the water quality and ecological integrity of waters entering the Puget Sound (an estuary of national significance).	Coordinate efforts through the U.S. Environmental Protection Agency (EPA) to fund projects targeting pollution prevention from urban stormwater runoff, and protecting and restoring habitat.	Ongoing

Table 29: Rainier, City of

Action	Comments	Schedule
Evaluate sewage treatment and disposal options for the city to reduce the nitrogen load to groundwater.	This includes examining wastewater treatment, disposal, and management alternatives.	Begin evaluation 2016

Table 30: Sand and Gravel General Permittees (SGGP) (New and Existing)

Action	Comments	Schedule
Comply with all requirements of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for Stormwater Discharges Associated with Sand and Gravel operations.	This is generally referred to as the Sand and Gravel General Permit (SGGP). The permit covers discharges related to process water, stormwater, and mine dewatering water associated with sand and gravel operations, rock quarries, and similar mining facilities. This includes stockpiles of mined materials, concrete batch operations, and hot mix asphalt operations. The permit applies within the TMDL coverage area.	The current permit is in effect until 10/1/15.
Where applicable, implement additional monitoring or source controls to prevent pollutants released into the watershed.	See Appendix C for specific requirements for each permit.	Ongoing

Table 31: Squaxin Island Tribe

Action	Comments	Schedule
Continue collaborating with watershed stakeholders and landowners to implement BMPs to reduce nonpoint pollution for non-permitted land use activities within the TMDL boundary.		Ongoing
Consult with EPA as needed		Ongoing
Source identification of fine sediment loading.	**Priority areas**: Banks and in the Deschutes River between Old Camp Lane and the Lake Lawrence tributary	
Identify and implement projects to improve or restore riparian and channel conditions or reduce sediments released into the watershed.	Apply for National Estuary Program (NEP) or other sources to fund this type of work. It is currently done on a case-by-case basis as grant funds are available. **Priority areas**: Deschutes River and Percival Creek	Ongoing as funding is available.

Table 32: Thurston Conservation District (TCD)

Action	Comments	Schedule
Work with landowners to encourage riparian restoration using native shrubs and trees.	Use the riparian assessment developed by the TCD in 2003-2007. It identified 40.6 miles of degraded riparian areas with potential for riparian restoration in Chambers Creek, the Deschutes River, East Bay, Ellis Creek, Percival Creek, and Spurgeon Creek. Maps developed included 1) degraded riparian LWD recruitment potential; 2) degraded riparian percent shade; and 3) degraded riparian vegetation composition. This work is currently funded through the Washington State Conservation Commission. The TCD has also applied for NEP funding to further their efforts.	Ongoing
Scope, vet, prioritize, fund, and implement riparian and channel restoration projects	Deschutes River and Percival Creek	Scope, vet, and prioritize in 2015. Fund and implement 2015 – 2030.
Identify and implement projects to reduce sediments released into the watershed.	The TCD has applied for NEP funding to fund this type of work. It is currently done on a case by case basis as funds are available.	Ongoing as funding is available.
Work with landowners with livestock or a commercial agricultural product (for example, hay, wheat, or vegetables) to identify (with a Nutrient Management or other equivalent plan) and implement best management practices (BMPs) that remove sources of fecal coliform bacteria and nutrients discharged to surface water or groundwater. Implementing BMPs is considered compliance with this TMDL.	The goal is for working lands to prevent or reduce over-application of nutrients on the land and encourage proper manure and stormwater management on-site. Recommended action: Routinely conduct nutrient soil testing to ensure prevention of over-applications. **Priority areas**: Deschutes River, tributaries to the Deschutes River, and tributaries to Budd Inlet.	Ongoing as funding is available.
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed

Table 33: Thurston County

Action	Comments	Schedule
Stormwater Related		
Action	**Comments**	**Schedule**
Comply with the Municipal Stormwater Phase II Western Washington General Permit, #WAR045025 to implement the permit obligations that address the TMDL-listed pollutants for the Deschutes TMDL. This includes, but is not limited to, public education and outreach; illicit discharge detection and elimination (IDDE); controlling runoff from new development, redevelopment, and construction sites; and municipal operations.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) within the National Pollutant Discharge Elimination System (NPDES) coverage area.	The current permit is in effect until 7/31/18.
Develop a plan to reduce nutrient, bacteria, and sediment loading with a schedule of prioritized projects to add to their stormwater management plan during the first permit cycle. The prioritized projects will need to be implemented during subsequent permit cycles.	Identify priority locations, scope, and projects.	Subsequent permit cycles
Work with existing commercial businesses to identify pollution sources and best management practices (BMPs) needed to prevent discharge of TMDL pollutants of concern to the MS4.	Continue to implement the Thurston County Hazardous Waste Management Plan (adopted July 2014) for existing businesses and new development. This plan includes the IDDE ordinance and applies to Thurston County and all local jurisdictions contained within.	Ongoing
On-site Sewage Systems (OSS) Related		
Action	**Comments**	**Schedule**
Provide oversight through the county's On-site Sewage System Operation and Maintenance Program of all septic systems with design flow 3500 gallons per day (gpd) or less throughout the county. *The only exception is for areas under tribal jurisdiction*.	Work is conducted by Thurston County Environmental Health.	Ongoing
Conduct and track investigations on known or suspected failing OSS based on complaints or unsatisfactory maintenance reports. Ensure all failing OSS are repaired using voluntary compliance or code enforcement.	Work is conducted by Thurston County Environmental Health.	Ongoing
Continue to implement and expand OSS operations and maintenance (O&M) program in accordance with the county's adopted OSS Management Plan.	This is an ongoing activity conducted by Thurston County Environmental Health.	Ongoing
In coordination with regional partners, develop and implement a strategy for converting OSS in high priority/high density neighborhoods within the urban area to sewer.	This includes examining wastewater treatment, disposal, and management alternatives. **Priority areas**: High priority areas identified in an adopted strategy within the Cities of Lacey, Olympia, and Tumwater, and the Urban Growth Area (UGA).	Planning: 2011-2016 Implementation Start Date: 2017
General		
Action	**Comments**	**Schedule**
Work with Ecology and other relevant partners to develop a groundwater model to evaluate the current impacts of nutrient in groundwater where there is a hydrologic connection with surface water. Use the model to inform growth management in priority areas.	**Priority areas**: Chambers Lake and other vulnerable groundwater sites in the Deschutes Watershed identified as gaining reaches in Sinclair and Bilhimer (2007).	As funding is available.

Implement a pet waste program at established pet recreation areas and work with other jurisdictions on a regional pet waste control program.	Continue to implement current program.	Ongoing
General		
Action	**Comments**	**Schedule**
Investigate complaints of shoreline and critical area ordinance violations, and achieve compliance where violations are occurring.		Ongoing
For Class IV forest practice permits, require erosion control and buffers in accordance with the Critical Area Ordinance, and require restoration where damage has occurred.		Ongoing
Identify agriculture-related pollution sources and initiate corrective actions in cooperation with the Thurston Conservation District.	NEP Round 4 grant awarded April 2014	7/1/14 – 10/31/16
Evaluate current land use and potential future development throughout the watershed based on existing zoning and regulations. Consider adjusting accordingly to improve and protect water quality.	NEP Round 4 grant awarded April 2014	2014-2016
Conduct ambient water quality and quantity monitoring on the Deschutes River and tributaries within the watershed.	Monthly stream monitoring at three sites on the Deschutes River, five tributaries to the river, and two tributaries to Budd Inlet.	Ongoing as funding is available
Conduct source identification of potential bacteria pollutants by extending the County's existing IDDE program field screening methodology, (consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.c.i), to include the portion of the County's jurisdiction in the Deschutes TMDL area falling outside its municipal stormwater permit coverage area. These could include agricultural operations, recreational use, and homeless encampments. If the bacteria pollutant sources are identified, the County will implement a compliance strategy consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.	Designated priority areas for illicit discharge detection and elimination routine field screening include: *Deschutes River watershed*: Vail Cutoff Rd. SE *Budd Inlet tributaries within the Phase II permit boundary*: Adams, Butler, Ellis, and Percival Creeks	To be determined
Identify and implement projects to improve or restore riparian and channel conditions or reduce sediments released into the watershed. Use existing programs to identify projects which will improve or restore riparian and channel conditions, or reduce sediments released into the watershed, and implement in partnership with restoration organizations.	Apply for National Estuary Program (NEP) or other sources to fund this type of work. It is currently done on a case-by-case basis as grant funds are available. **Priority areas**: Deschutes River and Percival Creek located within the county's jurisdictional boundary.	Ongoing as funding is available.
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed
Explore options with Ecology and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells along with other surface and groundwater uses in the Deschutes Watersheds and, if deemed appropriate, initiate an Instream Flow Rulemaking process.	Deschutes Watershed	Begin by 2020

Table 34: Tumwater, City of

Stormwater Related		
Action	**Comments**	**Schedule**
Comply with the Municipal Stormwater Phase II Western Washington General Permit, #WAR045020 to implement the permit obligations that address the TMDL-listed pollutants for the Deschutes TMDL. This includes, but is not limited to, public education and outreach; illicit discharge detection and elimination (IDDE); controlling runoff from new development, redevelopment, and construction sites; and municipal operations and maintenance.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) within the National Pollutant Discharge Elimination System (NPDES) coverage area. .	The current permit is in effect until 7/31/18.
Stormwater control and management: Identify locations where stormwater controls are needed using stormwater runoff models or other acceptable methods. Develop a plan to reduce nutrient, bacteria, and sediment loading with a schedule of prioritized projects to add to stormwater management plan during the first permit cycle. The prioritized projects will need to be implemented during subsequent permit cycles.	Projects could include: management of pet waste, wildlife, or homeless encampments. Provide stormwater treatment for currently untreated impervious surfaces; require stormwater retrofits as a condition of property development; and develop targeted pollutant source control program. Applies to the NPDES permit coverage area. Time is needed to gather information, develop design based on a prioritized schedule, followed by construction. Progress is dependent on available funding.	Start plan development: 2016 Rolled into next permit cycle: 2018
Work with commercial businesses to identify pollution sources and best management practices (BMPs) needed to prevent discharge of TMDL pollutants of concern to the MS4.	Continue to implement local source control plans for new development in the NPDES permit coverage area. Include educational outreach and technical assistance to ensure property owners or designees are adequately trained to implement the BMPs.	Continue implementation under the Phase II permit requirements
Develop and implement plan to identify and fix any cross-connections to the MS4 within the Tumwater city limits.	NPDES permit coverage area within the TMDL boundary. Priority contaminant is fecal coliform bacteria.	Ongoing activities already required in the Phase II permit
Reduce anthropogenic sources of heat. Possible actions include: retrofit stormwater outfalls to retain runoff and encourage infiltration; evaluate runoff from large areas of impervious surface, with focus on on-site retention and infiltration; or where feasible, increase native vegetative cover in sensitive areas.	**Priority area**: City of Tumwater's Phase II permit area within Percival Creek and Deschutes River watersheds.	Analysis and project identification: 2017-2018

On-Site Sewage System (OSS) Related		
Action	**Comments**	**Schedule**
In coordination with regional partners, develop and implement a strategy for converting on-site septic systems (OSS) in high priority/high density neighborhoods within the urban areas to sewer.	This includes examining wastewater treatment, disposal, and management alternatives. **Priority area**: High priority areas identified in an adopted strategy within the city and Urban Growth Area (UGA).	Planning: 2011-2016 Implementation start date: 2017
General		
Action	**Comments**	**Schedule**
Evaluate current land use and potential future development in the watershed based on existing zoning and regulations. Consider adjusting accordingly to improve and protect water quality.	Tumwater city limits (regulated and jurisdictional boundary) Additional funding is needed to model Tumwater's part of the basin and identify work done by Thurston County or other stakeholders.	2018
Identify and implement projects to improve or restore riparian and channel conditions that reduce stream temperatures or reduce sediments released into the portions of the Percival Creek and Deschutes River watersheds within the city's jurisdiction. Use existing programs to identify projects which will improve or restore riparian and channel conditions, or reduce sediments released into the watershed, and implement in partnership with restoration organizations.	Apply for National Estuary Program (NEP) or other sources to fund this type of work. It is currently done on a case-by-case basis as grant funds are available. **Priority area**: City-owned properties within Percival Creek or Deschutes River watersheds.	Ongoing as funding is available.
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed

Table 35: U.S. Environmental Protection Agency (EPA)

Action	Comments	Schedule
Provide funding through the National Estuary Program (NEP), Watershed Funding and Resources, and Federal Clean Water Act Section 319 Nonpoint Source Funds.	Coordinate efforts through the Puget Sound Partnership (PSP) and the Department of Ecology to fund projects targeting pollution prevention from urban stormwater runoff, and protecting and restoring habitat.	Ongoing

Table 36: U.S. Forest Service (USFS) Region 6

Action	Comments	Schedule
Reduce anthropogenic sources of heat. Possible actions include: retrofit stormwater outfalls to retain runoff and encourage infiltration; evaluate runoff from large areas of impervious surface, with focus on on-site retention and infiltration; or where feasible, increase native vegetative cover in sensitive areas.	**Priority area**: Percival Creek watershed	Analysis and project identification: 2017-2018
Bridge installation and replacement; culvert replacement and upgrade; road construction, reconstruction, and decommissioning.	These actions were identified in Attachment A of the Memorandum of Agreement (MOA) between the USDA Forest Service, Region 6, and the WA State Department of Ecology in 2000. The intent of the MOA is meet environmental responsibilities	Ongoing

	on federally owned forest lands under federal and state water quality laws. This applies to all National Forest System lands within the TMDL coverage area.	

Table 37: Washington State Department of Agriculture (WSDA)

Action	Comments	Schedule
Enforce the Dairy Nutrient Management Act (Ch. 90.64 RCW). Respond to dairy complaints.	Routine dairy inspections are conducted every 18 to 22 months to ensure compliance with the Dairy Nutrient Management Act and to provide regulatory technical assistance.	Ongoing
Environmental Complaint Response for nonpoint sources. Pursue enforcement action when necessary.	The WSDA addresses and tracks complaints Through Ecology's Environmental Report Tracking System (ERTS). Compliance responses may include regulatory technical assistance, informal enforcement, or formal enforcement.	Ongoing
Evaluate the overall facility and manure management for any operational dairies to confirm they are using appropriate BMPs consistent with the water quality objectives for fecal coliform bacteria, temperature, DO, pH, and fine sediments.	Identify dairy locations specific to river reaches. If there is evidence the BMPs are not sufficient to eliminate the contribution of fecal coliform bacteria to the Deschutes River watershed, additional BMPs are required. **Priority area**: Hwy 507 near Vail Rd.	Ongoing

Table 38: Washington State Department of Ecology (Ecy)

Action	Comments	Schedule
Enforce the Water Pollution Control Act (Ch. 90.48 RCW).	Watershed wide	Ongoing
Provide funding opportunities through its competitive water quality grants and loan funding cycle, to projects addressing the objectives and BMPs identified in this TMDL.	Watershed wide	Ongoing
Environmental Complaint Response for nonpoint sources, including non-dairy agriculture complaints. Pursue enforcement action when necessary.	Watershed wide	Ongoing
Coordinate with commercial or industrial dischargers to municipal stormwater collection systems to identify pollution sources and BMPs needed to prevent discharge of pollutants to the MS4 or directly to streams, rivers, or lakes within the TMDL boundary.	Watershed wide	Ongoing
Effectiveness Monitoring Pilot Project to study macroinvertebrates, periphyton, and related habitat indicators to evaluate the effectiveness of actions already taken to improve water quality in the Deschutes River.	The pilot project was completed in 2014. The project report will recommend a long-term effectiveness monitoring plan for the Deschutes River watershed to be implemented in 2020.	Report due 2015.
Conduct TMDL effectiveness monitoring to determine if implemented best management practices are working.	Watershed wide	2020
Hold Adaptive Management meetings with affected stakeholders to make adjustments to the implementation actions where needed.	Watershed wide	Begin 2020 or earlier as needed

Action	Comments	Schedule
Source identification of potential bacteria pollutants.	Possible sources include agricultural operations, recreational use, and homeless encampments. **Priority areas**: *Deschutes River watershed*: Route 507; Old Camp Lane; Vail Cutoff Rd. SE *Budd Inlet tributaries*: Adams, Butler, Ellis, Indian, Mission, and Percival Creeks *Percival Creek watershed*: Near Black Lake Ditch confluence	To be determined
Conduct inspections of stormwater sites and other permitted facilities. This includes the Municipal Stormwater Phase II, Construction Stormwater, Sand and Gravel, and Industrial Stormwater General Permits.	Watershed wide	Ongoing
Track implementation actions identified in this plan.	Watershed wide	Ongoing
Conduct and implement a TMDL or straight to implementation project addressing total phosphorus for Lake Lawrence.	Lake Lawrence	To be determined
Working in coordination with watershed stakeholders, or through implementation of the State Nonpoint Source Pollution Strategy, Ecology will scope, vet, prioritize, fund, and implement riparian and channel restoration projects	Deschutes River and Percival Creek	Scope, vet, and prioritize in 2016. Fund and implement 2016 – 2030.
Map cool water sources identified in the TIR imagery from flow depletion or temperature increases.	Future fisheries surveys may characterize these sites further as thermal refugia. Applies watershed wide.	2016
Evaluate Deschutes River tributaries for future nutrient reduction strategies. Quantify upstream nutrient sources in these areas.	**Priority areas**: Ayer/Elwanger, Chambers, Reichel, and Spurgeon Creeks, Tempo Lake, unnamed creek at RK 64, and Lake Lawrence outlet	Begin 2020
Oversee implementation of the Forest and Fish Program.	Coordinated efforts with national, state, and commercial forest land owners in the watershed. This includes helping to fund and conduct scientific research under the Cooperative Monitoring, Evaluation, and Research (CMER) committee.	Ongoing
Explore options with the county and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells along with other surface and groundwater uses in the Deschutes Watersheds and, if deemed appropriate, initiate an Instream Flow Rulemaking process.	Deschutes Watershed	Begin by 2020

Table 39: Washington State Department of Enterprise Services (DES)

Action	Comments	Schedule
Comply with the Municipal Stormwater Phase II Western Washington General Permit, #WAR045210. This includes, but is not limited to, public education and outreach; controlling runoff from new development, redevelopment, and construction sites; municipal operations and maintenance; and compliance with TMDL requirements.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) within the National Pollutant Discharge Elimination System (NPDES) coverage area.	The current permit is in effect until 7/31/18.

Table 40: Washington State Department of Health (DOH)

Action	Comments	Schedule
Provide oversight for on-site sewage systems with design flow greater than 3500 gallons per day (gpd). These are referred to as Large On-site Sewage Systems (LOSS).	More information is available online at www.doh.wa.gov/CommunityandEnvironment/WastewaterManagement/LOSSProgram.	Ongoing
Provide oversight and technical assistance for small on-site sewage systems, also known as septic systems. These have flows of less than 3500 gallons per day (gpd).	More information is available online at www.doh.wa.gov/CommunityandEnvironment/WastewaterManagement/OnsiteSewageSystemsOSS.	Ongoing

Table 41: Washington State Department of Natural Resources (DNR)

Action	Comments	Schedule
Oversee forest practices and maintain the rules and adaptive management programs.	More information is available at www.dnr.wa.gov/programs-and-services/forest-practices.	Ongoing
Improve or develop system potential shade on state-owned or managed lands, including aquatic lands. This can be achieved through maintaining or enhancing current riparian conditions, incorporating stream channel improvements and riparian protections in timber harvest plans, employ harvest strategies to enhance tree heights and keep current vegetation densities in riparian management zones, reducing stream width and revegetate or stabilize exposed gravel bar areas, increase channel complexity, revegetate exposed streambank and riparian areas, and condition shoreline development permits to maintain adequate riparian values and function. Ensure compliance with all forest practices rules and regulations.	**Priority areas**: Upper Deschutes Falls, 1000 Rd., Old Camp Lane, Vail Cutoff Rd., Vail Loop Rd., State Route 507, Waldrick Rd., Rich Rd.	Ongoing
Provide oversight and technical assistance to protect water quality and aquatic and riparian-dependent species on non-Federal forestlands in Washington.	This includes complying with the Forests and Fish Report which addresses restoring and maintaining riparian habitat to support a harvestable supply of fish, meeting the requirements of the Clean Water Act for water quality, and keeping the state timber industry economically viable.	Ongoing

	Information about the Forest Practices Habitat Conservation Plan is available at www.dnr.wa.gov/programs-and-services/forest-practices/forest-practices-habitat-conservation-plan.	
Provide technical assistance for small forest landowners, including information related to forest management and accessing publicly funded programs.	More information is available at www.dnr.wa.gov/programs-and-services/forest-practices/small-forest-landowner-office.	Ongoing

Table 42: Washington State Department of Transportation (WSDOT)

Action	Comments	Schedule
Comply with all requirements of WSDOT National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater General Permit, #WAR043000 that address the TMDL-listed pollutants.	The next permit revision is anticipated to include Deschutes River basin TMDL requirements. The permit applies to areas served by municipal separate storm sewer systems (MS4s) owned or operated by WSDOT in areas covered by the Western Washington Phase II Municipal Stormwater permit. See Appendix C for specific requirements.	The current permit is in effect until April 5, 2019.
If discharges of pollutants addressed in this TMDL occur outside of WSDOT's stormwater permit area (but within the TMDL boundary), WSDOT will implement best management practices (BMPs) included in the Highway Runoff Manual (HRM).	TMDL areas outside of the permit coverage area	Ongoing as needed
If stormwater discharges that transport fecal coliform over natural background levels to listed receiving waters are found from sources within WSDOT's right-of-way, WSDOT will apply BMPs from their SWMPP or perform remediation to correct bacteria discharges. For run-on sources of bacteria identified by WSDOT that are from outside of WSDOT's right-of-way, WSDOT will notify Ecology and work cooperatively with Ecology, the local jurisdiction, and other parties involved for their resolution.	Permit coverage area	Ongoing
If evidence exists demonstrating the WSDOT is a significant contributor of pollutants addressed in this TMDL, or this evidence becomes available in the future, stormwater retrofits at specific locations may be appropriate.	Permit coverage area	Ongoing
Participate in Adaptive Management process.	Work with Ecology to identify implemented actions which were ineffective and look for alternatives.	Begin 2020 or earlier as needed

Table 43: Washington State University (WSU) Stormwater Center

Action	Comments	Schedule
Work with businesses to help them comply with regulations using a watershed based approach.	For example, work with golf courses on how to manage their stormwater and fertilizer use.	As needed or when the opportunity exists
Work with businesses to develop or identify best management practices (BMPs) to proactively address stormwater.	For example, shopping centers/strip malls with garden centers with fertilizers and plants and their exposure to rainwater.	As needed or when the opportunity exists

Table 44: Washington State University (WSU) Thurston County Extension Office

Action	Comments	Schedule
Assist stakeholders to provide information on water quality improvement best management practices (BMPs).	Examples include Low Impact Development (LID), sustainable landscaping, riparian restoration, and stormwater management.	As opportunities are available
Train volunteers to become Stormwater Stewards to help local residents better manage their stormwater.	This program began in 2012 and is ongoing.	Ongoing
Conduct annual workshops to provide technical assistance to local residents and property owners.	"Naturescaping for Water and Wildlife", "Beyond Landscaping: Marine & Riparian Revegetation", and rain garden design and installation.	Annually

Forest practices

The state's forest practices regulations will be relied upon to bring waters into compliance with the load allocations established in this TMDL on private and state forest lands. This strategy, referred to as the Clean Water Act (CWA) Assurances, was established as a formal agreement to the 1999 Forests and Fish Report (www.dnr.wa.gov/Publications/fp_rules_forestsandfish.pdf).

The state's forest practices rules were developed with the expectation that the stream buffers and harvest management prescriptions were stringent enough to meet state water quality standards for temperature and turbidity, and provide protection equal to what would be required under a TMDL. As part of the 1999 agreement, new forest practices rules for roads were also established and implementation of new methods began in 2001. These new road construction and maintenance standards are intended to provide better control of road-related sediments, provide better stream bank stability protection, and meet current best management practices. They are included in the Road Maintenance and Abandonment Plans (RMAPs). All forest landowners are required to complete their road and culvert improvements by 2021. Forest landowners are required to improve their forest roads to protect public resources, including water, fish, and wildlife habitat.

To ensure the rules are as effective as assumed, a formal adaptive management program was established to assess and revise the forest practices rules, as needed. The agreement to rely on the forest practices rules in lieu of developing separate TMDL load allocations or implementation requirements for forestry is conditioned on maintaining an effective adaptive management program.

Consistent with the directives of the 1999 Forests and Fish agreement, Ecology conducted a formal 10-year review of the forest practices and adaptive management programs in 2009: www.ecy.wa.gov/programs/wq/nonpoint/ForestPractices/CWAassurances-FinalRevPaper071509-W97.pdf.
More information related to Nonpoint Pollution from Forestry is available at www.ecy.wa.gov/programs/wq/nonpoint/ForestPractices.html.

Ecology noted numerous areas where improvements were needed, but also recognized the state's forest practices program provides a substantial framework for bringing the forest practices rules and forestry activities into full compliance with the water quality standards. Therefore, Ecology decided to conditionally extend the CWA assurances with the intent to stimulate the needed improvements. Ecology, in consultation with key stakeholders, established specific milestones for program accomplishment and improvement. These milestones were designed to provide Ecology and the public with confidence that forest practices in the state will be conducted in a manner that does not cause or contribute to a violation of the state water quality standards.

State Environmental Policy Act (SEPA) and land use planning

Local governments should consider TMDLs during State Environmental Policy Act (SEPA) and other local land-use planning reviews. If the land-use action under review is known to potentially impact temperature and dissolved oxygen as addressed by this water cleanup plan, then the project may have a significant adverse environmental impact. SEPA lead agencies and reviewers are required to look at potentially significant environmental impacts and alternatives, and to document that the necessary environmental analyses have been made. Land-use planners and project managers should consider findings and actions in this water cleanup plan to help prevent new land uses from violating water quality standards. Additionally, the water cleanup plan should be considered in the issuance of land use permits by local authorities. More information about SEPA is available online at www.ecy.wa.gov/programs/sea/sepa/faq.htm.

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Measuring Progress toward Goals

Ecology will convene meetings of a stakeholder advisory committee to review and track water quality and implementation actions completed. This coordination with affected stakeholders will begin in 2017 and continue annually or as needed until the water quality goals for this project are reached by 2030. The purpose is to share information on the condition of the water quality in the Deschutes River, Percival Creek, and Budd Inlet tributaries. Key discussion items will include the status of implementation actions, water quality data, regulatory changes, new and innovative ideas, and potential funding sources. Ecology will work cooperatively with the stakeholders to help direct or redirect the adaptive management of this water cleanup plan.

Ecology will continue to offer grant funding through its annual grant and loan application process for water quality studies, stream restoration projects, BMP implementation, and for the development and implementation of monitoring programs.

To comply with this TMDL, all BMPs must be in place to address dissolved oxygen, pH, fine sediments, and temperature by the end of 2030. The success of this TMDL project will be assessed using monitoring data from streams in the watershed.

Performance measures and targets

Compliance with state water quality standards for fecal coliform bacteria should be achieved by 2030. However, full restoration of riparian zones and active channels will take longer. Table 45 identifies performance measures and targets by parameter.

Table 45: Performance measures and targets by parameter

Parameter	Measure	Target
Fecal coliform bacteria	Instream fecal coliform concentrations	Meet water quality standards during summer, winter, and storm conditions by 2030
Temperature	Percent river miles restored or canopy cover achieved	20% by 2020; 50% by 2030; 100% by 2065
	Instream temperature	Meets standards by 2065
DO, pH, and nutrients	Temperature	Achieve riparian restoration targets for temperature
	Instream values	Achieve system potential DO and pH by 2065
Fine sediments	Percent upper watershed controls in place	100% by 2030
	In situ fine sediment concentrations	Meets full mature riparian vegetation levels by 2065

Ecology will consider affected stakeholders in compliance if all appropriate BMPs have been implemented and are being operated and maintained correctly by 2030. Ecology recognizes it will take more years for vegetation to achieve full mature riparian shade.

Implementation actions will be tracked annually through meetings with the affected stakeholders beginning in 2016. Tracking will help identify and determine:

- What activities were performed and where they occurred.
- Whether the actions work and can they be applied elsewhere.

- What practices should be considered for adaptive management.
- Whether there resource limitations or other factors preventing some actions from occurring.
- Whether this implementation plan is adequate to meet water quality standards.
- If interim targets are met.

A monitoring program for evaluating progress is an important component of any implementation plan. Monitoring is needed to keep track of what activities have been done, measure the success or failure of actions, and evaluate if water quality standards are achieved. Monitoring should continue after attaining the water quality standards to ensure implementation measures are effective, remain in place, and the water bodies continue to meet the water quality standards.

Monitoring is required midway through the implementation progress to see if interim goals are being met. Ecology will conduct interim monitoring when enough implementation actions have been completed to anticipate achieving the specific reduction targets for temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediments. Ecology will monitor the progress of implementation through the yearly meeting with the affected stakeholders. Ecology will use information gathered through monitoring to ensure the Deschutes River, Percival Creek and its tributaries, and the Budd Inlet tributaries are on track for meeting the 2030 schedule to achieve meeting the water quality standards.

Effectiveness monitoring plan

Effectiveness monitoring determines if the interim targets and water quality standards have been met after the measures described in the water quality implementation plan are functioning. This plan includes monitoring conducted by other entities if there is any planned.

Related to this project, Ecology staff developed an Effectiveness Monitoring Pilot Project to study macroinvertebrates, periphyton, and related habitat indicators to evaluate the effectiveness of actions already taken to improve water quality in the Deschutes River. Ecology is using the study design as a supplement to routine chemical parameters currently used for monitoring TMDL effectiveness. The goals of the monitoring project are to summarize and link watershed-based cleanup efforts to responses in biological communities (macroinvertebrate and periphyton) and habitat. One objective for this study is to collect baseline macroinvertebrate, periphyton, habitat, and water quality data to distinguish between natural and anthropogenic (human-caused) variables that affect changes in biological communities over time.

The Deschutes River Multi-Parameter Total Maximum Daily Load Effectiveness Monitoring Pilot Project, Water Quality Design (Quality Assurance Project Plan), Publication No. 09-03-133, was published in December 2009. It is available online at https://fortress.wa.gov/ecy/publications/SummaryPages/0903133.html. After this pilot project is completed, a final report describing the study results will be posted on Ecology's website. In addition, in 2011 Ecology staff developed and presented a poster: "Using biological and habitat metrics to determine the effectiveness of TMDLs: A Case Study" which is available online at https://fortress.wa.gov/ecy/publications/SummaryPages/1203033.htm.

Ecology will convene a meeting annually, beginning in 2016, with the affected stakeholders, to track monitoring activities completed. Monitoring to determine the quality of water after implementation has occurred will be needed to determine whether water quality standards have been achieved, and to help with adaptive management decisions if standards have not been met. The product of this work will be the long-term effectiveness monitoring plan for the Deschutes River watershed, including fecal coliform bacteria, temperature, DO, pH, fine sediments, related parameters, bioassessment, and habitat.

Entities with enforcement authority will be responsible for following up on any enforcement actions. Stormwater permittees will be responsible for meeting the requirements of their permits. Those conducting restoration projects or installing BMPs will be responsible for monitoring plant survival rates and maintenance of improvements, structures, and fencing.

Adaptive management

Natural systems are complex and dynamic. The way a system will respond to human management activities is often unknown and can only be described as probabilities or possibilities. Adaptive management involves testing, monitoring, evaluating applied strategies, and incorporating new knowledge into management approaches that are based on scientific findings. In the case of TMDLs, Ecology uses adaptive management to assess whether the actions identified as necessary to solve the identified pollution problems are the correct ones and whether they are working. As we implement these actions, the system will respond, and it will also change. Adaptive management allows us to fine-tune our actions to make them more effective, and to try new strategies if we have evidence that a new approach could help us to achieve compliance.

Significant reductions in sources should be achieved by 2030, although riparian and channel restoration will require decades to achieve a natural equilibrium. Adaptive management will be applied if effectiveness monitoring and evaluation at 5-year intervals beginning in 2020 does not show significant improvement towards meeting the assigned targets. These targets will be described in terms of percent source reductions, instream concentrations, and progress toward implementation activities. Partners will work together to monitor progress towards these goals, evaluate successes, obstacles and changing needs, and make adjustments to the implementation strategy as needed.

Ecology will use adaptive management when effectiveness monitoring data show that the TMDL project targets are not being met or implementation activities are not producing the desired result. A feedback loop (Figure 34) consisting of the following steps will be implemented:

Step 1. The activities in the water quality implementation plan are put into practice.

Step 2. Programs and best management practices (BMPs) are evaluated for technical adequacy of design and installation.

Step 3. The effectiveness of the activities is evaluated by assessing new monitoring data and comparing it to the data used to set the TMDL project targets.

Step 3a. If the goals and objectives are achieved, the implementation efforts are adequate as designed, installed, and maintained. Project success and accomplishments should be publicized and reported to continue project implementation and increase public support.

Step 3b. If not, then BMPs and the implementation plan will be modified or new actions identified. The new or modified activities are then applied as in Step 1.

Meeting targets for temperature, DO, and pH will require surrogate measures of restoration activities and interim targets beyond instream values. These programs, performance measures, and progress toward targets will require additional refinement over time during the adaptive management process.

Fine sediments reflect complex upper watershed processes and downstream transport. Adaptive management should focus on upper watershed source controls first. Downstream transport may require additional analyses once upstream controls are in place.

It is ultimately Ecology’s responsibility to assure that implementation is being actively pursued and water standards are achieved.

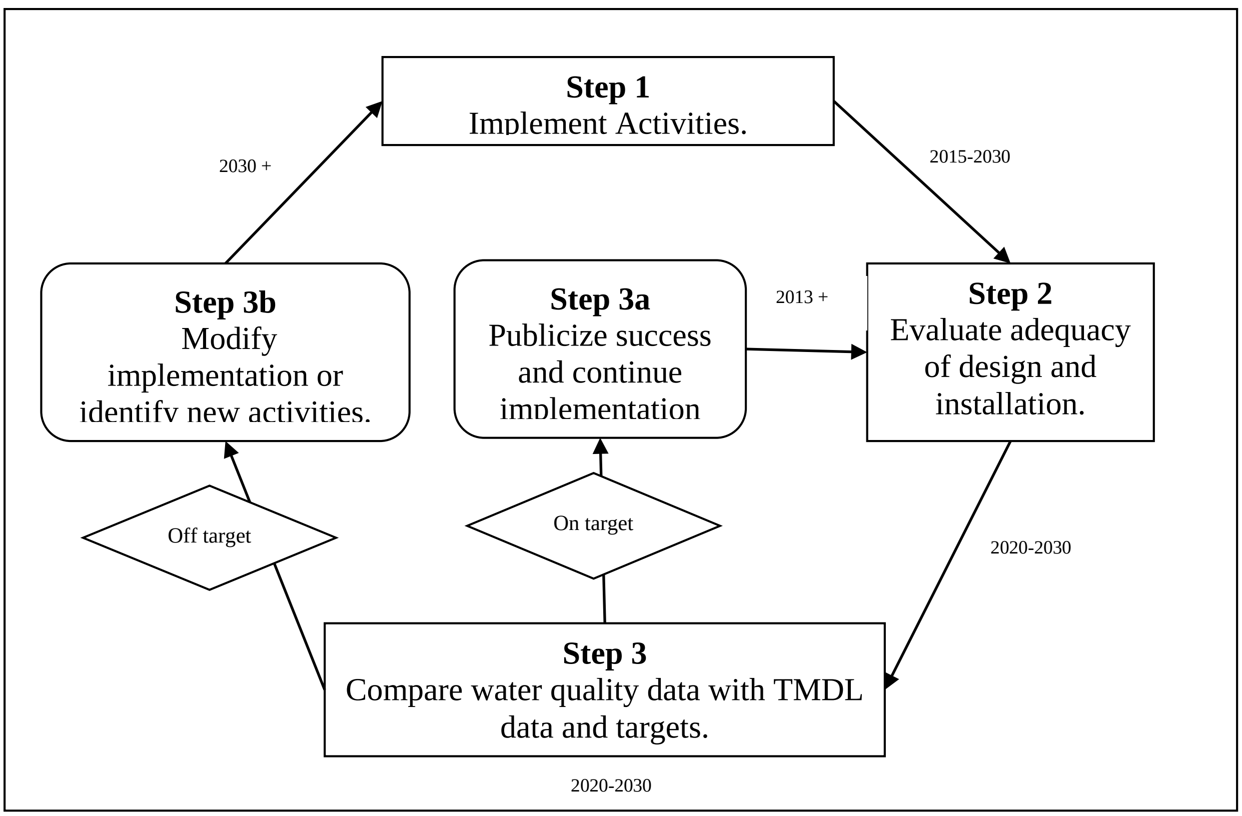


Figure 34: Feedback loop for determining need for adaptive management.

Dates are estimates and may change depending on resources and implementation status.

See the *Effectiveness Monitoring* section in this report.

Funding Opportunities

Financial assistance for water cleanup activities is available through various federal and state agencies; local government sources, including conservation districts; and selected public and not-for-profit sources. Ecology's Centennial Clean Water Fund, Section 319, and the Clean Water State Revolving Fund (CWSRF) grants and loans can provide funding to help implement this TMDL. In addition to Ecology's funding programs, there are many other funding sources available for watershed planning and implementation, point and nonpoint source pollution management, fish and wildlife habitat enhancement, stream restoration, and water quality education. Public sources of funding include federal and state government programs, which can offer financial as well as technical assistance. Private sources of funding include private foundations, which most often fund nonprofit organizations with tax-exempt status. Forming partnerships with other government agencies, nonprofit organizations, and private businesses can often be the most effective approach to maximize funding opportunities. Some of the most commonly accessed funding sources for TMDL implementation efforts are shown in Table 46.

The programs of each of the involved organizations have some base funding for implementing and monitoring costs. However, base funding is not adequate to meet the needs. Additional information about the sources included in this table is provided in Appendix D. More information about Ecology funding opportunities is available at www.ecy.wa.gov/programs/wq/tmdl/TMDLFunding.html.

Table 46: List of possible funding sources to support TMDL implementation.

Funding Source	Contact Information
Craft3 Septic Loans	
Funding Source	**Contact Information**
Craft3 *(formerly Enterprise Cascadia)*	877-480-5765, CleanWater@Craft3.org, or www.craft3.org/borrow/cleanwater
Puget Sound Partnership	
Funding Source	**Contact Information**
Public Involvement and Education Grants	Toll-free: 800-54-SOUND or 360-725-5444; www.psp.wa.gov
National Estuary Program funding to implement the Puget Sound Action Agenda	www.psp.wa.gov/epafunding.php
Thurston Conservation District (TCD)	
Funding Source	**Contact Information**
Washington State Conservation Commission (SCC)	Thurston Conservation District, 360-754-3588 or www.thurstoncd.org
United States Department of Agriculture (USDA)	
Funding Source	**Contact Information**
Conservation Reserve Enhancement Program (CREP)	Farm Service Agency (FSA), www.fsa.usda.gov/FSA
Conservation Reserve Program (CRP) Emergency Watershed Protection (EWP) Environmental Quality Incentives Program (EQIP)	Olympia Service Center and Rural Development Office, 360-704-7740; www.nrcs.usda/gov/programs/CRP, www.nrcs.usda.gov/programs/EWP, and www.nrcs.usda.gov/programs/EQIP
Rural Housing Repair and Rehabilitation Program	Olympia Area Office (serving Thurston County); 1835 Black Lake Blvd. SW, Suite C, Olympia, WA 98512-5716; 360-704-7760; www.rurdev.usda.gov/rhs/sfh/brief_repairloan.htm
Natural Resources Conservation Service programs including Wetland Reserve Program (WRP) and Wildlife Habitat Incentive Program (WHIP)	Washington NRCS West Area Field Office; 360-704-7740; www.nrcs.usda.gov
United States Environmental Protection Agency (U.S. EPA), Region 10	
Funding Source	**Contact Information**
Clean Water State Revolving Fund (CWSRF)	www2.epa.gov/cwsrf
National Estuary Program (NEP) Grants and Funding	www.epa.gov/pugetsound/funding/
Watershed Funding and Resources	www.yosemite.epa.gov/r10/ecocomm.nsf/webpage/Funding+and+Resources; www.water.epa.gov/aboutow/owow/funding.cfm
Washington State Department of Ecology (Ecology)	
Funding Source	**Contact Information**
Centennial Grants	www.ecy.wa.gov/programs/wq/funding/fundprgms/Cent/oppCent.html
Clean Water Act (CWA) Section 319 Federal Grants	www.ecy.wa.gov/programs/wq/funding/FundPrgms/Sec319/oppSec319.html
Clean Water State Revolving Fund (CWSRF or SRF) Loans	www.ecy.wa.gov/programs/wq/funding/fundprgms/CWSRF/oppSRF.html
Stormwater Financial Assistance	www.ecy.wa.gov/programs/wq/funding/FundPrgms/Stormwater/oppSW.html
Washington State Department of Natural Resources (DNR)	
Funding Source	**Contact Information**
Forest Riparian Easement Program (FREP)	Small Forest Landowner Office, 360-902-1415; Email: sflo@dnr.wa.gov; www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_frep.aspx
Rivers and Habitat Open Space Program	Forest Practices Division; 360-902-1427; www.dnr.wa.gov
Washington State Recreation and Conservation Office	
Funding Source	**Contact Information**
Salmon Recovery Funding Board (SRFB)	360-902-3000; www.rco.wa.gov/srfb/board/board.htm

Summary of Public Involvement Methods

Ecology convened an Advisory Group in 2009. Since then a core group of key stakeholders invested considerable time and effort into the development of the Water Quality Improvement Report/Implementation Plan (WQIR/IP). Meeting attendees were encouraged to participate by providing information specific to their represented organizations, discussions and suggestions for meeting topics or additional technical work, or examples of activities or actions included in this report. Ecology appreciates the commitment, dedication, and input provided by this group.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

January 9, 2009

Mr. Sam Merrill, President
Black Hills Audubon Society
P.O. Box 2524
Olympia, WA 98507

Subject: Deschutes Watershed Cleanup Plan

Dear Mr. Merrill:

The Department of Ecology (Ecology) has begun work to develop a water cleanup plan for the Deschutes watershed. This area includes the Deschutes River, Budd Inlet, and Capitol Lake. We are now at a point where we need your help.

We are holding an introductory meeting on February 13 for potential advisory group members. We would appreciate your organization's involvement in this process. The enclosed documents provide more information about this project and how your organization can help.

Please contact the Ecology staff listed below by January 30 to confirm your organization's participation. This ensures we have enough seating and refreshments available for all attendees.

Lydia C. Wagner, TMDL Coordinator
Eastern Olympic Water Quality Management Area
Office: 360-407-6329
E-mail: LBLA461@ecy.wa.gov

Sincerely,

Kelly Susewind

Kelly Susewind, P.E., P.G.
Water Quality Program Manager

KS:LCW:kd

Enclosures:

- "Seeking Advisory Group Participants"
- Pamphlet – "Advisory Groups for Water Quality Improvement Projects"
- Recipient List

cc: Lydia C. Wagner, Ecology

Figure 35: Representative letter inviting potential advisory group members.

Hard Copy Recipients	
Representing	**Name & Title**
Black Hills Audubon Society	Sam Merrill, President
Capitol Land Trust	Eric Erler, Executive Director
Citizen	Sue Danver
Citizen	Nancy Partlow
City of Lacey	Greg Cuoio, City Manager
City of Olympia	Richard Hoey, Water Resources Business Director
City of Rainier	Ron Gibson, Public Works Director
City of Tumwater	Dan Smith, Water Resources Program Manager
Department of Agriculture	Bob Gore, Acting Director
Department of Fish & Wildlife	Phil Anderson, Acting Director
Department of General Administration	Linda Villegas, Director
Department of Health	Mary Selecky, Secretary
Department of Natural Resources	Peter J. Goldmark, Commissioner of Public Lands
Department of Transportation	Paula Hammond, Secretary
Deschutes Grange #222	President
Environmental Protection Agency	Dave Ragsdale
Gifford Pinchot National Forest	Ruth Tracy, Soil & Water Program Manager
Lott Alliance	Michael Strub, Executive Director
PCF Management Services, inc.	Fred Hines, Property Management Owner
People for Puget Sound	Kathy Fletcher, Executive Director
Port of Olympia	Ed Galligan, Executive Director
Puget Sound Partnership	David Dicks, Executive Director
Squaxin Island Tribe	David Lopeman, Tribal Chairman
Thurston Conservation District	Kathleen Whalen, District Administrator
Thurston County	Don Krupp, Chief Administrative Officer
Weyerhaeuser Company	Steven Rogel, Chairman
Wild Fish Conservancy Northwest	Jamie Glasgow, Director of Science & Research
WSU Mason County Extension	Bob Simmons, Director
WSU Thurston County Extension	Cliff Moore, Director

E-mail Recipients	
Representing	**Name**
City of Lacey	Julie Rector
City of Olympia	Marc Blosser
City of Olympia	Andy Haub
City of Olympia	Vince McGowan
City of Olympia	Joe Roush
City of Tumwater	Debbie Smith
Consultant	Linda Hoffman
Consultant	Elizabeth McManus
Department of Agriculture	Virginia Prest
Department of Fish & Wildlife	Rich Eltrich
Department of Fish & Wildlife	Hal Michal
Department of General Administration	Jim Erskine
Department of General Administration	Nathaniel Jones
Department of Transportation	Mike Stephens
Lott Alliance	Ken Butti
Lott Alliance	Lisa Dennis-Perez
Lott Alliance	Karla Fowler
Port of Olympia	Don Bache
South Sound Green	Anne Mills
Squaxin Island Tribe	Jeff Dickison
Squaxin Island Tribe	John Konovsky
Thurston County Environmental Health	Jim Bachmeier
Thurston County Environmental Health	Sue Davis
Thurston County Environmental Health	Rachel Laderman
Thurston County Environmental Health	Barb Wood
Thurston County Water Resources	Mark Swartout
Thurston Public Utility District	John Weidenfeller
Thurston Regional Planning Council	Steve Morrison
U.S. Forest Service	Steve Wondzell
Weyerhaeuser Company	Bob Bilby
Weyerhaeuser Company	Ken Johnson
Weyerhaeuser Company	Julie Keough
WSU Mason County Extension	Emily Sanford
WSU Thurston County Extension	Karen Janowitz

Figure 36: Advisory Group outreach effort:

The letter from Figure 35 was sent to these individuals and entities.

Focus on Deschutes Watershed

DEPARTMENT OF ECOLOGY
State of Washington

Water Quality Program **January 2009**

Seeking Advisory Group Participants

Are you interested in the water quality and health of the Deschutes River, Capitol Lake, and Budd Inlet? If you are, then Ecology has an opportunity for you!

Q: What is the purpose of the advisory group?

A: The purpose of the advisory group is to assist the Department of Ecology (Ecology) in developing a water quality summary implementation strategy (SIS) as part of a water quality improvement project (also known as a Total Maximum Daily Load study, or TMDL) underway for the Deschutes River, Capitol Lake, and Budd Inlet. The SIS is a clear and concise plan about how to meet water quality standards by reducing pollution. A successful SIS identifies the entities needed (**who**) to accomplish tasks and activities

MORE INFORMATION

Advisory Group Meeting

February 13, 2009
9 a.m. – noon
Lacey Community Center
6729 Pacific Ave. S.E.
Lacey

If you plan to attend, please contact us by January 30.

Contact information:

Lydia C. Wagner
360-407-6329
LBLA461@ecy.wa.gov

Figure 37: Focus sheet outreach for Advisory Group participants.

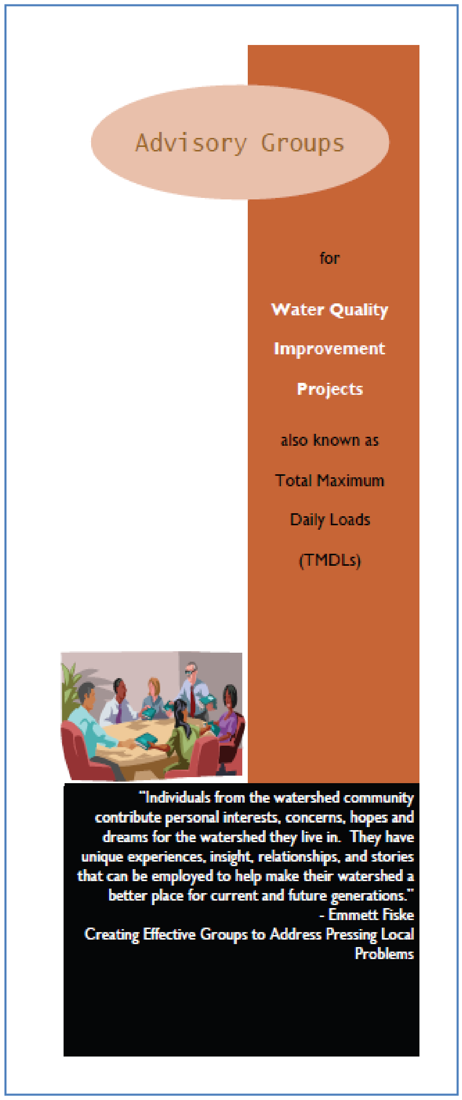


Figure 38: Brochure outlining Advisory Group expectations (Ecology publication #05-10-101).

Table 47: List of Advisory Group meetings

2009	2010	2011	2012	2013	2014
Feb 13	Jan 12	Jan 27	Jan 26	Jan 24	Jan 20
Mar 26	Apr 15	Mar 31	Feb 23	Feb 28	Feb 27
Apr 22	May 20	Apr 28	Mar 22	Mar 28	Jun 26
Jun 4	Jul 15	May 26	May 24	Jun 27	Oct 30
Jul 23	Aug 19	Jul 28	Jul 26	Sep 26	Nov 20
Sep 29	Sep 30	Aug 25	Nov 15	Nov 21	
Nov 17	Nov 9	Sep 22	Dec 13		
		Oct 27			
		Nov 17			

During these meetings time was spent educating participants on environmental issues related to the Deschutes River and Budd Inlet watersheds and Capitol Lake. The following list provides an overview of the key topics by year.

2009: Technical Study overview; process and group structure overview; Clean Water Act Assurances for Forest Practices; Forest and Fish Rules; working forests challenges; Road Maintenance and Abandonment Plans (RMAP) program; water typing; sustainable forest management; and general upper watershed issues.

2010: Thurston County land use and environmental review; New Zealand mud snails (invasive species); effectiveness monitoring pilot project; Sand and Gravel General Permit overview; Thurston County Critical Areas Ordinance; riparian restoration examples and education/outreach efforts; Thurston County watershed characterization study; reverse auction grant idea; ambient monitoring pilot project; dairy operations and the Dairy Nutrient Management Program; conservation efforts; nonpoint source compliance and enforcement; state water use laws and the groundwater permit exemption; contaminant fate and transport modeling for nitrate impacts; on-site sewage systems; Woodland Creek pollutant load reduction project; and general middle watershed issues.

2011: LOTT Clean Water Alliance presentation on Cleaning and Restoring Water for our Communities; Budd Inlet treatment plant tour; presentation by the Capitol Lake Improvement and Protection Association (CLIPA); presentation by the Deschutes Estuary Restoration Team (DERT) presentation; observations from the Squaxin Island Tribe on the Deschutes River fall chinook run as it relates to Capitol Lake; upstream priorities for salmonid habitat improvement; city of Olympia Storm and Surface Water Program; state stormwater regulations; municipal stormwater general permit overview; septic systems and water quality; nitrogen removal and LOTT's impact on Budd Inlet; modeling to help determine load and wasteload allocations; dissolved oxygen model scenarios; Thurston County projects and programs in the Budd/Deschutes watershed; riparian restoration along the Black Lake Ditch; implementation strategy components; and general middle and lower watershed issues.

2012: Technical study update; potential management scenarios to evaluate with modeling tools; Deschutes River-oriented, Budd Inlet/Capitol Lake-oriented, and Capitol Lake-oriented potential model runs; presentation about the Hardel Mutual Plywood Cleanup site; model scenario results for the Deschutes River watershed, Budd Inlet, and Capitol Lake; and discussions on establishing load and wasteload allocations throughout the watershed.

2013: Establishing load and wasteload allocations; potential grant and loan funding opportunities; discussions regarding implementation actions; Budd Inlet model results; South Puget Sound Dissolved Oxygen Study; mapping Deschutes River/Budd Inlet load and wasteload allocations; proposed GIS nutrient and on-site septic systems analysis; stormwater permits and their crossover with the water cleanup plan and wasteload allocations.

2014: Concerns expressed by the Thurston County Commissioners and Ecology's response; stormwater wasteload allocations; implementation actions; the decision to take a phased approach to this water cleanup plan; evaluation of on-site septic system (OSS) nitrogen removal technologies; Hood Canal area nitrogen removal pilot project; Chesapeake Bay TMDL; city of Olympia Shoreline Master Program update; Capitol Lake/Budd Inlet technical discussion; Deschutes River, and Capitol Lake, and Budd Inlet TMDL Study – Supplemental Modeling Scenarios; and review of the draft Water Quality Improvement Report/Implementation Plan.

Table 48: List of Advisory Group meeting attendees

(Representation as noted on sign-in sheets).

Representing	Name	Meetings Attended
Agriculture (WSDA), WA State Dept. of	Mena, Nora	11/9/10
	Prest, Virginia (Ginny)	9/29/09
	Wick, Ann	2/13/09; 3/26/09; 7/23/09; 11/17/09; 1/12/10; 5/20/10; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10
Alliance for a Healthy South Sound (AHSS)	Byrne, Gabby	7/26/12
Black Hills Audubon Society	Danver, Sue	2/13/09; 3/26/09; 4/22/09; 9/29/09; 11/17/09; 1/12/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 4/28/11; 7/28/11; 8/25/11; 9/22/11; 11/17/11; 1/26/12; 3/22/12; 7/26/12; 11/15/12; 12/13/12; 1/30/14; 2/27/14; 11/20/14
Brown & Caldwell	Cleveland, Chris	3/26/09; 11/17/09
Capitol Lake Improvement and Protection Association (CLIPA)	Goddard, Jewel	3/31/11; 4/28/11
	Havens, Jack	11/17/09; 1/12/10; 5/20/10; 7/15/10; 1/27/11; 3/31/11; 3/31/11; 4/28/11; 12/13/12
	Holman, Bob	1/26/12; 2/23/12; 5/24/12; 11/15/12; 12/13/12; 2/28/13; 6/27/13; 9/26/13; 1/30/14; 10/30/14; 11/20/14
	Horton, Mark	1/27/11
	Larson, Gary	4/28/11; 7/28/11
	Wubbena, Robert	1/27/11; 4/28/11; 12/13/12
Capitol Land Trust	Malmberg, Paul	2/13/09
	Wiggin, Cathy	2/13/09
Citizens	Bibow, Ali	4/22/09
	DeMeyer, John	11/17/09; 1/12/10; 4/15/10; 5/20/10; 9/30/10; 11/9/10; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 11/20/14
	Holman, Bob	3/31/11; 4/28/11; 10/27/11
	Jaqua, Debra	4/28/11; 7/28/11; 8/25/11
	Kincaid, Melanie	4/28/11
	Larson, Gary	3/31/11; 5/26/11; 9/22/11
	Milne, David	9/26/13; 11/21/13; 1/30/14; 2/27/14
	Morrison, Steve	6/27/13; 9/26/13; 2/27/14; 10/30/14
	Newman, John	4/28/11
	Riener, Lisa	4/28/11
	Wheatley, Helen	10/27/11

Representing	Name	Meetings Attended
Deschutes Estuary Restoration Team (DERT)	Hartung, Zena	3/31/11; 9/22/11; 10/27/11
	Madrone, Dani	1/30/14
	Mitchell, Cliff	3/31/11; 4/28/11; 5/26/11; 10/27/11; 1/26/12; 3/22/12; 7/26/12; 11/15/12; 2/28/13; 1/30/14
	Patnude, Sue	1/27/11; 3/31/11; 4/28/11; 7/28/11; 11/17/11; 1/26/12; 7/26/12; 11/15/12; 12/13/12
	Peeler, Dave	8/25/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/14; 10/30/14; 11/20/14
Ecology (ECY), WA State Dept. of *(representing multiple programs)*	Ahmed, Anise	5/24/12; 11/15/12; 6/26/14
	Bailey, Chrissy	6/26/14
	Beers, Shawna	2/13/09; 1/27/11; 4/28/11; 2/23/12
	Bergman, Michael	3/26/09; 4/22/09
	Bergquist, Bob	9/22/11; 1/26/12; 7/26/12; 11/15/12; 1/24/13; 2/28/13
	Bilhimer, Dustin	9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/14; 10/30/14; 11/20/14
	Callender, Alex	12/14/10; 11/17/11; 12/13/12
	Collyard, Scott	4/15/10; 7/15/10
	Cox, Lisa	5/26/11; 7/26/12; 11/21/13; 1/30/14; 6/26/14
	Crane, Phil	7/15/10
	Cummings, Tonnie	4/15/10
	Dickes, Betsy	3/26/09; 4/22/09; 7/23/09; 4/15/10; 5/20/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 4/28/11; 8/25/11; 2/23/12; 11/21/13; 6/26/14
	Doenges, Rich	1/30/14; 6/26/14
	Dougherty, Dave	8/25/11; 7/26/12
	Farrell, Tracy	1/24/13
	Graber, Craig	9/29/09; 9/26/13
	Gray, Donovan	6/26/14
	Hancock, Kevin	6/26/14
	Hicks, Mark	11/17/09
	Hoffman, Chuck	2/13/09; 3/26/09; 4/22/09; 9/29/09; 11/17/09; 5/20/10; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 7/28/11; 9/22/11; 6/27/13; 6/26/14
	Jackson, Stephanie	7/28/11
	Johnson, Chris	7/15/10
	Kent, Linda	1/26/12; 2/23/12
	Kolosseus, Andrew	6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 10/30/14; 11/20/14
	Lee, Gary	6/26/14
	McKee, Kim	2/13/09; 4/22/09; 7/23/09; 9/29/09; 11/17/09; 1/12/10; 4/15/10; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 3/31/11; 4/28/11; 7/28/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13

Representing	Name	Meetings Attended
	Morrison, Scott	7/15/10
	Murphy, Brad	2/13/09; 4/22/09
	Pacifico, Marc	6/26/14
	Pelletier, Greg	9/22/11; 1/26/12; 2/23/12; 6/27/13
	Raunig, Brett	8/25/11; 9/22/11; 11/17/11; 1/26/12; 1/24/13; 6/27/13; 9/26/13; 6/26/14
	Roberts, Mindy	2/13/09; 4/22/09; 9/29/09; 5/20/10; 1/27/11; 4/28/11; 9/22/11; 1/26/12; 2/23/12; 5/24/12; 7/26/12; 11/15/12; 6/27/13; 11/20/14
	Rockett, Derek	11/9/10; 4/28/11
	Schrieve, Garin	2/13/09; 3/26/09
	Smith, Diana	3/22/12
	Stasch, Paul	7/28/11
	Stormon, John	2/27/14
	Toal, Charles	9/26/13
	Toteff, Sally	4/28/11
	Wagner, Lydia	2/13/09; 3/26/09; 4/22/09; 7/23/09; 9/29/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 7/28/11; 8/25/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/14; 11/20/14
Enterprise Services (DES), WA State Dept. of *(Previously known as General Administration or GA)*	Araiza, Cip	9/29/09
	Evans, Tom	3/26/09
	Jones, Nathaniel	4/22/09; 7/23/09; 9/29/09; 1/12/10; 4/15/10; 5/20/10; 12/14/10; 1/27/11; 3/31/11; 11/15/12
	Martin, Carrie	8/25/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/14; 10/30/14; 11/20/14
Environmental Protection Agency (EPA), U.S.	Batiuk, Rich	6/26/14
	Carlin, Jayne	6/26/14
	Cope, Ben	6/26/14
	Henszey, Jo	1/30/14; 2/27/14; 6/26/14
	Ragsdale, Dave	2/13/09; 3/26/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 7/15/10; 8/19/10; 9/30/10; 1/27/11; 4/28/11; 7/28/11; 8/25/11; 9/22/11; 1/26/12; 3/22/12; 7/26/12; 11/15/12; 1/24/13; 3/28/13; 6/27/13
Fish and Wildlife (WDFW), WA State Dept. of	Adkins, Dan	7/23/09
	Eltrich, Rich	3/26/09
	Hughes, Kirt	2/13/09
	Michael, Hal	4/22/09; 7/23/09; 9/29/09; 1/12/10; 4/15/10; 5/20/10; 8/19/10; 12/14/10
Health (DOH), WA State Dept. of	McBride, Dave	2/13/09
	Schneider, Lynn	2/27/14

Representing	Name	Meetings Attended
	Toy, Mark	7/15/10; 3/31/11; 7/28/11; 7/26/12; 1/24/13; 6/27/13
Hood Canal Salmon Enhancement Group (HCSEG)	Sammons, Julian	2/27/14
Lacey, City of	Rector, Julie	2/23/12; 1/24/13; 2/28/13; 10/30/14
Little Hollywood Blog, SPEECH	Unsoeld, Janine	3/22/12; 5/24/12; 9/26/13
LOTT Clean Water Alliance	Dennis-Perez, Lisa	8/25/11
	Fowler, Karla	2/13/09; 3/26/09; 4/22/09; 7/23/09; 9/29/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 7/15/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 7/28/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 11/15/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 1/30/14; 2/27/14; 6/26/14; 10/30/14; 11/20/14
	Hielema, Eric	3/31/11
	McConkey, Ben	3/31/11; 7/26/12; 12/13/12
	Peterson, George	3/31/11
	Pierce, Laurie	2/13/09; 3/26/09; 4/22/09; 9/29/09; 1/12/10; 5/20/10; 8/19/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 8/25/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 11/21/13
	Topolski, Brian	9/22/11; 2/23/12
	Williamson, Paula	7/15/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11
Natural Resources (DNR), WA State Dept. of	Shambo, Jack	11/17/09; 4/15/10
	Tausch, Kristi	11/17/09
	Thomas, Zoanne	7/23/09; 9/29/09; 11/17/09
	Zora, Craig	1/12/10; 4/15/10
Northwest Indian Fisheries Commission (NWIFC)	O'Connell, Emmett	3/31/11; 4/28/11
Olympia, City of	Bryan, Kris	6/27/13
	Buxbaum, Steve	3/28/13
	Buxton, Donna	7/26/12
	Christensen, Eric	6/27/13
	Goodman, Marcus	11/17/11
	Graham, Jeremy	10/30/14; 11/20/14
	Pyle, Patricia	8/25/11; 9/22/11; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 6/27/13; 9/26/13; 1/30/14
	Roush, Joe	7/23/09; 11/17/09; 8/19/10; 6/27/13; 6/26/14
	Haub, Andy	2/23/12; 9/26/13

Representing	Name	Meetings Attended
	Keehan, Laura	2/13/09; 3/26/09; 4/22/09; 9/29/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 7/15/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 7/28/11; 8/25/11; 9/22/11; 10/27/11; 1/17/11; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 11/21/13; 1/30/14
Olympia, Port of	Bache, Don	3/26/09
	Smith, Alexandra	6/26/14; 11/20/14
	Snarski, Joanne	7/23/09; 9/29/09; 11/17/09
	Tope, Barb	6/26/14
	Zinkevich, Robert	12/14/10; 1/27/11; 3/31/11; 4/28/11; 7/28/11; 8/25/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12
Olympia Yacht Club	DeMeyer, John	1/12/10; 4/15/10; 5/20/10; 9/30/10; 11/9/10; 4/28/11; 10/30/14
	Lengenfelder, Jim	2/13/09; 9/29/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 8/19/10; 9/30/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 8/25/11; 9/22/11; 11/17/11; 2/23/12; 7/26/12; 11/15/12; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 10/30/14; 11/20/14
Pacific Shellfish Institute (PSI)	Cheney, Dan	6/27/13
	Hudson, Bobbi	9/26/13; 6/26/2014; 10/30/14; 11/20/14
People for Puget Sound (PPS)	Myers, Doug	4/28/11
	Peeler, Dave	11/17/09; 7/28/11
Pioneer Technologies	Bussey, Troy	5/26/11
Puget Sound Partnership (PSP)	Call, Roma	11/17/09; 4/15/10
	Fagergren, Duane	2/13/09; 3/26/09; 4/22/09; 4/15/10
South Puget Environmental Education Clearing House (SPEECH)	Mocniak, Jeff	2/13/09; 3/26/09; 4/22/09; 7/15/10
South Puget Sound Salmon Enhancement Group (SPSSEG)	Havens, Jack	3/31/11
South Sound GREEN	Mills, Anne	8/19/10
Squaxin Island Tribe (SIT)	Keesecker, Levi	3/26/09
	Konovsky, John	7/23/09; 9/29/09; 4/15/10; 5/20/10; 8/19/10; 1/27/11; 4/28/11; 1/26/12; 2/23/12; 5/24/12; 12/13/12
	Marbet, Erica	11/21/13; 2/27/14; 6/26/2014; 10/30/14; 11/20/14
	Steltzner, Scott	1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 6/26/2014; 10/30/14
Thurston Conservation District (TCD)	Hatch-Winecka, Amy	1/24/13; 3/28/13; 6/27/13
	Sant, Adam	7/15/10
	Thompson, Brian	1/12/10
	Whalen, Kathleen	3/26/09; 4/22/09; 9/29/09; 4/15/10; 11/9/10; 10/27/11; 1/24/13; 2/28/13; 6/26/2014; 10/30/14
Thurston County	Allen, Pat	8/19/10; 9/30/10
	Bachmeier, Jim	5/26/11

Representing	Name	Meetings Attended
(representing multiple departments or programs)	Davis, Sue	2/13/09; 3/26/09; 4/22/09; 7/23/09; 9/29/09; 11/17/09; 1/12/10; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 7/28/11; 8/25/11; 9/22/11; 10/27/11; 11/17/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 11/21/13; 1/30/14; 2/27/14; 6/26/14; 10/30/14; 11/20/14
	Deffobis, Andrew	7/15/10
	Doenges, Rich	4/15/10; 8/25/11; 9/22/11; 10/27/11; 9/26/13
	Kain, Mike	1/12/10
	Levitt, Molly	10/30/14; 11/20/14
	Osterberg, Allison	1/30/14; 6/26/2014
	Peterson, Steve	9/30/10
	Reynolds, Owen	8/19/10
	Romero, Nadine	9/30/10
	Schaffner, Larry	10/30/14
	Starry, Art	5/20/10; 9/30/10
	Sullivan, Lawrence	6/27/13; 9/26/13; 11/21/13
	Swartout, Mark	2/13/09
	Wilson, Cynthia	1/12/10
	Wood, Barb	8/19/10; 9/30/10; 1/27/11; 10/27/11; 11/17/11; 1/26/12; 3/22/12; 5/24/12; 7/26/12; 12/13/12; 1/24/13; 1/30/14
Thurston County Storm & Surface Water Advisory Board	Heide, Pete	2/23/12
	Larson, Gary	10/27/11; 11/17/11; 2/23/12; 5/24/12; 7/26/12
Thurston Public Utility District (PUD)	Olsen, Russ	6/27/13
	Oosterman, Linda	1/24/13; 2/28/13; 1/30/14; 2/27/14; 10/30/14
	Pickett, Paul	5/26/11
	Stearns, Chris	7/23/09; 11/17/09; 1/12/10; 4/15/10; 5/20/10; 7/15/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 7/28/11; 8/25/11; 9/22/11; 10/27/11; 1/26/12; 2/23/12; 3/22/12; 5/24/12; 7/26/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 9/26/13; 11/21/13
Transportation (WSDOT), WA State Dept. of	Iwasaki, Brandon	11/20/14
	Miller, Emily	1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/2014; 10/30/14
	Pond, Elsa	10/30/14; 11/20/14
	Ratcliff, Jana	1/12/10; 5/26/11; 7/28/11; 9/22/11; 6/27/13; 10/30/14
	Williams, Jeff	2/23/12; 11/15/12; 12/13/12; 1/24/13

Representing	Name	Meetings Attended
Tumwater, City of	Smith, Dan	2/13/09; 3/26/09; 4/22/09; 7/23/09; 9/29/09; 11/17/09; 7/15/10; 8/19/10; 9/30/10; 11/9/10; 12/14/10; 1/27/11; 3/31/11; 4/28/11; 5/26/11; 7/28/11; 9/22/11; 10/27/11; 1/26/12; 3/22/12; 5/24/12; 11/15/12; 12/13/12; 1/24/13; 2/28/13; 3/28/13; 6/27/13; 9/26/13; 11/21/13; 1/30/14; 2/27/14; 6/26/2014; 10/30/14
	Wilson, Tim	2/13/09; 3/26/09; 7/23/09; 1/12/10; 4/15/10; 7/15/10
Washington Farm Forestry Association (WFFA)	Miller, Ken	9/29/09
Washington Forest Protection Association (WFPA)	Mitchell, Cindy	9/29/09
Washington State Society of American Foresters (WSSAF)	Walkowiak, John	11/17/09
Washington Stormwater Center	Copado, Aaron	6/26/14; 11/20/14
	Rozmyn, Lisa	1/30/14; 2/27/14; 6/26/2014; 11/20/14
Weyerhaeuser	Barnowe-Meyer, Steve	9/29/09; 4/15/10; 5/20/10; 2/28/13; 3/28/13
	Johnson, Ken	2/13/09; 7/26/12; 1/24/13; 6/26/2014
	Keough, Julie	9/29/09
WSU Thurston Extension Office	Janowitz, Karen	3/26/09
	Moore, Cliff	2/13/09
	Simmons, Bob	2/13/09; 4/22/09; 9/29/09; 11/17/09; 4/15/10; 5/20/10; 9/30/10; 1/27/11; 8/25/11; 1/26/12

In addition to the advisory group meetings, Ecology staff provided briefings to federal, local, and tribal governments at their request. These briefings generally were to clarify the technical findings or the development process and status of the WQIR/IP.

Ecology has dedicated web pages for the entire Deschutes River watershed project. Information posted includes: project overview; technical information; advisory group meeting agendas, notes, presentations, and supplementation information; additional related information, Phase 1, and Phase 2.

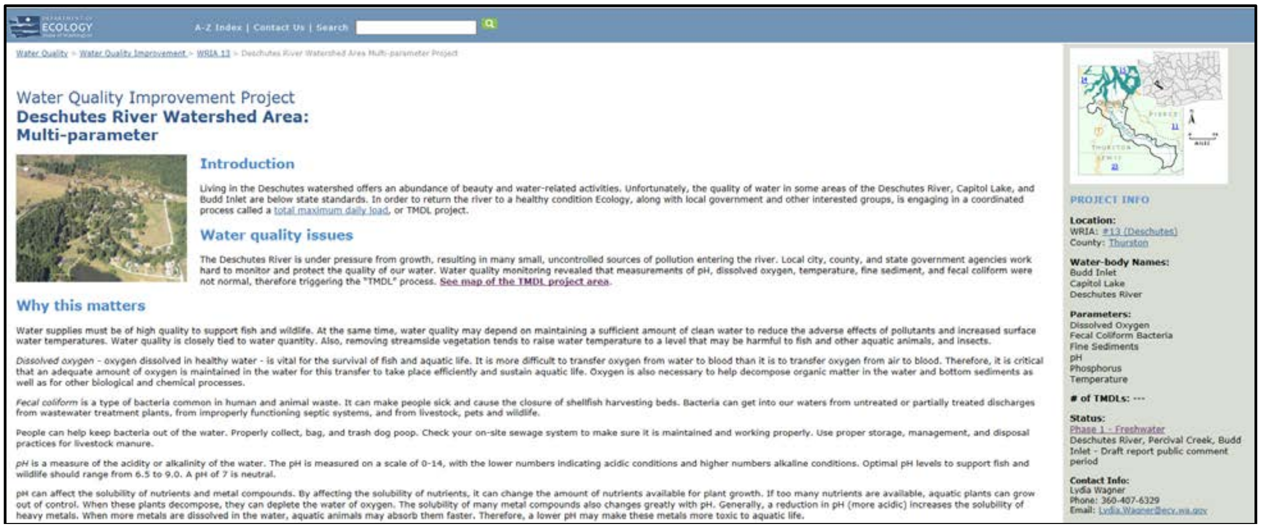


Figure 39: Deschutes River Watershed main project web page.

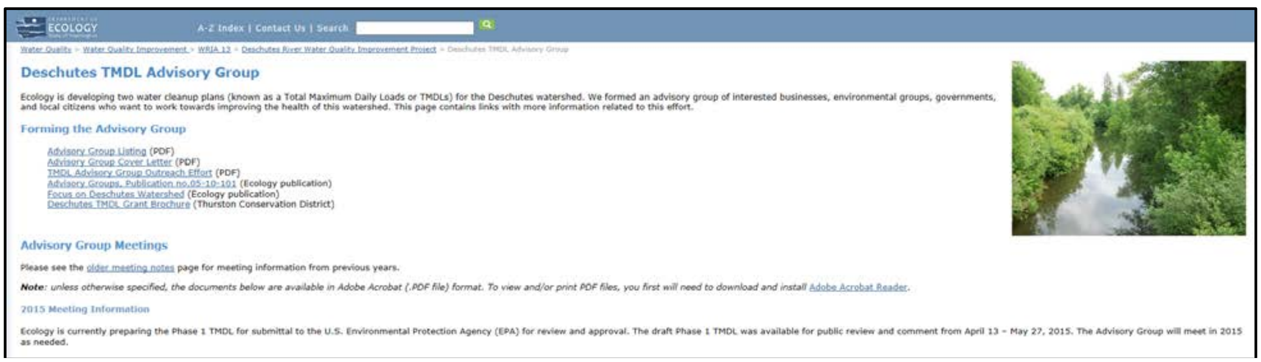


Figure 40: Deschutes TMDL Advisory Group main web page.

Advisory Group Meetings

Please see the older meeting notes page for meeting information from previous years.

Note: *unless otherwise specified, the documents below are available in Adobe Acrobat (.PDF file) format. To view and/or print PDF files, you first will need to download and install Adobe Acrobat Reader.*

2015 Meeting Information

Ecology is currently preparing the Phase 1 TMDL for submittal to the U.S. Environmental Protection Agency (EPA) for review and approval. The draft Phase 1 TMDL was available for public review and comment from April 13 – May 27, 2015. The Advisory Group will meet in 2015 as needed.

2014 Meeting Information

No meetings were held in March, April, May, July, August, September, or December.

January 30, 2014 • Agenda - final • Meeting Notes - final • Draft Implementation Actions - Revised January 2014	**February, 2014** • Agenda - final • Meeting Notes - final • Letter to Ecology concerning the TMDL Completion Schedule – from Thurston County Commissioners • Letter from Ecology to the County Commissioners concerning the TMDL Completion Schedule – from Rich Doenges, WQ/SWRO • Evaluation of OSS Nitrogen Removal Technologies – Presentation by Lynn Schneider, Dept. of Health • Hood Canal OSS Nitrogen Removal – Presentation by Julian Sammons, Hood Canal Salmon Enhancement Group
June 26, 2014 • Agenda - final • Meeting Notes - final • EPA Chesapeake Bay Pre-Q&A – Presentation by Rich Batiuk, EPA • EPA Chesapeake Bay TMDL Presentation – Presentation by Rich Batiuk, EPA	**October 30, 2014** • Meeting Notes - final • Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment TMDL - Presentation by Dustin Bilhimer and Andrew Kolosseus
November 20, 2014 • Agenda - Final • Meeting Notes - final • Supplemental Report Overview - Mindy Roberts, Ecology	

Figure 41: 2014 Advisory Group Meeting Information.

Technical Information

Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan (Ecology Publication)
https://fortress.wa.gov/ecy/publications/summarypages/1510012.html

Deschutes River, Capitol Lake, and Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Study Findings (Ecology Publication)
https://fortress.wa.gov/ecy/publications/summarypages/1203008.html

Independent review of the technical study (12-03-008):

- Questions and Answers about Deschutes River, Capitol Lake, and Budd Inlet
- 7/23/14 Overview of independent review process and results
- Draft independent review (Cadmus Group and Portland State University, 2009)
- Completion of independent review (12/27/11 memo from Scott Wells and Chris Berger)
- Supplemental independent review (Cadmus Group and HDR HydroQual, 2012)
- Completion of supplemental independent review (3/23/12 email)

QAPP (Sampling Plan): Deschutes River, Capitol Lake, & Budd Inlet Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment TMDL Study (Ecology Publication)
https://fortress.wa.gov/ecy/publications/summarypages/0403103.html

Interim Results from the Budd Inlet, Capitol Lake, and Deschutes River Dissolved Oxygen and Nutrient Study (PDF)
www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical_reports/budd-deschutes_nutrstudy2007.pdf

Assessment of Surface Water / Groundwater Interactions and Associated Nutrient Fluxes in the Deschutes River and Percival Creek Watersheds, Thurston County (Ecology Publication)
https://fortress.wa.gov/ecy/publications/summarypages/0703002.html

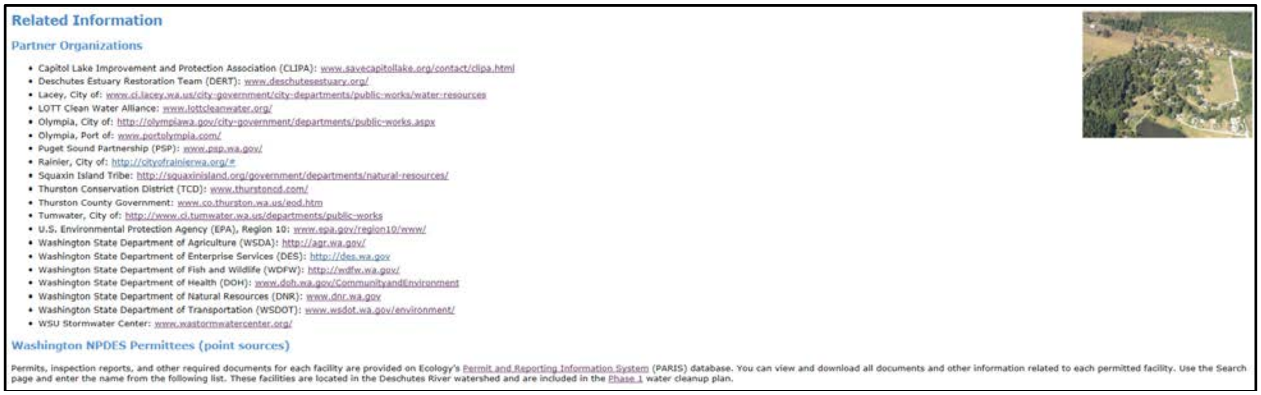
Final Reconnaissance Study Plan for Deschutes River/Capitol Lake/Budd Inlet Total Maximum Daily Loads (PDF)
www.ecy.wa.gov/programs/wq/tmdl/watershed/deschutes/technical_reports/reconplan_deschutes.pdf

Deschutes River Basin Aerial Surveys - Thermal Infrared and Color Video
www.ecy.wa.gov/apps/watersheds/temperature/tir/deschutes

Lower Deschutes and Budd Inlet Tributaries Wet Weather Monitoring Plan (PDF)
www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical_reports/stormwaterplan_final_nofigs.pdf

Poster: Using biological and habitat metrics to determine the effectiveness of TMDLs: A Case Study (Ecology publication)
https://fortress.wa.gov/ecy/publications/summarypages/1203033.html

Figure 42: TMDL Technical Information available from the TMDL project web page.



Related Information

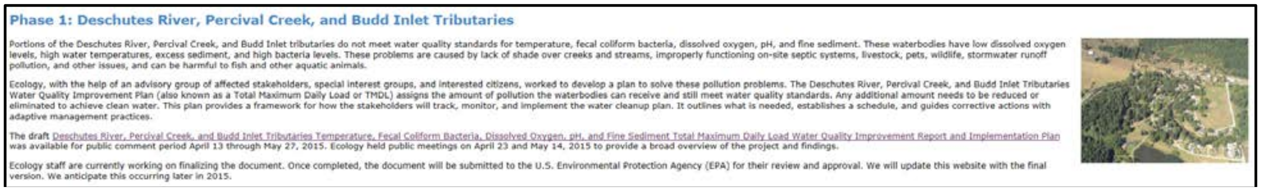
Partner Organizations

- Capitol Lake Improvement and Protection Association (CLIPA): www.savecapitollake.org/contact/clipa.html
- Deschutes Estuary Restoration Team (DERT): www.deschutesestuary.org/
- Lacey, City of: www.ci.lacey.wa.us/city-government/city-departments/public-works/water-resources
- LOTT Clean Water Alliance: www.lottcleanwater.org/
- Olympia, City of: http://olympiawa.gov/city-government/departments/public-works.aspx
- Olympia, Port of: www.portolympia.com/
- Puget Sound Partnership (PSP): www.psp.wa.gov/
- Rainier, City of: http://cityofrainierwa.org/#
- Squaxin Island Tribe: http://squaxinisland.org/government/departments/natural-resources/
- Thurston Conservation District (TCD): www.thurstoncd.com/
- Thurston County Government: www.co.thurston.wa.us/eod.htm
- Tumwater, City of: http://www.ci.tumwater.wa.us/departments/public-works
- U.S. Environmental Protection Agency (EPA), Region 10: www.epa.gov/region10/www/
- Washington State Department of Agriculture (WSDA): http://agr.wa.gov/
- Washington State Department of Enterprise Services (DES): http://des.wa.gov
- Washington State Department of Fish and Wildlife (WDFW): http://wdfw.wa.gov/
- Washington State Department of Health (DOH): www.doh.wa.gov/CommunityandEnvironment
- Washington State Department of Natural Resources (DNR): www.dnr.wa.gov
- Washington State Department of Transportation (WSDOT): www.wsdot.wa.gov/environment/
- WSU Stormwater Center: www.wastormwatercenter.org/

Washington NPDES Permittees (point sources)

Permits, inspection reports, and other required documents for each facility are provided on Ecology's Permit and Reporting Information System (PARIS) database. You can view and download all documents and other information related to each permitted facility. Use the Search page and enter the name from the following list. These facilities are located in the Deschutes River watershed and are included in the Phase 1 water cleanup plan.

Figure 43: TMDL related information available on the project web page.



Phase 1: Deschutes River, Percival Creek, and Budd Inlet Tributaries

Portions of the Deschutes River, Percival Creek, and Budd Inlet tributaries do not meet water quality standards for temperature, fecal coliform bacteria, dissolved oxygen, pH, and fine sediment. These waterbodies have low dissolved oxygen levels, high water temperatures, excess sediment, and high bacteria levels. These problems are caused by lack of shade over creeks and streams, improperly functioning on-site septic systems, livestock, pets, wildlife, stormwater runoff pollution, and other issues, and can be harmful to fish and other aquatic animals.

Ecology, with the help of an advisory group of affected stakeholders, special interest groups, and interested citizens, worked to develop a plan to solve these pollution problems. The Deschutes River, Percival Creek, and Budd Inlet Tributaries Water Quality Improvement Plan (also known as a Total Maximum Daily Load or TMDL) assigns the amount of pollution the waterbodies can receive and still meet water quality standards. Any additional amount needs to be reduced or eliminated to achieve clean water. This plan provides a framework for how the stakeholders will track, monitor, and implement the water cleanup plan. It outlines what is needed, establishes a schedule, and guides corrective actions with adaptive management practices.

The draft Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan was available for public comment period April 13 through May 27, 2015. Ecology held public meetings on April 23 and May 14, 2015 to provide a broad overview of the project and findings.

Ecology staff are currently working on finalizing the document. Once completed, the document will be submitted to the U.S. Environmental Protection Agency (EPA) for their review and approval. We will update this website with the final version. We anticipate this occurring later in 2015.

Figure 44: Phase 1: Deschutes River, Percival Creek, and Budd Inlet Tributaries

Phase 2: Capitol Lake and Budd Inlet

Ecology will begin work on Phase 2 of this water cleanup plan in late 2015.

Deschutes Watershed Phase in approach

Summary of Ecology's decision on how we are proceeding with the Deschutes River, Capitol Lake, and Budd Inlet Water Quality Improvement Report/Implementation Plan (WQIR/IP)

Post 2012 technical study reviews

David Milne's Analysis of the Deschutes Watershed TMDL report's assessments of the Lake and Estuary alternatives for Washington's Capitol City (March 27, 2014)
DMilneReport0314.pdf

Ecology's Response to Memorandum from David Milne
www.ecy.wa.gov/programs/wq/tmdl/deschutes/EcyResp070314DavidMilne0314.pdf

Email correspondence Steltzner to Wagner (July 30, 2014)
www.ecy.wa.gov/programs/wq/tmdl/dechutes/technical_reports/SITJuly2014MilneRptRev.pdf

Dr. Frodge's review of Milne review of Deschutes Technical Study
www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical_reports/FrodgeCommentsCapLkBIMilneRptJuly2014.pdf

Dr. Frodge's Credentials
www.ecy.wa.gov/programs/wq/tmdl/deschutes/technical_reports/FrodgeCurriculumVitae2014.pdf

Dr. Milne's August review of Dr. Frodge's July review of Dr. Milne's March review of the Deschutes Technical Study published in 2012
www.ecy.wa.gov/programs/wq/tmdl/deschutes/MilneRespFrodgeRev08202014.pdf

Technical discussion - November 3, 2014

Figure 45: Phase 2: Capitol Lake and Budd Inlet

Deschutes River, Capitol Lake, and Budd Inlet TMDL
Phased Approach
April 2014

Phased approach

- Ecology is taking a phased approach to the Deschutes River, Capitol Lake, and Budd Inlet Total Maximum Daily Load (TMDL).
- Ecology will first move forward with the freshwater section and submit it to EPA in 2014.
- The boundaries for the freshwater section include: The Deschutes River (above Deschutes Falls), Percival Creek and its tributaries, Black Lake Ditch, and the freshwater tributaries flowing into Capitol Lake and Budd Inlet.
- The pollutants addressed remain the same: Fecal coliform bacteria, temperature, fine sediments, dissolved oxygen, and pH.
- Ecology will *not* assign numeric load allocations for nitrogen in the freshwater section. The implementation actions identified in the freshwater Water Quality Improvement Report/Implementation Plan (WQIR/IP) will provide benefits to the nitrogen issues in Budd Inlet.

Benefits to this approach

- The technical work for the freshwater section is complete.
- EPA can approve the submitted freshwater WQIR/IP this year.
- Stakeholders applying for grant funding from Ecology can receive extra points for addressing an approved TMDL. They can use the funding to implement the actions identified in the WQIR/IP to improve water quality in the freshwater sections of the watershed.
- This validates the time and work already invested by the advisory group.
- The local partners and stakeholders can continue or begin implementing the action items identified in the WQIR/IP.
- It reinforces Ecology's ongoing commitment to improving the watershed.

Marine sections

- Ecology will address Capitol Lake and Budd Inlet after additional modeling is finished.
- Ecology will further refine Budd Inlet and Puget Sound modeling to determine the extent of the impacts to Budd Inlet from the northern TMDL boundary. It will take several years to complete the marine TMDL.

Figure 46: Memo to TMDL Advisory Group members regarding the decision to take a phased approach to the development of this TMDL.

Ecology held a 45-day public comment period from April 13, 2015 through May 27, 2015, on this report to discuss the study and process for developing this water cleanup plan. Ecology held two public meetings on April 23 and May 14. Comments from 10 individuals or organizations were received during the comment period. All the comments received during the public comment period and Ecology's responses are in Appendix F. Additional comments were provided from two organizations after the close of the public comment period. While Ecology reviewed all comments and made changes as appropriate, only the received comments are included in Appendix F.

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Special note: The Department of Ecology is required by RCW 34.05.272 to categorize supporting information used to inform significant agency actions (such as this TMDL document) according to the following categorization schema. This categorization is in addition to meeting data quality assurance objectives described within this Water Quality Improvement Report. While a higher quality of work is inferred by increasing levels of peer review, and all attempts are made to use high quality data and information in this report, Ecology does not guarantee the completeness or quality of review conducted for external publications over which Ecology has no control. References may fit into more than one category, but the highest level of review applies to the annotations in the references.

The bibliography, citation list, or similar list of sources must categorize the sources of information as belonging to one or more of the following categories:

(i) Independent peer review: Review is overseen by an independent[1] third party;
  a. Refereed journal articles
  b. Text books
  c. Ecology documents that are subject to peer reviews conducted by an independent third party.
  d. Documents produced by other organizations (such as tribal, federal, regional, local, or other state agencies) that have been subject to peer reviews conducted by an independent third party.

(ii) Internal peer review: Review by staff internal to the department of ecology;
  a. Ecology documents, web pages, or other products such as monitoring data subject to internal peer review and quality assurance rules but that are not distributed to external parties for review.

[1] An independent review occurs when a separate entity has ultimate approval authority of the final product.

(iii) External[2] peer review: Review by persons that are external to the author's organization and selected by the author's organization;

a. Ecology documents that are released in draft form to advisory groups or other technical committees where members are selected by Ecology for review and input prior to finalizing.

b. Documents produced by other organizations (such as tribal, federal, regional, local, or other state agencies) that have been subject to peer reviews conducted by individuals external to the authors' organization that have been selected by the author's organization.

(iv) Open review: Documented open public review process that is not limited to invited organizations or individuals;

a. Water Quality Improvement Reports that are subject to review and comment by the general public.

b. Ecology documents that are released in draft form to advisory groups or other technical committees where members are not limited to those selected by Ecology for review and input prior to finalizing.

c. Documents produced by other organizations (such as tribal, federal, regional, local, or other state agencies) that have been subject to peer reviews conducted by individuals external to the author's organization that are not limited to those selected by the author's organization.

(v) Legal and policy document: Documents related to the legal framework for the significant agency action including but not limited to:

(A) Federal and state statutes;
(B) Court and hearings board decisions;
(C) Federal and state administrative rules and regulations; and
(D) Policy and regulatory documents adopted by local governments;

(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (i), (ii), (iii), and (iv) of this subsection;

a. Preliminary monitoring data that have not been subject to quality assurance/quality control checks

(vii) Records of the best professional judgment of department of ecology employees or other individuals; or

a. Personal communications by Ecology employees or by individuals external to Ecology

(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).

a. GIS data layers from Ecology or other sources

b. Documents, web pages, products, or personal communications from other organizations that are not distributed to parties external to that organization for review

c. Newsletters produced by government, industry, environmental, or community groups

[2] An external review occurs when a separate entity reviews a document but the authors have ultimate approval of the final product.

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Appendices

Appendix A. Glossary, Acronyms, and Abbreviations

Glossary

1-DMax or 1-day maximum temperature: The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum and minimum thermometers or continuous monitoring probes having sampling intervals of 30 minutes or less.

303(d) List: Section 303(d) of the federal Clean Water Act requires Washington State periodically to prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality-limited water bodies (ocean waters, estuaries, lakes, and streams) that fall short of state surface water quality standards and are not expected to improve within the next two years.

7-DADMax or 7-day average of the daily maximum temperatures: The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

7Q10 flow: A critical low-flow condition. The 7Q10 is a statistical estimate of the lowest 7-day average flow that can be expected to occur once every 10 years on average. The 7Q10 flow is commonly used to represent the critical flow condition in a water body and is typically calculated from long-term flow data collected in each basin. For temperature TMDL work, the 7Q10 is usually calculated for the months of July and August as these typically represent the critical months for temperature in our state.

90th percentile: A statistical number obtained from a distribution of a data set, above which 10 percent of the data exists and below which 90 percent of the data exists.

Best management practices (BMPs): Physical, structural, or operational practices that, when used singularly or in combination, prevent or reduce pollutant discharges.

Clean Water Act (CWA): A federal act passed in 1972 that contains provisions to restore and maintain the quality of the nation’s waters. Section 303(d) of the Clean Water Act establishes the TMDL program.

Critical condition: When the physical, chemical, and biological characteristics of the receiving water environment interact with the effluent to produce the greatest potential adverse impact on aquatic biota and existing or designated water uses. For steady-state discharges to riverine systems, the critical condition may be assumed to be equal to the 7Q10 (see definition) flow event unless determined otherwise by the department.

Designated uses: Those uses specified in Chapter 173-201A WAC (Water Quality Standards for Surface Waters of the State of Washington) for each water body or segment, regardless of whether or not the uses are currently attained.

Diel: Of, or pertaining to, a 24-hour period.

Diurnal: Of, or pertaining to, a day or each day; daily. (1) Occurring during the daytime only, as different from nocturnal or crepuscular, or (2) Daily; related to actions which are completed in the course of a calendar day, and which typically recur every calendar day (for example, diurnal temperature rises during the day and falls during the night.)

Effective shade: The fraction of incoming solar shortwave radiation that is blocked from reaching the surface of a stream or other defined area.

Exceeded criteria: Did not meet criteria.

Existing uses: Those uses actually attained in fresh and marine waters on or after November 28, 1975, whether or not they are designated uses. Introduced species that are not native to Washington, and put-and-take fisheries comprised of non-self-replicating introduced native species, do not need to receive full support as an existing use.

Extraordinary primary contact: Waters providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas.

Fecal coliform (FC): That portion of the coliform group of bacteria which is present in intestinal tracts and feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within 24 hours at 44.5 plus or minus 0.2 degrees Celsius. Fecal coliform bacteria are "indicator" organisms that suggest the possible presence of disease-causing organisms. Concentrations are measured in colony forming units per 100 milliliters of water (cfu/100mL).

Geometric mean: A mathematical expression of the central tendency (average) of multiple sample values. A geometric mean, unlike an arithmetic mean, tends to dampen the effect of very high or low values, which might bias the mean if a straight average (arithmetic mean) were calculated. This is helpful when analyzing bacteria concentrations, because levels may vary anywhere from 10 to 10,000 fold over a given period. The calculation is performed by either:

Taking the nth root of a product of n factors, or
Taking the antilogarithm of the arithmetic mean of the logarithms of the individual values.

Hyporheic: The area beneath and adjacent to a stream where surface water and groundwater intermix.

LiDar: Light Detection and Ranging is high-resolution digital topography data.

Load allocation (LA): The portion of a receiving water's loading capacity attributed to one or more of its existing or future sources of nonpoint pollution or to natural background sources.

Loading capacity: The greatest amount of a substance that a water body can receive and still meet water quality standards.

Margin of safety: Required component of TMDLs that accounts for uncertainty about the relationship between pollutant loads and quality of the receiving water body.

Municipal separate storm sewer systems (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains): (1) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body having jurisdiction over disposal of wastes, stormwater, or other wastes and (2) designed or used for collecting or conveying stormwater; (3) which is not a combined sewer; and (4) which is not part of a Publicly Owned Treatment Works (POTW) as defined in the Code of Federal Regulations at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES): National program for issuing and revising permits, as well as imposing and enforcing pretreatment requirements, under the Clean Water Act. The NPDES permit program regulates discharges from wastewater treatment plants, large factories, and other facilities that use, process, and discharge water back into lakes, streams, rivers, bays, and oceans.

Near-stream disturbance zone (NSDZ): The active channel area without riparian vegetation that includes features such as gravel bars.

Nonpoint source (NPS): Pollution that enters any waters of the state from any dispersed land-based or water-based activities, including but not limited to, atmospheric deposition; surface water runoff from agricultural lands; urban areas; or forest lands; subsurface or underground sources; or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System Program. Generally, any unconfined and diffuse source of contamination. Legally, any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act.

Parameter: Water quality constituent being measured (analyte). A physical, chemical, or biological property whose values determine environmental characteristics or behavior.

Pathogen: Disease-causing microorganisms such as bacteria, protozoa, viruses.

pH: A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is considered to be neutral. Since the pH scale is logarithmic, a water sample with a pH of 8 is ten times more basic than one with a pH of 7.

Phase II stormwater permit: The second phase of stormwater regulation required under the federal Clean Water Act. The permit is issued to smaller municipal separate storm sewer systems (MS4s) and construction sites over one acre.

Point source: Sources of pollution that discharge at a specific location from pipes, outfalls, and conveyance channels to a surface water. Examples of point source discharges include municipal wastewater treatment plants, municipal stormwater systems, industrial waste treatment facilities, and construction sites that clear more than five acres of land.

Pollution: Such contamination, or other alteration of the physical, chemical, or biological properties, of any waters of the state. This includes change in temperature, taste, color, turbidity, or odor of the waters. It also includes discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state. This definition assumes that these changes will, or are likely to, create a nuisance or render such waters harmful, detrimental, or injurious to (1) public health, safety, or welfare, or (2) domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or (3) livestock, wild animals, birds, fish, or other aquatic life.

QUAL2K: A one-dimensional, steady-state stream model that includes a diurnal heat budget.

Reach: A specific portion or segment of a stream.

Riparian: Relating to the banks along a natural course of water.

Salmonid: Fish that belong to the family *Salmonidae*. Any species of salmon, trout, or char.

Stormwater: The portion of precipitation that does not naturally percolate into the ground or evaporate but instead runs off roads, pavement, and roofs during rainfall or snow melt. Stormwater can also come from hard or saturated grass surfaces such as lawns, pastures, playfields, and from gravel roads and parking lots.

Stream-side vegetation corridor: A vegetated area near a stream, creek, or river, containing native grasses, flowers, shrubs, and trees. Well managed corridors can provide environmental benefits to the waterbody and adjacent stream banks by providing shade to cool the water, stabilize stream flow, and enhance aquatic and wildlife habitat. A healthy corridor is achieved when the vegetation is of varying sizes, such as conifers grown to full maturity, to provide the best coverage to the water and stream banks.

Surface waters of the state: Lakes, rivers, ponds, streams, inland waters, salt waters, wetlands and all other surface waters and water courses within the jurisdiction of Washington State.

Surrogate measures: To provide more meaningful and measurable pollutant loading targets, EPA regulations [40 CFR 130.2(i)] allow other appropriate measures, or surrogate measures in a TMDL. The Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program (EPA, 1998) includes the following guidance on the use of surrogate measures for TMDL development:

When the impairment is tied to a pollutant for which a numeric criterion is not possible, or where the impairment is identified but cannot be attributed to a single traditional "pollutant," the state should try to identify another (surrogate) environmental indicator that can be used to develop a quantified TMDL, using numeric analytical techniques where they are available, and best professional judgment (BPJ) where they are not.

System potential: The design condition used for TMDL analysis.

System-potential channel morphology: The more stable configuration that would occur with less human disturbance.

System-potential mature riparian vegetation: Vegetation which can grow and reproduce on a site, given climate, elevation, soil properties, plant biology, and hydrologic processes.

System-potential riparian microclimate: The best estimate of air temperature reductions that are expected under mature riparian vegetation. System potential riparian microclimate can also include expected changes to wind speed and relative humidity.

System-potential temperature: An approximation of the temperatures that would occur under natural conditions. System potential is our best understanding of natural conditions that can be supported by available analytical methods. The simulation of the system-potential condition uses best estimates of *mature riparian vegetation, system potential channel morphology, and system-potential riparian microclimate* that would occur absent any human alteration.

Total maximum daily load (TMDL): A distribution of a substance in a water body designed to protect it from exceeding water quality standards. A TMDL is equal to the sum of all of the following: (1) individual wasteload allocations for point sources, (2) the load allocations for nonpoint sources, (3) the contribution of natural sources, and (4) a margin of safety to allow for uncertainty in the wasteload determination. A reserve for future growth is also generally provided.

Total suspended solids (TSS): The suspended particulate matter in a water sample as retained by a filter.

TTools: An ArcView extension originally developed by the ODEQ (2001) to quantify stream channel characteristics, topographic details, and vegetation characteristics for shade and temperature model development.

Turbidity: A measure of water clarity. High levels of turbidity can have a negative impact on aquatic life.

Wasteload allocation: The portion of a receiving water's loading capacity allocated to existing or future point sources of pollution. Wasteload allocations constitute one type of water quality-based effluent limitation.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

Acronyms and abbreviations

AHSS	Alliance for a Healthy South Sound
ATV	All-terrain vehicle
BHAS	Black Hills Audubon Society
BIA	Bureau of Indian Affairs
BLD	Black Lake Ditch
BMP	Best management practice
BPJ	Best professional judgment
CAFO	Concentrated animal feeding operation
CFR	Code of Federal Register
Ch.	Chapter
CLIPA	Capitol Lake Improvement and Protection Association
CO_2	Carbon dioxide
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CSWGP	Construction Stormwater General Permit
CWSRF	Clean Water State Revolving Fund
DERT	Deschutes Estuary Restoration Team
DES	Washington State Department of Enterprise Services
DIN	Dissolved inorganic nitrogen
DMR	Discharge Monitoring Report
DNMP	Dairy Nutrient Management Program
DO	Dissolved oxygen
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
ECY	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
EWP	Emergency Watershed Protection
FREP	Forest Riparian Easement Program
GA	Washington State Department of General Administration
GIS	Geographic Information System software
HPA	Hydraulic project approval
HRM	Highway Runoff Manual
Hwy	Highway
IDDE	Illicit discharge detection and elimination
ISGP	Industrial Stormwater General Permit
JJA	June, July, August
LA	Load allocation
LID	Low impact development
LOSS	Large on-site sewage system
LOTT	Lacey, Olympia, Tumwater, Thurston County
LWD	Large woody debris
MC	Municipal code
MEL	Manchester Environmental Laboratory

MOA	Memorandum of Agreement
MSWGP	Municipal Stormwater General Permit
NEP	National Estuary Program
NFS	National Forest Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSDZ	near-stream disturbance zone
O&M	Operations and maintenance
ODEQ	Oregon Department of Environmental Quality
OP	Orthophosphate
OSS	On-site sewage system
OWSC	Office of the Washington State Climatologist
PCB	Polychlorinated biphenyl
PDO	Pacific Decadal Oscillation
PSP	Puget Sound Partnership
QAPP	Quality Assurance Project Plan
RCW	Revised Code of Washington
SCC	Washington State Conservation Commission
SEPA	State Environmental Policy Act
SIT	Squaxin Island Tribe
SPV	System potential vegetation
SRF	State Revolving Fund
SRFB	Salmon Recovery Funding Board
STEEP	Solutions to Environmental and Economic Problems
TCC	Thurston County Code
TCD	Thurston Conservation District
TIR	thermal infrared radiation
TMDL	total maximum daily load (water cleanup plan)
TPUD	Thurston Public Utility District
UGA	Urban Growth Area
USDA	United Stated Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WET	Water, Education, and Technology
WHIP	Wildlife Habitat Incentive Program
WLA	Wasteload allocation
WQA	Water Quality Assessment
WQBEL	Water quality based effluent limit
WQIR/IP	Water Quality Improvement Report/Implementation Plan
WQS	Water Quality Standards
WRIA	Water Resources Inventory Area
WRP	Wetland Reserve Program
WSDA	Washington State Department of Agriculture

WSDOT	Washington State Department of Transportation
WSU	Washington State University
WWTP	wastewater treatment plant

Units of Measurement

°C	degrees centigrade
Cfu	Colony forming units
DMax	Daily maximum
DMin	Daily minimum
ft	feet
g	gram, a unit of mass
gpd	gallons per day
kg	kilograms, a unit of mass equal to 1,000 grams.
kg/d	kilograms per day
kJ/d	kilo joules per day
km	kilometer, a unit of length equal to 1,000 meters.
m	meter
mg/L	milligrams per liter (parts per million)
mL	milliliters
NTU	Nephelometric turbidity units
RK	river kilometer
RM	river mile
SU	standard units

Appendix B. Record of Public Participation

Introduction

This section provides a record of the public outreach which occurred during the public comment period for the draft Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report/Implementation Plan.

Outreach and announcements

A 45-day public comment period for this report was held from April 13 through May 27, 2015. Ecology provided news releases to local media in the Deschutes River watershed area. A paid display ad was placed in The Olympian on April 14, 2015. Emails from Ecology to interested parties were sent on April 13, May 22, and May 27, and to news media on April 13.

Paper copies of the draft Water Quality Improvement Report/Implementation Plan were available at the following locations:

Department of Ecology
Southwest Regional Office
300 Desmond Dr. SE
Lacey, WA 98503

Tumwater Timberland Library
7023 New Market St.
Tumwater, WA 98501-6563

An online version of the draft Water Quality Improvement Report/Implementation Plan was available at www.ecy.wa.gov/deschutes.

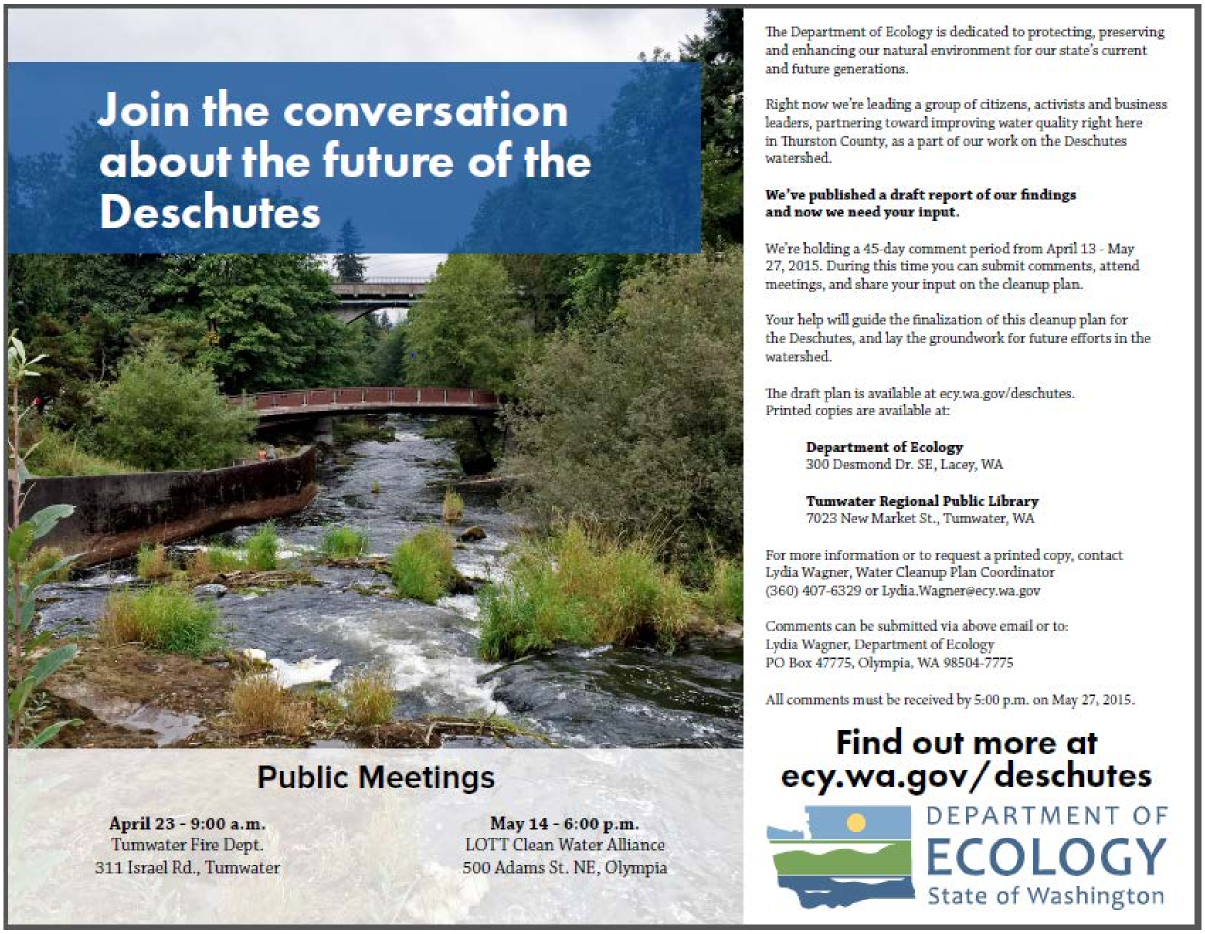


Figure B-1: Display Ad

Washington Department of Ecology – *NEWS*
April 13, 2015

Contacts:

Chase Gallagher, communications, 360-407-6239, @ECYSW

Draft plan to clean up Deschutes watershed out for review

Comment on the cleanup plan through May 27

OLYMPIA – With Thurston County's growing population, water quality in the Deschutes River has declined. As a part of continued efforts to restore water quality, the Department of Ecology has released a draft water cleanup plan for the Deschutes River, and is hosting public meetings as part of a comment period over the next six weeks.

The draft plan looks at the total maximum daily load of pollution that enters the river. This plan focuses on the river above Tumwater Falls and on freshwater streams flowing to Budd Inlet. A second phase will later look at water quality in Capitol Lake and Budd Inlet.

The report found a number of pollution factors contributing to a decrease in water quality, including warmer water temperature, high bacteria and sediment levels, and low levels of dissolved oxygen.

"With such a decrease in water quality in our own backyard, we are focused on a multi-faceted solution to restore the clean and cool water the Deschutes needs to support fishing, recreation and other public benefits," said Rich Doenges, Water Quality section manager for the Department of Ecology's Southwest Region. "The public's input is critical to make sure this is a comprehensive approach to cleaning up the watershed."

The draft report is available online, and printed copies are available at Ecology's Southwest Regional office in Lacey at 300 Desmond Dr. SE, and at the Tumwater Regional Public Library at 7023 New Market Street.

Ecology is asking for public comment during an extended 45-day comment period from April 13 to May 27, 2015. Public comments must be received by 5 p.m. May 27, 2015.

The agency will hold two public meetings in Olympia and Tumwater:

- 9 a.m. April 23 - Tumwater Fire Department, 311 Israel Road, Tumwater
- 6 p.m. May 14 - LOTT Clean Water Alliance, 500 Adams St NE, Olympia

After the comment period ends, Ecology will respond to the public's comments, and issue the final report later in 2015. Then the second phase studying Capitol Lake and Budd Inlet can begin.

______

Department of Ecology home page: http://www.ecy.wa.gov

Figure B-2: News Media Announcement

From: Wagner, Lydia (ECY) [mailto:LBLA461@ECY.WA.GOV]
Sent: Monday, April 13, 2015 3:55 PM
To: Wagner, Lydia (ECY)
Subject: Deschutes Phase 1 (Freshwater) TMDL - Available for Public Review and Comment

Dear **Deschutes TMDL Advisory Group Members** and **other interested parties:**

The draft **Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan** is now available for your review. We welcome and encourage your comments on this draft plan during the extended public comment period.

Public Comment Period
April 13 – May 27, 2015

The draft plan is available **online** at www.ecy.wa.gov/deschutes.

Printed copies are available at:

- Department of Ecology, 300 Desmond Dr. SE, Lacey, WA
- Tumwater Regional Public Library, 7023 New Market St, Tumwater, WA

Public Meetings

April 23, 2015
Tumwater Fire Department
311 Israel Rd. SW, Tumwater, WA
9:00 a.m.

May 14, 2015
LOTT Clean Water Alliance
500 Adams St. NE, Olympia, WA
6:00 p.m.

How to submit comments

Send comments by email *(preferred)* to Lydia.Wagner@ecy.wa.gov or by regular mail to:

Lydia Wagner
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

All comments must be received by 5:00 p.m. on May 27, 2015.

Additional Resources
(Attached)

- Water Quality Improvement Projects also known as Total Maximum Daily Loads (TMDLs) – What should I know? What does it mean to me?
- How to Comment Effectively on Water Cleanup Plans "Total Maximum Daily Loads (TMDLs)"

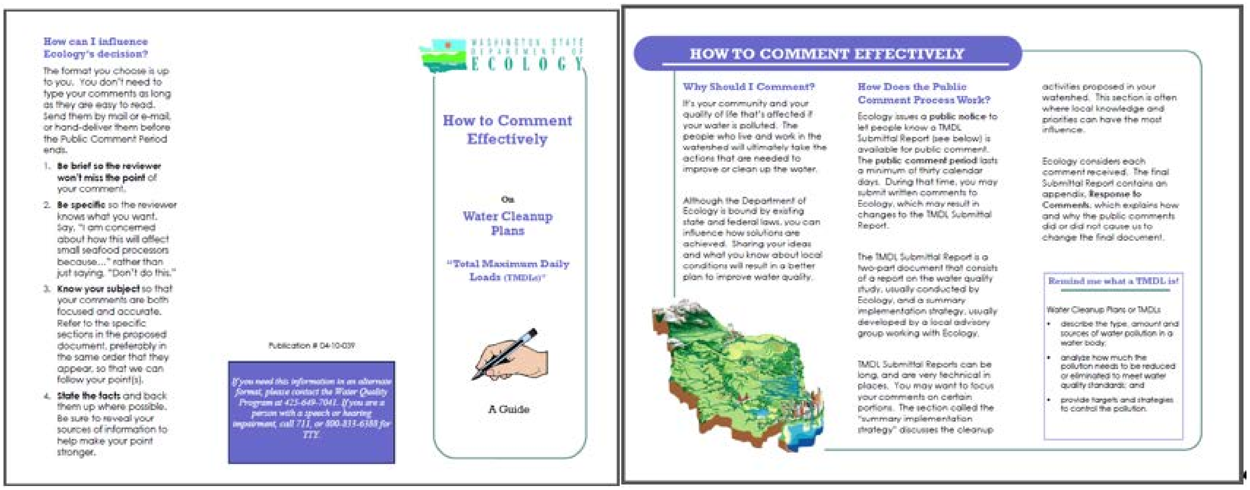
For more information or to request a hard copy of the plan, please contact me by phone or email.

Thank you for your continued interest in the Deschutes River watershed.

Lydia

Lydia C. Wagner | Water Cleanup Plan (TMDL) Coordinator | Lydia.Wagner@ecy.wa.gov
WA Department of Ecology | Direct 360.407.6329 | Main 360.407.6000 | Fax 360.407.6305
PO Box 47775 | Olympia, WA 98504-7775 | Street: 300 Desmond Dr. SE | Lacey, WA 98503-1274
http://www.ecy.wa.gov/programs/wq/wqhome.html

Figure B-3: April 13 Email to Deschutes Interested Parties



How can I influence Ecology's decision?

The format you choose is up to you. You don't need to type your comments as long as they are easy to read. Send them by mail or e-mail, or hand-deliver them before the Public Comment Period ends.

1. **Be brief so the reviewer won't miss the point** of your comment.
2. **Be specific** so the reviewer knows what you want. Say, "I am concerned about how this will affect small seafood processors because..." rather than just saying, "Don't do this."
3. **Know your subject** so that your comments are both focused and accurate. Refer to the specific sections in the proposed document, preferably in the same order that they appear, so that we can follow your point(s).
4. **State the facts** and back them up where possible. Be sure to reveal your sources of information to help make your point stronger.

Publication # 04-10-039

If you need this information in an alternate format, please contact the Water Quality Program at 425-649-7041. If you are a person with a speech or hearing impairment, call 711, or 800-833-6388 for TTY.

Washington State Department of Ecology

How to Comment Effectively

On

Water Cleanup Plans

"Total Maximum Daily Loads (TMDLs)"

A Guide

HOW TO COMMENT EFFECTIVELY

Why Should I Comment?

It's your community and your quality of life that's affected if your water is polluted. The people who live and work in the watershed will ultimately take the actions that are needed to improve or clean up the water.

Although the Department of Ecology is bound by existing state and federal laws, you can influence how solutions are achieved. Sharing your ideas and what you know about local conditions will result in a better plan to improve water quality.

How Does the Public Comment Process Work?

Ecology issues a **public notice** to let people know a TMDL Submittal Report (see below) is available for public comment. The **public comment period** lasts a minimum of thirty calendar days. During that time, you may submit written comments to Ecology, which may result in changes to the TMDL Submittal Report.

The TMDL Submittal Report is a two-part document that consists of a report on the water quality study, usually conducted by Ecology, and a summary implementation strategy, usually developed by a local advisory group working with Ecology.

TMDL Submittal Reports can be long, and are very technical in places. You may want to focus your comments on certain portions. The section called the "summary implementation strategy" discusses the cleanup activities proposed in your watershed. This section is often where local knowledge and priorities can have the most influence.

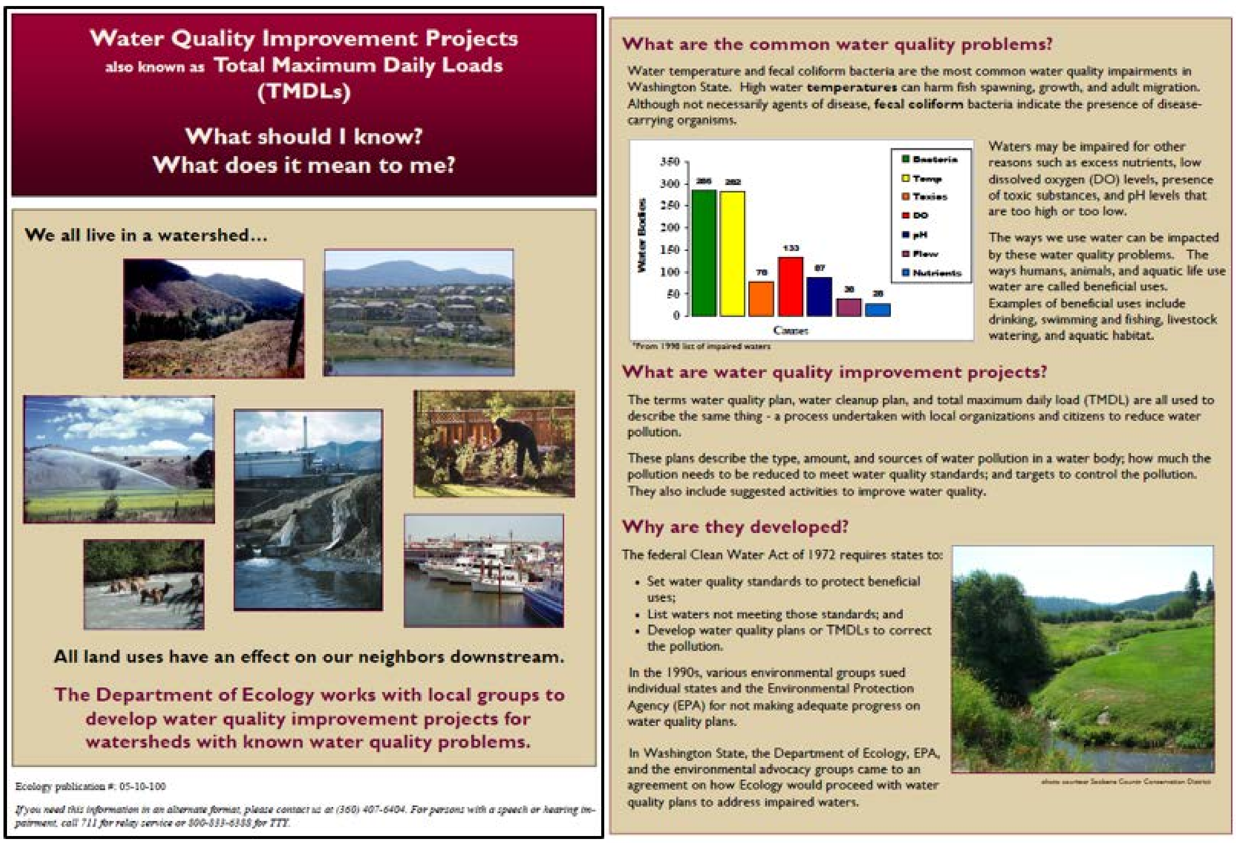
Ecology considers each comment received. The final Submittal Report contains an appendix, **Response to Comments**, which explains how and why the public comments did or did not cause us to change the final document.

Remind me what a TMDL is!

Water Cleanup Plans or TMDLs

- describe the type, amount and sources of water pollution in a water body;
- analyze how much the pollution needs to be reduced or eliminated to meet water quality standards; and
- provide targets and strategies to control the pollution.

Figure B-4: How to Comment Effectively on Water Cleanup Plans



Water Quality Improvement Projects also known as Total Maximum Daily Loads (TMDLs)

What should I know?
What does it mean to me?

We all live in a watershed...

All land uses have an effect on our neighbors downstream.

The Department of Ecology works with local groups to develop water quality improvement projects for watersheds with known water quality problems.

Ecology publication #: 05-10-100

If you need this information in an alternate format, please contact us at (360) 407-6404. For persons with a speech or hearing impairment, call 711 for relay service or 800-833-6388 for TTY.

What are the common water quality problems?

Water temperature and fecal coliform bacteria are the most common water quality impairments in Washington State. High water **temperatures** can harm fish spawning, growth, and adult migration. Although not necessarily agents of disease, **fecal coliform** bacteria indicate the presence of disease-carrying organisms.

Waters may be impaired for other reasons such as excess nutrients, low dissolved oxygen (DO) levels, presence of toxic substances, and pH levels that are too high or too low.

The ways we use water can be impacted by these water quality problems. The ways humans, animals, and aquatic life use water are called beneficial uses. Examples of beneficial uses include drinking, swimming and fishing, livestock watering, and aquatic habitat.

What are water quality improvement projects?

The terms water quality plan, water cleanup plan, and total maximum daily load (TMDL) are all used to describe the same thing - a process undertaken with local organizations and citizens to reduce water pollution.

These plans describe the type, amount, and sources of water pollution in a water body; how much the pollution needs to be reduced to meet water quality standards; and targets to control the pollution. They also include suggested activities to improve water quality.

Why are they developed?

The federal Clean Water Act of 1972 requires states to:

- Set water quality standards to protect beneficial uses;
- List waters not meeting those standards; and
- Develop water quality plans or TMDLs to correct the pollution.

In the 1990s, various environmental groups sued individual states and the Environmental Protection Agency (EPA) for not making adequate progress on water quality plans.

In Washington State, the Department of Ecology, EPA, and the environmental advocacy groups came to an agreement on how Ecology would proceed with water quality plans to address impaired waters.

Figure B-5: Water Quality Improvement Projects, Pgs. 1-2

What is the water quality planning process?

1. A water quality improvement project is developed for a water body that fails to meet water quality standards.
2. Ecology works with local organizations and citizens (advisory group) to plan and conduct a study. The study determines how much pollution needs to be reduced to meet standards.
3. The advisory group and Ecology develop an implementation strategy that describes the activities underway or planned to clean up water or restore water quality.
4. A water quality improvement report that combines the result of the study and implementation strategy is submitted by Ecology to EPA for approval.
5. A water quality implementation plan is written that expands upon the information in the implementation strategy and describes:
   - Activities to reduce pollution
   - Timelines when actions will be completed
   - Who is doing the activities
   - Resources needed (funding)
6. Everyone works together to clean up the water using the implementation plan as a guide.

What does it mean to me?

- Nearby streams may likely be part of a study.
- You are invited to provide input to this process. Other citizens, agencies, and organizations may also be involved.
- You can help be part of the solution to restore water quality.
- Permits for wastewater treatment plants may need updated and ordinances may be adopted by local governments after EPA approval of the TMDL report.

Where do I find more information?

- Frequently Asked Questions about TMDLs
  http://www.ecy.wa.gov/biblio/0310068.html
- Working Together to Achieve Clean Water: A Progress Report
  http://www.ecy.wa.gov/biblio/0310065.html
- Washington State Department of Ecology TMDL website
  http://www.ecy.wa.gov/programs/wq/tmdl/index.html
- Examples of implementation activities
  http://www.ecy.wa.gov/biblio/0410068.html

Water Quality Improvement Projects
also known as
Total Maximum Daily Loads (TMDLs)

What should I know?
What does it mean to me?

Almost everything we do when we are at home, work, or play has the potential to cause water pollution.

Figure B-6: Water Quality Improvement Projects, Pgs. 3-4

From: Wagner, Lydia (ECY)
Sent: Friday, May 22, 2015 8:28 AM
Subject: Draft Deschutes Phase 1 Plan Available for Review/Comment

Hi Everyone,

This is one more reminder the public comment period for the ***draft*** **Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan** ends at 5:00 p.m. on Wednesday, May27.

Your input is important to us. We welcome and encourage you to let us know what you like/don't like, suggestions for implementation actions, or ways to improve clarity of the messages.

Public Comment Period
April 13 – May 27, 2015

The draft plan is available **online** at
www.ecy.wa.gov/deschutes.

Printed copies are available at:

- Department of Ecology, 300 Desmond Dr. SE, Lacey, WA
- Tumwater Regional Public Library, 7023 New Market St, Tumwater, WA

How to submit comments

Send comments by email *(preferred)* to Lydia.Wagner@ecy.wa.gov or by regular mail to:

Lydia Wagner
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

All comments must be received by 5:00 p.m. on May 27, 2015.

As always, we appreciate your interest in improving the water quality in the Deschutes River watershed. Please forward this e-mail to anyone else who is interested. We welcome questions, comments, or suggestions about the work we're doing.

Lydia

Lydia C. Wagner | Water Cleanup Plan (TMDL) Coordinator | Lydia.Wagner@ecy.wa.gov
WA Department of Ecology | Direct 360.407.6329 | Main 360.407.6000 | Fax 360.407.6305
PO Box 47775 | Olympia, WA 98504-7775 | Street: 300 Desmond Dr. SE | Lacey, WA 98503-1274
http://www.ecy.wa.gov/programs/wq/wqhome.html

Figure B-7: May 22 Email reminder to Deschutes Interested Parties

From: Wagner, Lydia (ECY)
Sent: Wednesday, May 27, 2015 9:56 AM
Subject: Final Reminder! Draft Deschutes Phase 1 Plan Public Comment Ends today

Hi Everyone,

This is a **final** reminder the public comment period for the ***draft*** **Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan** ends **today**, Wednesday, May 27, at 5:00 p.m.

Your input is important to us. We welcome and encourage you to let us know what you like/don't like, suggestions for implementation actions, or ways to improve clarity of the messages.

Public Comment Period
April 13 – May 27, 2015

The draft plan is available **online** at www.ecy.wa.gov/deschutes.

Printed copies are available at:

- Department of Ecology, 300 Desmond Dr. SE, Lacey, WA
- Tumwater Regional Public Library, 7023 New Market St, Tumwater, WA

How to submit comments

Send comments by email *(preferred)* to Lydia.Wagner@ecy.wa.gov or by regular mail to:

Lydia Wagner
Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Today!

All comments must be received by 5:00 p.m. on May 27, 2015.

As always, we appreciate your interest in improving the water quality in the Deschutes River watershed. Please forward this e-mail to anyone else who is interested. We welcome questions, comments, or suggestions about the work we're doing.

Lydia

Lydia C. Wagner | **Water Cleanup Plan (TMDL) Coordinator** | **Lydia.Wagner@ecy.wa.gov**
WA Department of Ecology | Direct 360.407.6329 | Main 360.407.6000 | Fax 360.407.6305
PO Box 47775 | Olympia, WA 98504-7775 | Street: 300 Desmond Dr. SE | Lacey, WA 98503-1274
http://www.ecy.wa.gov/programs/wq/wqhome.html

Figure B-8: May 27 Final Email reminder to Deschutes Interested Parties

List of public meetings

- April 23, 2015: 9:00 a.m. at the Tumwater Fire Department, 311 Israel Rd., Tumwater.
- May 14, 2015: 6:00 p.m. at the LOTT Clean Water Alliance, 500 Adams St. NE, Olympia.

Public Meeting

Deschutes River, Percival Creek, and Budd Inlet Tributaries
Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment
Total Maximum Daily Load (TMDL)
Water Cleanup Plan

April 23, 2015
Tumwater Fire Department
311 Israel Rd. SW, Tumwater, WA
9:00 a.m.

AGENDA

Welcome & Introductions

Ecology Presentation

Question & Answer

Squaxin Island Tribe Presentation

Cities of Lacey and Olympia Presentation

Closing

Thank you *for attending today's public meeting.*

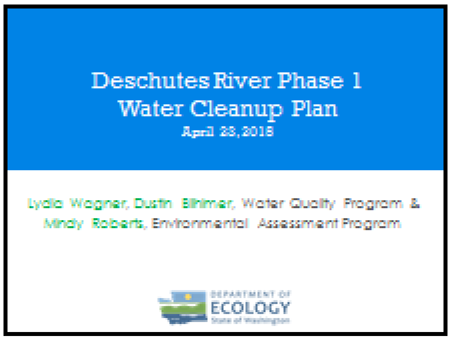
We appreciate your participation.

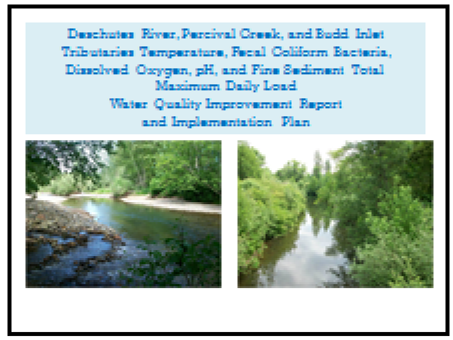
Figure B-9: April 23 Public Meeting Agenda

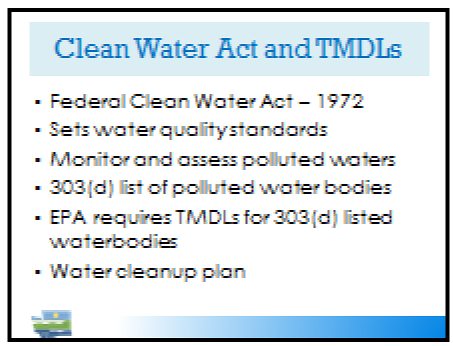
Table B-1: April 23 Meeting Attendees

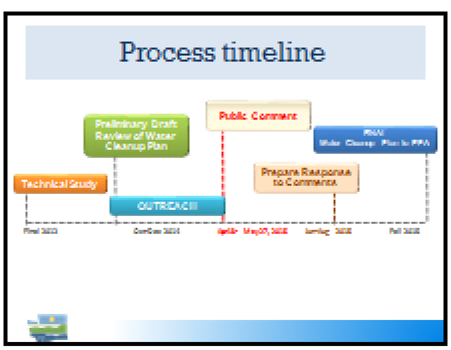
Full Name	Representing	Mailing Address	Phone	E-mail
Lydia Wagner	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6329	Lydia.Wagner@ecy.wa.gov
Dustin Bilhimer	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6276	Dustin.Bilhimer@ecy.wa.gov
Rich Doenges	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6271	Rich.Doenges@ecy.wa.gov
Andrew Kolosseus	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-7543	Andrew.Kolosseus@ecy.wa.gov
Sally Toteff	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6307	Sally.Toteff@ecy.wa.gov
Mindy Roberts	Ecology/EAP	P.O. Box 47600, Olympia, WA 98504-7600	360-407-6804	Mindy.Roberts@ecy.wa.gov
Allison Osterberg	Thurston County	2000 Lakeridge Dr., Olympia, WA 98502-6045	360-754-3355, x7011	osterba@co.thurston.co.wa
Erica Marbet	Squaxin Island Tribe	3110 SE Old Olympic Hwy, Shelton, WA 98584	360-432-3804	emarbet@squaxin.us
Dan Smith	City of Tumwater	555 Israel Rd. SE, Tumwater, WA 98501	360-754-4149	desmith@ci.tumwater.wa.us
Dave Peeler	Deschutes Estuary Restoration Team (DERT)	2504 Link Ct. SW, Olympia, WA 98512	360-866-3998	davepeeler@hotmail.com
Joe Roush	City of Olympia	837 7th Ave. SE, Olympia, WA 98501	360-753-8563	jroush@ci.olympia.wa.us
Scott Steltzner	Squaxin Island Tribe	3110 SE Old Olympic Hwy, Shelton, WA 98584	360-432-3803	ssteltzner@squaxin.us
Sue Davis	Thurston County	412 Lilly Rd. NE, Olympia, WA 98506	360-867-2643	DAVISS@co.thurston.wa.us
Carrie Martin	WA Department of Enterprise Services (DES)	P.O. Box 41011, Olympia, WA 98504-1011	360-407-9323	carrie.martin@des.wa.gov
Heather Saunders Benson	Thurston County Resource Stewardship Department	929 Lakeridge Dr. SW, Bldg 4, Rm 100, Olympia, WA 98502	360-867-2075	bensonh@co.thurston.wa.us
Ron Nelson	Citizen	3624 Waldrick Rd., Olympia, WA 98501	360-352-1761	nelsonb962@aol.com
Karla Fowler	LOTT Clean Water Alliance	500 Adams St. NE, Olympia, WA 98501-6911	360-528-5712	karlafowler@lottcleanwater.org
Jo Henszey	U.S. Environmental Protection Agency (EPA)	300 Desmond Dr. SE, Suite 2, Lacey, WA 98503	360-753-9469	henszey.jo@epamail.epa.gov
Jesse Barham	City of Olympia	*Not provided*		
Jeremy Graham	City of Olympia	P.O. Box 1967, Olympia, WA 98507-1967	360-753-8097	jgraham@ci.olympia.wa.us

Full Name	Representing	Mailing Address	Phone	E-mail
Julie Rector	City of Lacey	P.O. Box 3400, Lacey, WA 98509	360-493-2410	jrector@ci.lacey.wa.us
Martin McCallum	Citizen	2009 Columbia St. SW, Olympia, WA 98501	*Not provided*	martinandval@comcast.net
Rich Schwartz	WA State Department of Natural Resources (DNR)	1405 Rush Rd., Chehalis, WA	360-338-2726	Rick.Schwartz@dnr.wa.gov
Steve Bilhimer	Citizen	*Not provided*		









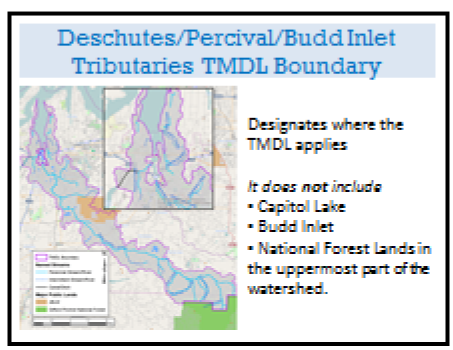
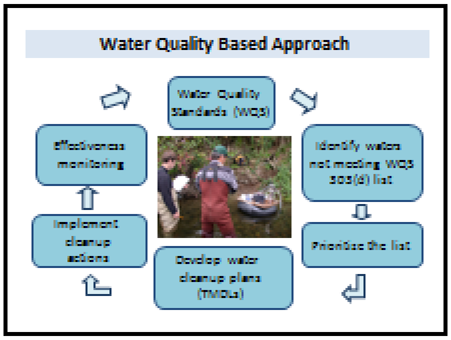
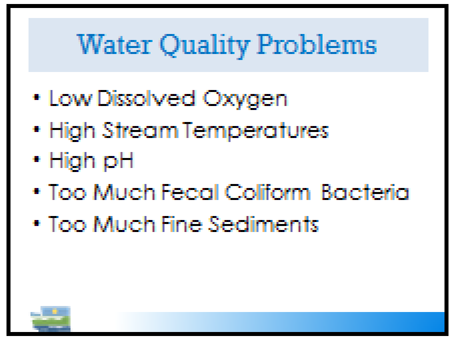
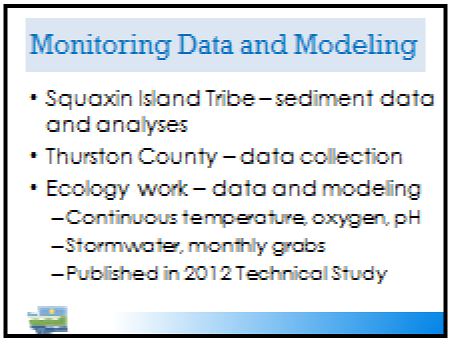
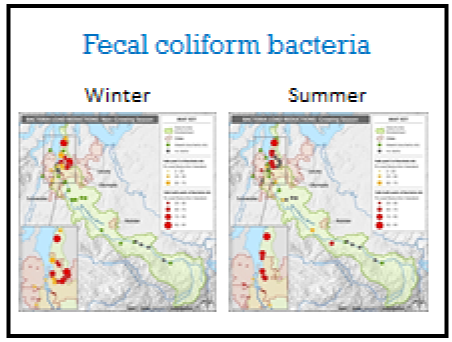


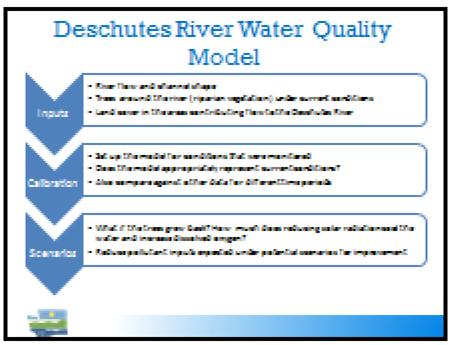
Figure B-10: Ecology April 23 Presentation Slides 1-6











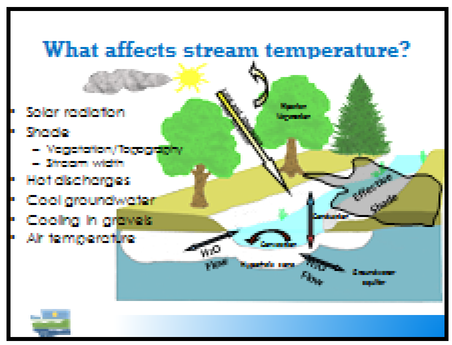
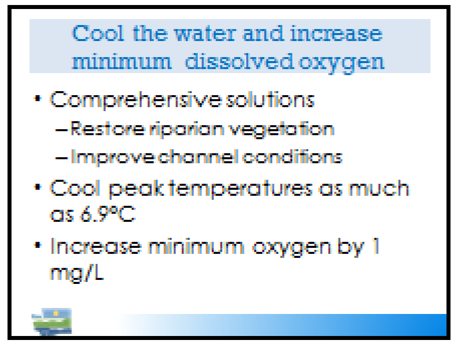


Figure B-11: Ecology April 23 Presentation Slides 7-12



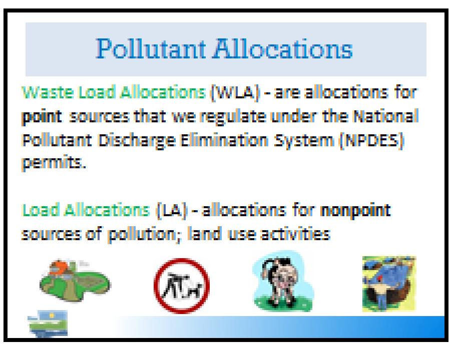
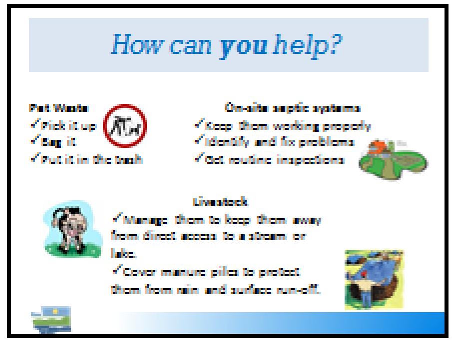


Figure B-12: Ecology April 23 Presentation Slides 13-18



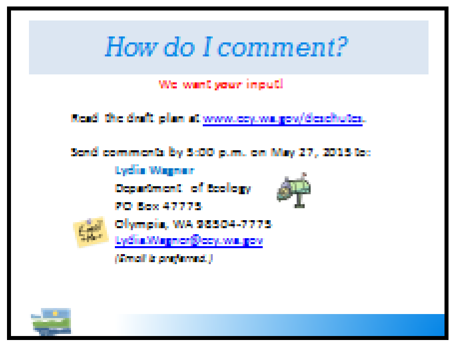
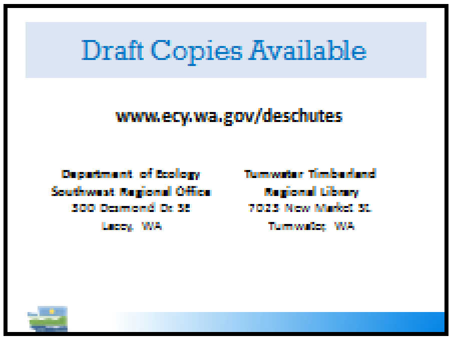
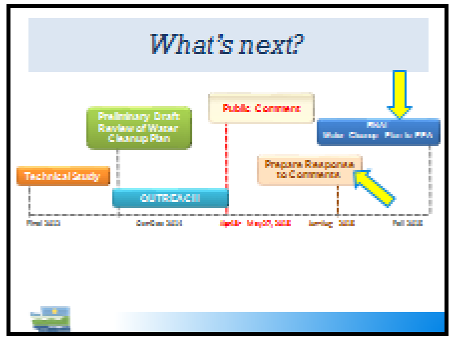


Figure B-13: Ecology April 23 Presentation Slides 19-24





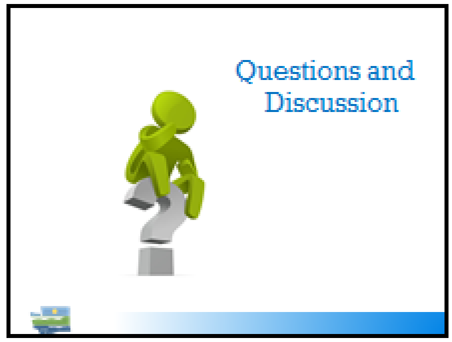
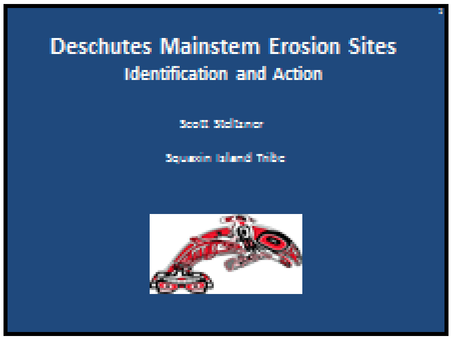
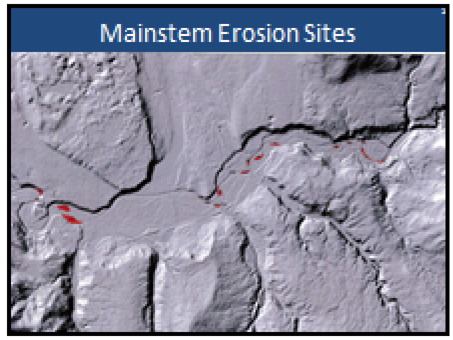
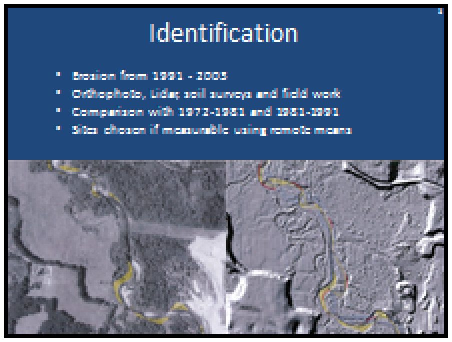
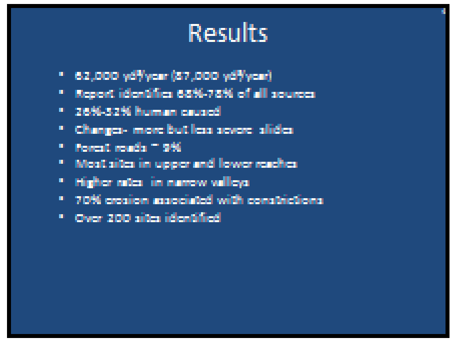


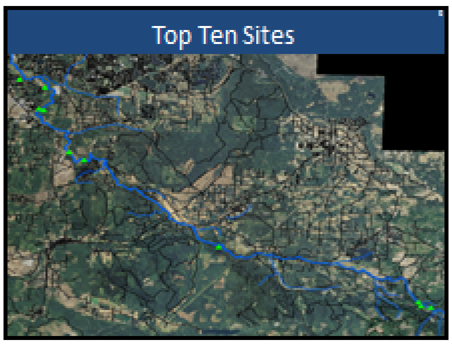
Figure B-14: Ecology April 23 Presentation Slides 25-29











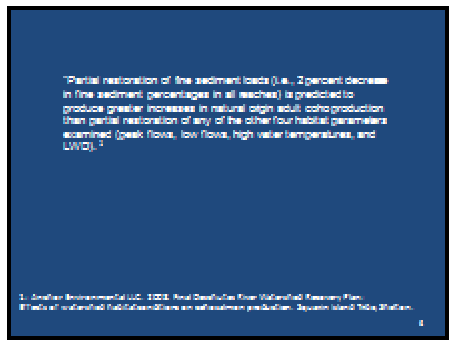


Figure B-15: Squaxin Island Tribe April 23 Presentation Slides 1-6

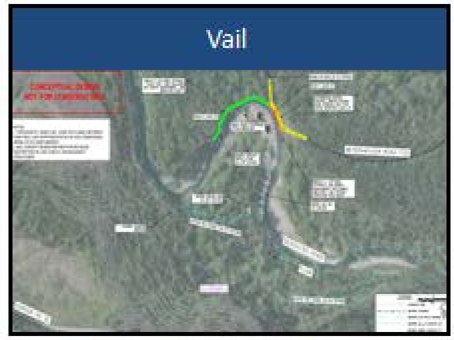
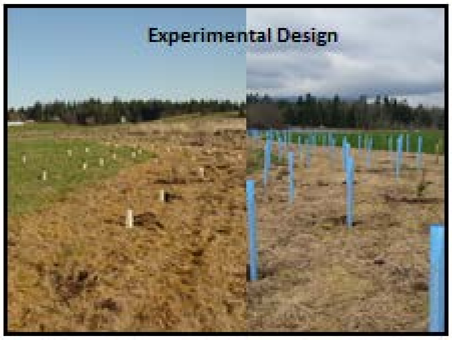


Figure B-16: Squaxin Island Tribe April 23 Presentation Slides 7-11

Figure B-17: Olympia/Lacey April 23 Presentation Slides 1-6



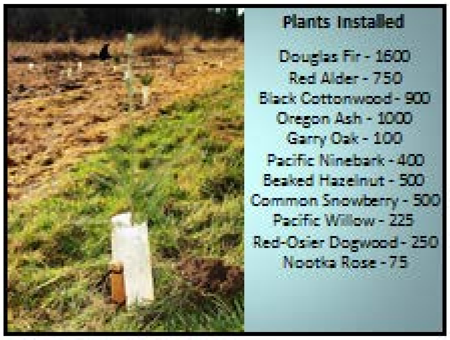


Figure B-18: Olympia/Lacey April 23 Presentation Slides 7-9

Public Meeting

Deschutes River, Percival Creek, and Budd Inlet Tributaries
Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment
Total Maximum Daily Load (TMDL)
Water Cleanup Plan

May 14, 2015
LOTT Clean Water Alliance
500 Adams St. NE, Olympia, WA
6:00 p.m.

AGENDA

Welcome & Introductions

Ecology Presentation

Question & Answer

Squaxin Island Tribe Presentation

Thurston Conservation District Presentation

Closing

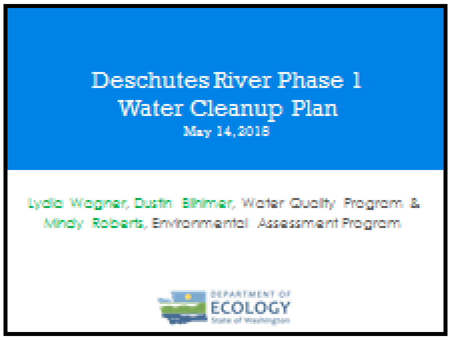
Thank you *for attending today's public meeting.*

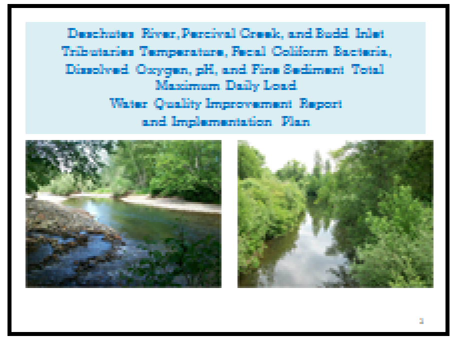
We appreciate your participation.

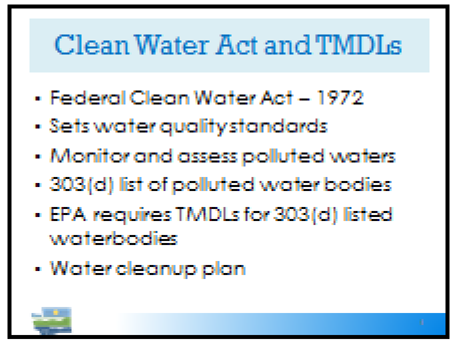
Figure B-19: May 14 Public Meeting Agenda

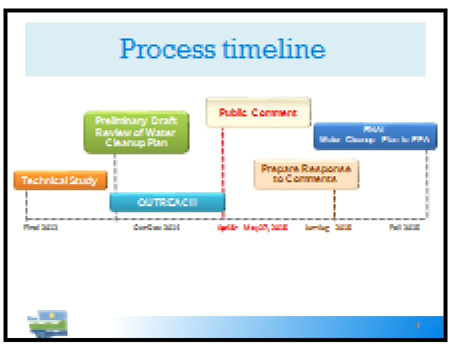
Table B-2: May 14 Meeting Attendees

Full Name	Representing	Mailing Address	Phone	E-mail
Lydia Wagner	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6329	Lydia.Wagner@ecy.wa.gov
Dustin Bilhimer	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6276	Dustin.Bilhimer@ecy.wa.gov
Rich Doenges	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6271	Rich.Doenges@ecy.wa.gov
Chase Gallagher	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6239	Chase.Gallagher@ecy.wa.gov
Andrew Kolosseus	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-7543	Andrew.Kolosseus@ecy.wa.gov
Sally Toteff	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-6307	Sally.Toteff@ecy.wa.gov
Mindy Roberts	Ecology/EAP	P.O. Box 47600, Olympia, WA 98504-7600	360-407-6804	Mindy.Roberts@ecy.wa.gov
Scott Steltzner	Squaxin Island Tribe	3110 SE Old Olympic Hwy, Shelton, WA 98584	360-432-3803	ssteltzner@squaxin.us
Kathleen Whalen	Thurston Conservation District	2918 Ferguson St. SW, Suite A, Tumwater, WA 98512	360-754-3588, x114	kwhalen@thurstoncd.com
Martin McCallum	Citizen	2009 Columbia St. SW, Olympia, WA 98501	*Not provided*	martinandval@comcast.net
Eileen Swarthout	City of Tumwater	3127 Dellrose Rd. SW, Tumwater, WA 98512	360-943-5239	eileenswarthout@gmail.com
Stephanie Zurenko	Ecology/WQ/SWRO	P.O. Box 47775, Olympia, WA 98504-7775	360-407-7633	Stephanie.Zurenko@ecy.wa.gov
Brian Topolski	LOTT Clean Water Alliance	500 Adams St. NE, Olympia, WA 98501-6911	360-528-5703	briantopolski@lottcleanwater.org
Karla Fowler	LOTT Clean Water Alliance	500 Adams St. NE, Olympia, WA 98501-6911	360-528-5712	karlafowler@lottcleanwater.org
Laura Schyler	Deschutes Estuary Restoration Team (DERT)	*Not provided*		lauraschleyer@gmail.com









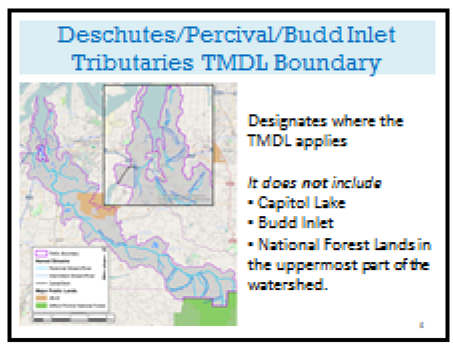
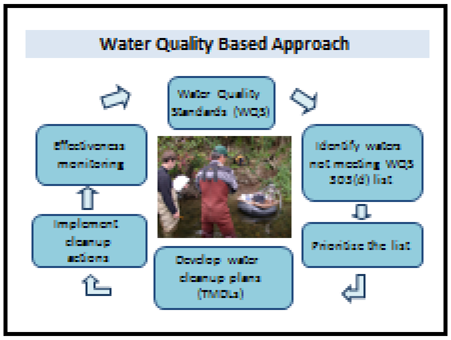
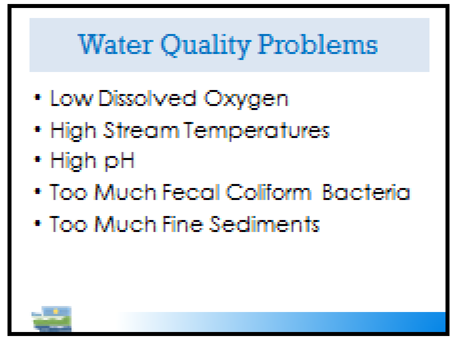
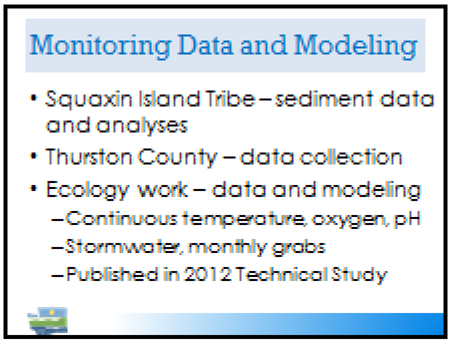
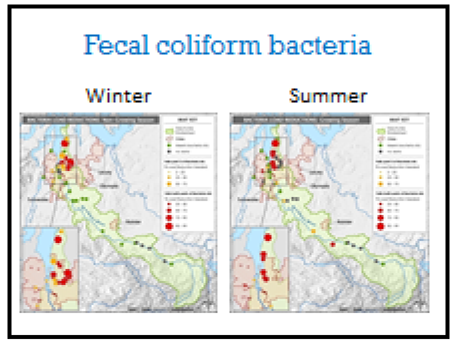


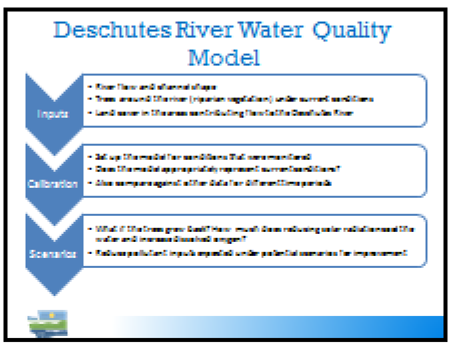
Figure B-20: Ecology May 14 Presentation Slides 1-6











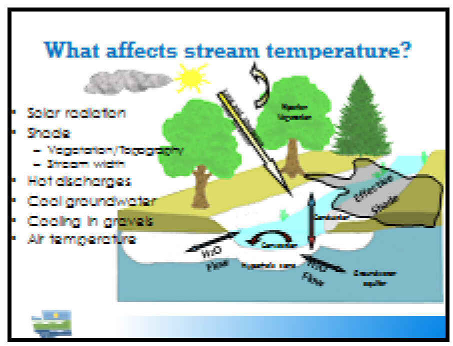
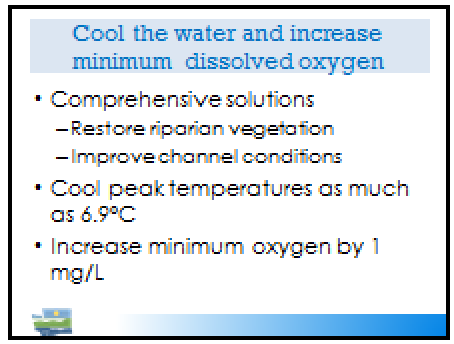


Figure B-21: Ecology May 14 Presentation Slides 7-12



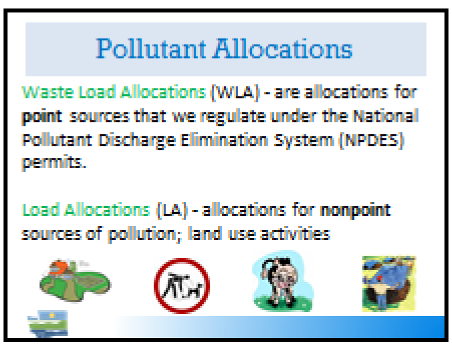
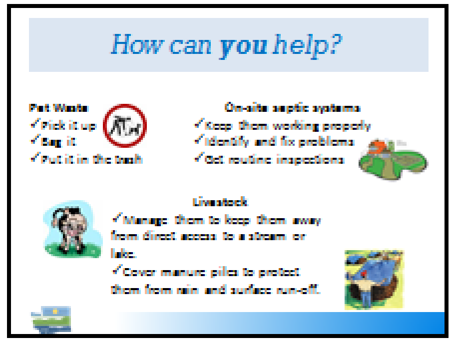


Figure B-22: Ecology May 14 Presentation Slides 13-18



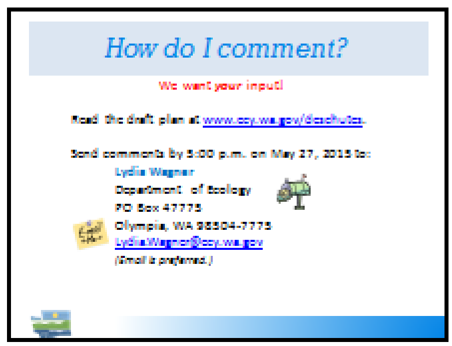
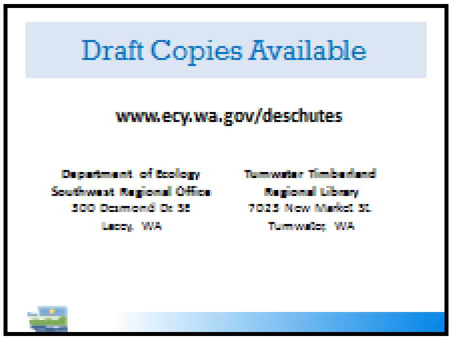
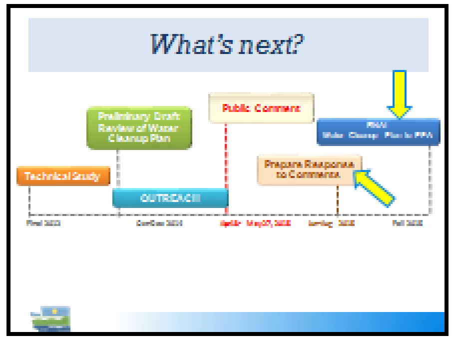


Figure B-23: Ecology May 14 Presentation Slides 19-24





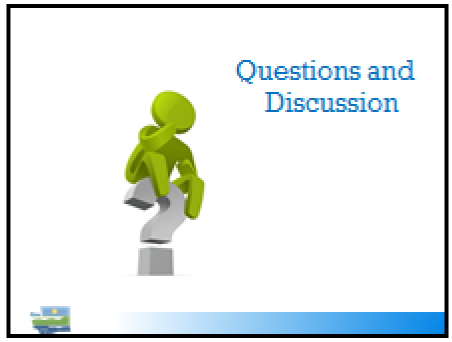


Figure B-24: Ecology May 14 Presentation Slides 25-29

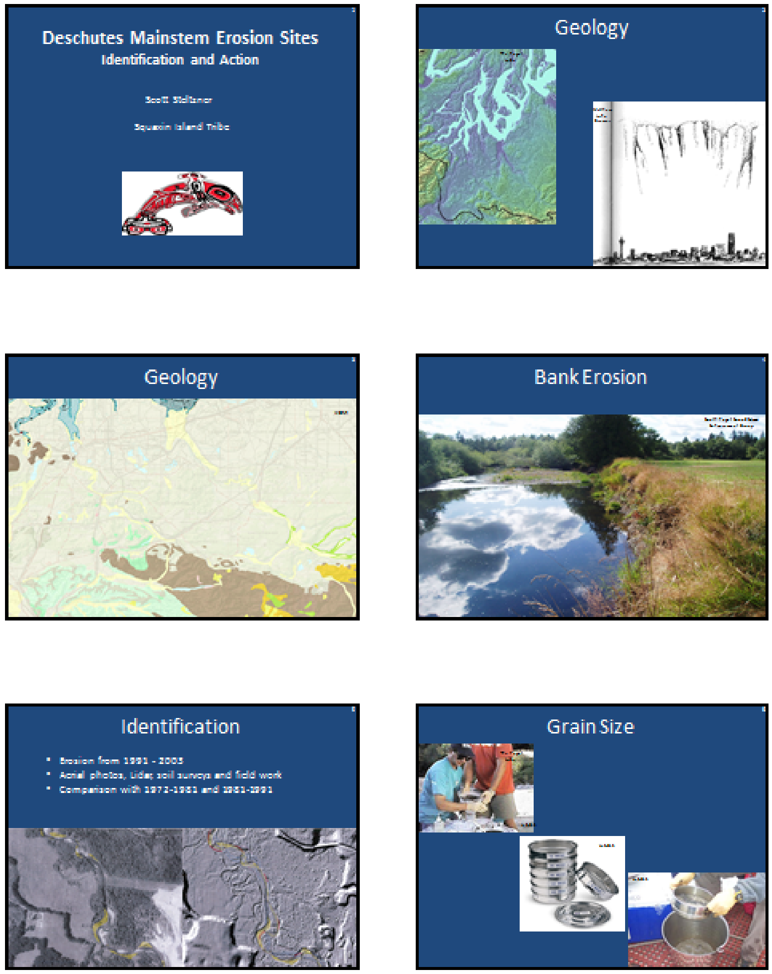
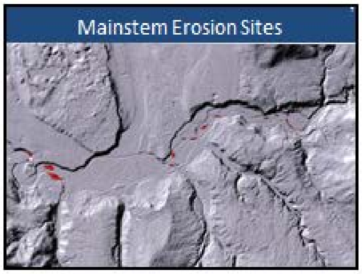


Figure B-25: Squaxin Island Tribe May 15 Presentation Slides 1-6



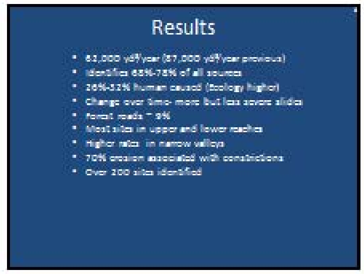


Figure B-26: Squaxin Island Tribe May 14 Presentation Slides 7-12

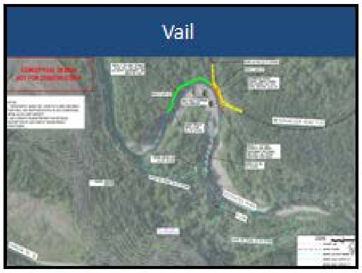
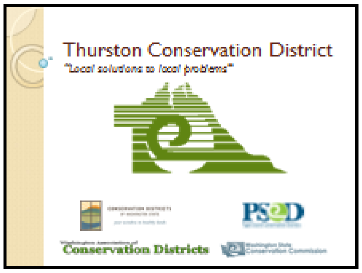
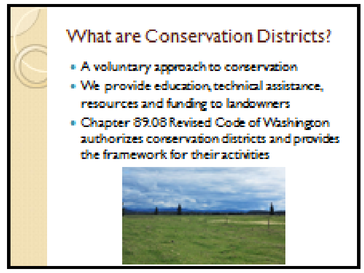


Figure B-27: Squaxin Island Tribe May 14 Presentation Slides 13-18





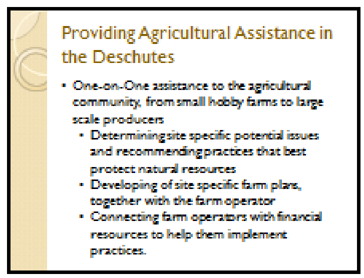
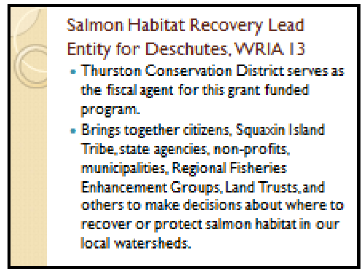


Figure B-28: Thurston Conservation District May 14 Presentation Slides 1-6



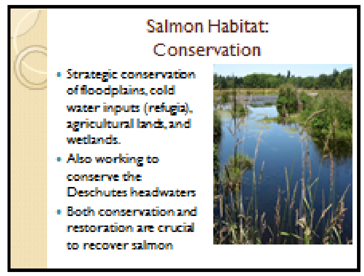


Figure B-29: Thurston Conservation District May 14 Presentation Slides 7-12

Figure B-30: Thurston Conservation District May 14 Presentation Slides 13-15

Comments Received

Images of emails or letters received are included here in the order in which we received them. The comments and Ecology's responses are included in Appendix F.

Martin McCallum, Citizen

Provided the following comments by email on May 18, 2015.

TO: Lydia C. Wagner
Eastern Olympic Water Quality
Management Area Water Cleanup Plan Coordinator
Department of Ecology

FROM: Martin McCallum

Thank you for the opportunity to offer comment on the Deschutes River Phase I TMDL Report and Implementation Plan. I thought the plan was thorough with recommendations based on good science.

Thurston County's urban and rural areas are growing in population with many new houses being constructed. Rural homeowners drill exempt wells that are not metered. I am concerned that the proliferation of exempt wells in the Deschutes River watershed will have a negative effect on temperature and stream flow in the river and its tributaries. For this reason I support the fourth recommendation on page 87 proposing the Department of Ecology prepare a detailed groundwater model of the Deschutes watershed to help evaluate the effect of further groundwater withdrawals, as well as the effects of solutions such as water conservation, groundwater recharge, and low impact development. Are there any planned dates for this modeling?

I also support the fifth recommendation on page 88 to: "Maintain the current status that the Deschutes River watershed is closed to further withdrawals, eliminate illegal withdrawals, and quantify and mitigate the effect of exempt wells."

Here are some related facts:

1. Surface and groundwater interaction related to fish habitat

Groundwater exchange directly affects the ecology of surface water by:

- sustaining stream base flow and moderating water-level fluctuations of groundwater-fed lakes;
- providing stable-temperature habitats (i.e., thermal refugia for fish); and
- supplying nutrients and inorganic ions.

Groundwater also indirectly affects surface water by providing water for riparian vegetation, and by controlling the shear strength of bank materials, thereby affecting slope stability and erosion processes. In streams, the mixing of groundwater and surface water in shallow sediments creates a unique environment called the hyporheic zone, an important feature of the stream ecosystem (paragraph from Hayashi and Rosenberry 2002).

Groundwater from the phreatic aquifer influences channel water temperature when it enters the stream channel. Additionally, the two-way water exchange between the alluvial aquifer and the stream channel (hyporheic flow) is perhaps the most important stream temperature buffer. Various factors such as the stream channel pattern and streambed will determine the magnitude of the hyporheic flow. Poole and Berman also discuss human influences on stream temperature and groundwater. Human activities affect water temperatures in various ways. With respect to phreatic groundwater, reduced groundwater discharge via removal of upland vegetation or well pumping reduces the stream's ability to assimilate heat. (Quote from **Review of Groundwater-Salmon Interactions in British Columbia report).**

Washington State Department of Agriculture

Chery Sullivan provided the following comments by email on May 22, 2015.

From: Sullivan, Chery (AGR)
Sent: Friday, May 22, 2015 1:43 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>
Subject: FW: Draft Deschutes Phase 1 Plan Available for Review/Comment

Hello Lydia,
Thank you for the reminder that the comment period is almost up! We do have a couple of comments…

- Page 103, Implementation Plan section: WSDA's logo should be updated, which I've attached.

- Page 126, Activities to address pollution sources sub-section, Table 37: Washington State Department of Agriculture (WSDA):
    - Not sure where the third action fits (Starts with "Reduce anthropogenic sources of heat."), but it is not related to WSDA so should be removed from Table 37.
    - Please add the following comment next to action 1: Routine dairy inspections are conducted every 18 to 22 months to ensure compliance with the Dairy Nutrient Management Act and to provide regulatory technical assistance.
    - Please add the following comment next to action 2: WSDA addresses and tracks complaints through Ecology's Environmental Response Tracking System. Compliance responses may include regulatory technical assistance, informal enforcement, or formal enforcement.

Thank you,
Chery

Chery Sullivan
DNMP Technical and Compliance Specialist
Dairy Nutrient Management Program
WA Dept of Agriculture
Office: 360.902.1928
Mobile: 360.292.5870
csullivan@agr.wa.gov

Washington State Department of Transportation

Kenneth Stone provided the following comments in an attached letter to an email sent by Diana Hendrickson on May 22, 2015.

Washington State Department of Transportation

Lynn Peterson
Secretary of Transportation

Transportation Building
310 Maple Park Avenue S.E.
P.O. Box 47300
Olympia, WA 98504-7300
360-705-7000
TTY: 1-800-833-6388
www.wsdot.wa.gov

May 22, 2015

Ms. Lydia C. Wagner
Washington State Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

RE: WSDOT Review Comments for Deschutes River, Percival Creek and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan Draft

Dear Ms. Wagner:

The Washington State Department of Transportation (WSDOT) Environmental Services Office has reviewed the Deschutes River, Percival Creek and Budd Inlet Tributaries Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan Draft – April 2015 (Washington State Department of Ecology Publication No. 15-10-012). We appreciate the opportunity to provide comment on this TMDL document.

First and foremost, WSDOT is committed to working collaboratively with Ecology and others to address pollutant sources from state highways to the Deschutes River, Percival Creek, and Budd Inlet Tributaries, as they may exist.

We would like to provide the following comments, which include the page number and wording in question/of concern:

1) Page 51, second sentence of the bullet for fine sediment: "No offsite transport via runoff of any materials to a surface water body within the TMDL boundary is allowed."

   Comment: Suggest removing this sentence as it is not consistent with the requirements described in the rest of the paragraph or the NPDES Construction Stormwater General Permit.

2) Page 178, Table C-5:

   Comment: Table C-5 is inconsistent with the body of the document. Therefore, we suggest Ecology:

Figure B-31: WSDOT, Pg. 1 of 2

- Remove the bulleted actions, "Apply fecal coliform programmatic…" and "Reduce anthropogenic sources of heat…," and ensure WSDOT's actions are consistent with those listed in Table 42.
- Revise the table so it is consistent with the language on page 57. Specifically, the critical periods for the Waste Load Allocations (WLAs) are listed as year round on page 57, while Table C-5 lists the critical period as June – September. In addition, the description of the WLA for Bacteria is slightly different on page 57 than it is in Table C-5.
- Revise "current permit limits" to reflect WSDOT's current permit's effective date of April 5, 2014.

3) Several pages throughout text: WSDOT's permit number is inconsistent.

Comment: Ensure all references to WSDOT's permit number are the correct number: #WAR043000A.

Thank you for considering our comments. If you have questions or wish to discuss, please contact WSDOT's TMDL Lead, Elsa Pond at 360-570-6654 (office), 360-584-2631 (cell), or ponde@wsdot.wa.gov.

Sincerely,

Kenneth M. Stone
Resource Programs Branch Manager
Environmental Services Office

KMS:ep

Figure B-32: WSDOT, Pg. 2 of 2

Zena Hartung, Citizen

Provided the following comments by email on May 26, 2015.

From: Zena Hartung [mailto:zhartung@gmail.com]
Sent: Tuesday, May 26, 2015 3:52 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>
Subject: TMDL for Deschutes-comments

As a resident of Olympia semi-consistently for over 30 years, I'd like to congratulate Dept of Ecology on the TMDL drafted for the Deschutes River and related water bodies. I am grateful for the opportunity to comment.

I am presently the President of the Carnegie Group of Thurston County: a local good-government all volunteer non-profit organization. I do not speak for the board in my comments, but the board includes some strong environmental advocates who have been encouraged to make their own comments. Indeed we pooled our funds and provided Thurston County with an all-day forum on water issues just last month.

First, the indications that stormwater is providing scouring and noxious chemical stews to Deschutes River needs to be addressed, with more and better raingardens, stormwater ponds and preferentially, to less impervious pavement. Slowing and cleaning stormwater before it joins the streams needs to be a priority. Some losses due to urban development mean this won't be possible. Look at the paving over of Schneider Creek's estuary. For the gain of a bit of parking a whole ecosystem suffers daily. This impacts the whole community, not just the fish. Another local estuary loss is Moxlie Creek. Though that decision was made generations ago, Moxlie Creek, the waters and the habitat suffer everyday from the loss.

So in this regard I was pleased to read the following in this draft: "There is no reserve for growth to contribute to nonpoint sources of pollution. In addition, municipal, construction and industrial stormwater permit requirements are expected to protect the impaired water bodies from further degradation due to future growth. All new development within the urban growth areas of the cities of Olympia, Tumwater and Lacey and Thurston County must implement low impact development (LID) practices as a requirement of their Western Washington Phase II Municipal Stormwater Permit. New development outside the UGA's should implement LID principles...to ensures that NPS of pollution are reduced to a negligible amount."

So my question is, will it stick? Will the Department of Ecology require these permitting agencies to stick by LID practices?

May I also suggest that the Department look closely at the temperature issues. Salmon are negatively impacted with waters as warm as are recorded in this document. The likelihood of a long hot summer ahead, and more to come, mean the Deschutes will be witness to dead fish soon and in the future, if any survive. Riparian plantings take 30 years to mature, and some of the large woody debris the Squaxin Tribe has hoped to place have been refused by local residents. Please include funding for education for owners of riparian zones. These folks need to understand they are stewards of a precious resource we all share and they need to be prepared to treat it according to the best available science. Once they understand the importance of not denuding or lawn planting the shore and not resisting the debris in the river, they will, we hope, come to appreciate the clean, cool water that is the result.

There is good science now that confirms that surface and groundwater are strongly connected systems. The history of permitting of exempt wells threatens the instream flow of waters of Deschutes River. If only a few conditions may be addressed as the result of this study, please recognize the critical role this bad piece of law has played in reducing the viability of this river and rivers and streams throughout the State.

Thanks for the opportunity to comment,

Zena Hartung
3240 Centerwood Ct SE
Olympia, WA 98501

U.S. Environmental Protection Agency

Laurie Mann provided the following comments by email on May 27, 2015.

From: Mann, Laurie [mailto:mann.laurie@epa.gov]
Sent: Wednesday, May 27, 2015 12:47 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>; Bilhimer, Dustin (ECY) <DBIL461@ECY.WA.GOV>
Cc: Croxton, Dave <Croxton.David@epa.gov>; Henszey, Jo <Henszey.Jo@epa.gov>; Stewart, William C. <Stewart.Williamc@epa.gov>
Subject: RE: Final Reminder! Draft Deschutes Phase 1 Plan Public Comment Ends today

Hi Lydia,
Here are EPA's comments on the draft document. We are happy to meet with you at any time to discuss these comments.
Thanks,
Laurie

1. Does the proposed 303(d) list identify impairments that haven't been included on previous lists? If so, EPA recommends that Table 1 ("2012 303(d) listings for pollutants addressed by this TMDL") be updated to include waters that Ecology has identified as being impaired, but which haven't been identified on previous lists.

2. Water Quality Standards & Numeric Targets. In this Section, please clearly explain which "numeric targets," if any, have been chosen by Ecology as the focus for TMDL development. For example, dissolved oxygen impairments are typically addressed by identifying specific pollutants targets; the pollutants that have been chosen, and the reason for choosing those particular pollutant targets, should be clearly explained. For example, the targets (used to calculate the loading capacity and the allocations) should be clearly explained for temperature (e.g. kcal/day), DO (e.g. kcal/day and nitrogen), sediment (e.g. turbidity and/or cubic yards/day) and pH.
3. A numeric loading capacity for all pollutants should be included in the document, either in the LC section, or in the Appendix.

4. Loading Capacity for fine sediment. Is the loading capacity equal to the load allocation? If so, please state this in the LC section and refer the reader to the load allocation section (which currently contains the type of write-up that is typically found in the loading capacity section). The loading capacity section doesn't currently specific a numeric load, but the load allocation section does include a numeric load. Also, please explain the way in which the fine sediment targets are linked to the mass loading (either here, or in the Water Quality Standards & Targets discussion); and explain how the turbidity targets are related to the water quality standard.

5. EPA appreciates the thorough identification of point sources that are currently covered by the Construction Stormwater general permit, Industrial Stormwater general permit, Sand and Gravel general permit, Phase II Municipal stormwater permit and the Washington State Department of Transportation Municipal stormwater permit. EPA also acknowledges the thorough work that has been done to translate WLAs into very specific stormwater permit requirements.

City of Olympia

Andy Haub provided the following comments in an attached letter to an email sent by Jeremy Graham on May 27, 2015. A paper copy of the letter was also received the same day.

City of Olympia | Capital of Washington State
P.O. Box 1967, Olympia, WA 98507-1967
olympiawa.gov

May 27, 2015

Ms. Lydia C. Wagner
Washington State Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia, WA 98504-7775

Dear Ms. Wagner:

Subject: City of Olympia Review Comments for Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load: Water Quality Improvement Report and Implementation Plan

The City of Olympia has reviewed the Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load: Water Quality Improvement Report and Implementation Plan – April 2015 (Washington State Department of Ecology Publication No. 15-10-012).

We appreciate the opportunity to provide comments on this document. The City of Olympia is committed to working collaboratively with Ecology and others to address the fecal coliform, temperature, dissolved oxygen, pH, and fine sediment contributions of the City in the Deschutes River Percival Creek, and Budd Inlet tributaries, as they may exist.

The City of Olympia would like Ecology, the citizens of Olympia, and visitors in our community to know we are committed to excellence in our obligations of steadfast devotion to resource management and of watershed cleanup and protection. We have and continue to be proactive in our approach to storm and surface water management, protecting and preserving these valuable resources for current and future uses and users within this community. We are aware and acknowledge there are bacteria, temperature, and possibly fine sediment issues taking place throughout many streams within and around the City. We are and have been committed to helping solve, cleanup, and manage these problems. Some of our efforts include: implementation of an illicit discharge and source tracing program to track down and eliminate sources of bacteria; an education and outreach program devoted to long-term behavioral change; and a construction stormwater program that takes huge strides in reducing erosion and sediment laden runoff at development sites throughout the City. We are also currently in the process of developing a habitat program focused on riparian, channel and near shore restoration activities.

The City has reviewed the Deschutes TMDL document and identified several areas of concern. We are addressing these concerns within this letter as well as including an attached matrix with specific comments, which include the page number and preferred alternatives or recommendations.

MAYOR: Stephen H. Buxbaum, **MAYOR PRO TEM:** Nathaniel Jones, **CITY MANAGER:** Steven R. Hall
COUNCILMEMBERS: Jim Cooper, Julie Hankins, Steve Langer, Jeannine Roe, Cheryl Selby

Figure B-33: City of Olympia, Pg. 1 of 8

Ms. Lydia C. Wagner
Department of Ecology
Page 2

The Deschutes TMDL Implementation Plan does not appear to provide a clear path or understanding of when or how the TMDL is considered complete. The City would appreciate a section within the document explaining the delisting process (i.e., how it is determined, when obligations are complete, and when it is appropriate to delist). Absent this information, the City of Olympia presumes it is in full compliance with TMDL requirements when all implementation actions (IA) and BMPs are deployed, installed and maintained.

Since Waste Load Allocations (WLA's) and Implementation Actions (IA's) can result in specific requirements imposed on the City via a revision to our Phase II, MS4 NPDES Permit, it seems like an oversight by Ecology to require specific IA's that are not stormwater related. The City has identified sections within the *pollution sources and organizational actions, Table 27, for the City of Olympia*, that are non-stormwater related (i.e., Smith Ranch mitigation, regional onsite septic system conversion program, riparian restoration, and homeless camp management). Since these are not stormwater related, the City believes these IA's are inappropriate and should be removed from the action table. This does not mean the City disagrees with these actions. Just that these actions are more appropriately addressed through other mandates and regulations required of the City. For example the City's Wastewater Utility is currently involved in efforts to develop an inter-jurisdictional strategy for OSS conversions. The City's Drinking Water Utility is collaborating with the Cities of Yelm and Lacey on riparian and habitat enhancement projects along the Deschutes River, and the City's Storm and Surface Water Utility is implementing habitat enhancement projects in riparian areas throughout the City of Olympia. All are programs that will help improve water quality within the boundaries of the Deschutes TMDL, but should not be included as Waste Load Allocations nor Implementation Actions especially if they result in a mandated requirement within our Phase II, MS4 NPDES Permit. We request that non-stormwater related actions be removed from the action table and associated narrative.

The City of Olympia recognizes there is a measurable fine sediment problem occurring within the Deschutes River mainstem. However, the link between fine sediment problems within the Deschutes River and the Budd Inlet tributaries is unclear. It appears the City of Olympia is being tasked with WLA's and IA's that will address and reduce fine sediment loading within several Budd Inlet tributaries, yet neither of these tributaries have been assigned pollutant impairment for fine sediment by Ecology's Water Quality Assessment and 303(d) listing. The City of Olympia is concerned we will be tasked with financial burden and responsibility to solve a non-city problem. We believe it is more reasonable for Ecology to work with the appropriate agencies and landowners that are contributing to the fine sediment problems in the Deschutes River watershed. Therefore we request removal of any requirements for WLA's and IA's for fine sedimentation required of the City.

In conducting an analysis of the Deschutes TMDL, staff were simultaneously reviewing Ecology's proposed Water Quality Assessment and 303(d) List for Washington State Using Fresh Water Data (proposed listing update). Through our review of the proposed listing update we identified three stream reaches/segments currently listed as impaired under Ecology's 2012 303(d) list. These streams include Black Lake Ditch, Percival Creek and Chambers Creek. It appears these three streams will be delisted or moved to a Category 1 (meets water quality standards) as a result of the proposed listing update. As a result of this best available science, we recommend that Ecology

Figure B-34: City of Olympia, Pg. 2 of 8

Ms. Lydia C. Wagner
Department of Ecology
Page 3

review the Deschutes TMDL document in its entirety for consistency and remove any WLA's associated with these streams as it relates to the pollutant of concern. The City of Olympia is interested in knowing how these changes will be incorporated into the Deschutes TMDL.

Finally in our review and recommendations, the City encourages Ecology to use its authority where appropriate. RCW 90.48 grants the Department authority to regulate and enforce the standards of quality for waters of the state and for substances discharged therein. The sediment and bacteria problems in the Deschutes River are a middle and upper watershed management issue that includes the Department of Natural Resources forest practices and Department of Agriculture laws regulating private landowner stewardship. These contaminant and pollutant sources are outside of the City's control. The City would like to know how downstream interests are being protected and ensured regulations are being applied appropriately, are effectively protecting water resources, and assured that means of compliance are being met. The City asks Ecology to guarantee pollution sources not currently assigned WLA's are held responsible for managing their contributions to downstream water quality degradation problems. The City of Olympia stresses that Ecology complete its task in assessing the Forest and Fish Report, and make recommendations to improving the process. We want to ensure we will not be tasked with the responsibility of addressing these issues, nor have our rate payers "foot the bill" for these issues in an attempt to mitigate the problem.

The intent of our comments is to help Ecology gain an understanding of the City's perspective and to foster collaboration between our departments. We are interested in working toward common goals in extinguishing sources of water quality degradation in order to recover and protect the health of the headwaters to South Sound. The City of Olympia wants to pave a path forward toward success in developing meaningful actions with measurable outcomes.

Thank you for considering our comments. If you have questions or need any additional information, please contact Olympia's Surface Water Quality Planner, Jeremy Graham, at 360.753.8097 or jgraham@ci.olympia.wa.us. In addition, we would like to respectfully request an in-person meeting to review the details of our comments. Please work with Mr. Graham to arrange a time to meet prior to finalization of the Deschutes TMDL.

Sincerely,

ANDY HAUB
Water Resources Director
Public Works Department

ec: Joe Roush, Environmental Services Supervisor
Jeremy Graham, Surface Water Quality Planner
Enclosure

\\calvin\PW Water Resources\WR Administration\Andy Haub\Correspondence\2015\Letter to WDOE Re City Comments on TMDL WQ Improvement Plan_05-27-15.docx

Figure B-35: City of Olympia, Pg. 3 of 8

Deschutes River TMDL (April 2015)
Review Comments

Reviewer Information	
Name:	City of Olympia
Representing:	City of Olympia
E-mail:	jgraham@ci.olympia.wa.us
Phone:	360-753-8097

Comment Number	Page, Paragraph, & Line Number	Comments, Questions, and Suggestions
1	General Comment	The TMDL implementation plan does not provide a clear path or understanding of how or when the TMDL is considered complete. Please provide a section within the TMDL document that outlines a clear path for delisting (i.e., how it is determined, when obligations are complete, and when it is appropriate to delist).
2	General Comment	Because Wasteload Allocations (WLA's) and Implementation Actions (IA's) typically result in specific requirements imposed via a revision to the City's Phase II, MS4 NPDES Permit, we believe it is inappropriate to require specific IA's that are not stormwater related. Please remove any non-stormwater related WLA's and IA's from the TMDL document. Specifically those resulting in inappropriate requirements and actions to the City of Olympia (i.e., Smith Ranch mitigation, regional onsite septic system conversion program, riparian restoration, and homeless camp management).
3	General Comment	The City of Olympia is only responsible for pollutants we have control over (i.e., Property, Ownership) in the case of bacteria source tracking/tracing the City is limited to working within the public domain, providing limited access to private property. Source tracking/tracing may lead to a point source, a cause, or point of supply that the City does not have responsibility, ownership, or jurisdictional authority over. At that point we have completed our actionable TMDL obligations and turn the findings over to the appropriate authority for further review and action.
4	General Comment	Ecology is the appropriate entity to conduct monitoring of streams and waterbodies. The City of Olympia requests Ecology take the lead for any monitoring or sampling of streams.
5	General Comment	Please utilize Ecology's proposed Water Quality Assessment and 303(d) List for Washington State Using Fresh Water Data as current best available science to update the TMDL accordingly reflecting changes to waterbodies within the Deschutes TMDL watershed boundary.
6	General Comment	Because Water Quality Assessments and best available science can identify changes to stream Listing Id's, we recommend that a section be included within the Deschutes TMDL document that allows for changes to IA's required by entities through an adaptive management process as Water Quality listings change.

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Figure B-36: City of Olympia, Pg. 4 of 8, Comments 1-6

Deschutes River TMDL (April 2015)
Review Comments

Comment Number	Page, Paragraph, & Line Number	Comments, Questions, and Suggestions
7	General Comment	The sediment problem in Deschutes River is an upper watershed and management issue involving DNR forest practices and Department of Agriculture laws regulating private landowner stewardship over their lands and operations. How are affected interests downstream ensured regulations are being applied appropriately, are effectively protecting water resources, and assurance that means of compliance are being met. How are others that are affected being included in the adaptive management process?
8	pg. 6, Table 1	The water body Indian Creek has a 2012 Assessment Listing ID #45026. There is likely an incorrect number set as there is no matching listing in the 303(d) listing database. Please correct this Listing ID information or remove from the table.
9	pg. 8, Table 1	The 2012 Assessment Listing ID #42337 for temperature is mistakenly labeled under the water body Black Lake Ditch and should be identified as water body Black *River* Ditch.
10	pg. 53, 1st bullet point	*Fine sediment: No offsite transport via runoff of any materials is allowed.* This sentence is contradictory of the use of turbidity as a surrogate for fine sediment and discharges. Also, because of the natural occurence of sedimentation in the built environment through multiple non-point sources, it is unreasonable to expect "no offsite transport via runoff of any materials is allowed" is possible. Based on the current science and understanding of the stormwater infrastructure dynamic, this would be an ineffective and unattainable goal utilizing the current technologies and BMPs available for use. We recommend utilizing text similar to that of WSDOTs permit on page 57. **Recommended Text:** ~~No offsite transport via runoff of any materials is allowed.~~ No visible accumulation of fine sediment where MS4 discharges stormwater to the Deschutes River, Percival Creek, and Budd Inlet Tributaries is allowed.
11	pg. 113, 2nd paragraph, 3rd sentence	*To meet the requirements of the TMDL, these actions must be completed by 2025*. To be more consistent with the Schedule requirements (*implementation 2016 - 2030*) in the action tables, **we recommend** that the completion date be changed to 2030.
12	pg. 114, 2nd sentence	*These actions do not apply to entities already assigned specific actions in previous tables.* We assume the intent of this sentence was to capture the action items required of entities in table 24 through 40. Because this sentence precedes these tables it effectively does not cover any of the entities it is identifying as already being assigned specific actions. The sentence as stands may be misinterpreted due to its placement in the document. **Recommended Text:** These actions do not apply to entities already assigned specific actions ~~in previous~~ identified in tables 24 through 40. [Or something similar capturing the intent]
13	pg. 118, Table 27, Schedule Dates	Because the finalization of this TMDL will likely occur sometime in late 2015, **we recommend** that all Schedule dates be shifted a year back to allow for a more realistic implementation process. For instance instead of *Plan Development: 2015* and *Implementation start date: 2016* we would prefer a Plan Development date of 2016 and implementation start date of 2017.

Figure B-37: City of Olympia, Pg. 5 of 8, Comments 7-13

Deschutes River TMDL (April 2015)
Review Comments

Comment Number	Page, Paragraph, & Line Number	Comments, Questions, and Suggestions
14	pg. 118, Table 27, Action #2, 1st sentence	The action item requires the City to develop a plan to reduce bacteria and sediment loading. Further review of the Deschutes TMDL makes apparent the fine sediment problems are occurring within the Deschutes River mainstem. None of the priority areas identified for the City (Budd inlet tributaries and/or Percival Creek watershed) have been assigned pollutant impairment for fine sediment by Ecology's Water Quality Assessment and 303(d) listings. Because none of the priority waterbodies for the City have been determined as requiring a load allocation for fine sediment we recommend that sediment be removed from actionable items. **Recommended Text:** Develop a plan to reduce bacteria ~~and sediment~~ loading with a schedule of prioritized projects prior to expiration of the permit on July 31, 2018.
15	pg. 118, Table 27, Action #2, 2nd sentence	*The prioritized projects will need to be implemented during subsequent permit cycles.* In order to be more consistent with Action Item #7. **Recommended Text:** The prioritized projects will need to be implemented during subsequent permit cycles <u>in the priority area.</u>
16	pg. 118, Table 27, Action #2	Because Bacteria is the only pollutant of concern appropriately identified as requiring and assigning a WLA to the City we recommend removing any reference to Percival Creek watershed, Percival Creek, or Black Lake Ditch within the Deschutes TMDL as it relates to a Bacteria parameter. The Department of Ecology's proposed Water Quality Assessment and 303(d) list proposes to remove Percival Creek, Black Lake Ditch and Chambers Creek from a Category 5 (impaired) to a Category 1 (meets water quality standards) for Bacteria. We recommend that Ecology review the entire TMDL document for consistency and make changes to the document reflecting the current Best Available Science, by removing all references that bacteria is a parameter of concern for these waterbodies. There should not be any waste load allocations, loading reductions, or requirements for tracking or tracing bacteria sources in these watersheds or waterbodies. **Recommended Text: Priority areas:** <u>Budd Inlet tributaries:</u> Ellis, Indian, Mission, Moxlie, and Schneider Creeks~~; Percival Creek Watershed: Percival Creek~~
17	pg. 118, Table 27, Action #3	This action table requires source identification of potential bacteria pollutants. Because the best available science provided by Ecology's Water Quality Assessment and 303(d) list proposes to lower Black Lake Ditch and Percival Creek from waters of concern/impaired to a Category 1 (meets water quality standards) We recommend Percival Creek and Black Lake Ditch be removed from requirements of screening. **Recommended Text:** ...routine field screening include Budd Inlet tributaries: Butler, Ellis, Indian, Mission,~~, and Percival Creeks; Percival Creek Watershed: Near Black Lake Ditch confluence.~~
18	pg. 118, Table 27, Action #5, 2nd sentence	In order to be more consistent with Action Item #7. **Recommended Text:** ...including installing pet waste stations at established pet recreation areas to prevent or reduce bacteria released into local water bodies <u>in the priority area.</u>

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Figure B-38: City of Olympia, Pg. 6 of 8, Comments 14-18

Deschutes River TMDL (April 2015)
Review Comments

Comment Number	Page, Paragraph, & Line Number	Comments, Questions, and Suggestions
19	pg. 118, Table 27, Action #6	**We recommend** striking and removing the action item altogether as riparian and channel restoration are non stormwater related and IA's required by the TMDL will likely be incorporated via the City of Olympia's MS4 NPDES Permit.
20	pg. 118, Table 27, Action #7	This action item is already a requirement and mandate of the City of Olympia's Shoreline Master Program. **We recommend** striking and removing the action item completely.
21	pg. 119, Table 27, Action #8 Smith Ranch	Because WLA's and IA's typically result in specific requirements imposed via a revision to the City's Phase **II**, MS4 NPDES Permit, we believe it is inappropriate to require specific IA's that are not stormwater related. The Smith Ranch mitigation project is mandated as mitigation through other permittable actions as it relates to a ground water withdrawal permit. This mandate is currently being implemented through other legal avenues, requirements, and schedules. Including Smith Ranch mitigation into this TMDL will cause confusion and possible mismanagement of an existing mandate. Therefore **we request** it be removed as an actionable item within Table 27. It may be more appropriately placed within the body of the TMDL text as a background informational discussion item.
22	pg. 119, Table 27, Action #9	The City is actively participating on an inter-jurisdictional work team with the City of Tumwater and Thurston County along with Public Health. Because onsite septic is already being managed through other regulations and mandates, **we recommend** striking and removing the entire action item.
23	pg. 119, Table 27, Action #10	This action item is essentially describing the City of Olympia's Drainage Design Manual which already addresses this issue. We recommend referencing the City's Drainage Manual. **Recommended Text:** Reduce anthropogenic sources of heat through implementation of the City of Olympia Drainage Design Manual. ~~Possible actions include: where feasible, retain runoff and encourage infiltration; evaluate runoff from large areas of impervious surface, with focus on on-site retention and infiltration; or where feasible, increase native vegetative cover in sensitive areas.~~
24	pg. 119, Table 27, Action #11	The City Utility is currently implementing habitat enhancement projects in riparian areas throughout the City of Olympia. **We recommend** striking and removing the action item altogether as riparian and channel restoration are non stormwater related and IA's required by the TMDL will be incorporated via the City of Olympia's MS4 NPDES Permit.
25	pg. 119, Table 27, Action #13	This action item is duplicative of action #3, **we recommend** striking and removing the action item completely.

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Figure B-39: City of Olympia, Pg. 7 of 8, Comments 19-25

Deschutes River TMDL (April 2015)
Review Comments

Comment Number	Page, Paragraph, & Line Number	Comments, Questions, and Suggestions
26	pg. 162, Appendix 1 (Glossary)	Near Stream Disturbance Zone (NSDZ) is defined as *The active channel area without riparian vegetation that includes features such as gravel bars.* Based on this definition, it is difficult to understand and visualize where this would be in relation to applying in the field. The Ordinary High Water mark is also within the active channel at a location devoid of vegetation. **We request** Ecology provide or develop a diagram that allows for visual representation of the NSDZ in relation to other stream boundary indicators (i.e., OHWM, OHWL, CMZ, Bankfull Channel Width, and flood plain)
27	pg. 176, Appendix C, Table C-4 (WLA)	Recommended Text: ~~No offsite transport via runoff of any materials is allowed.~~ No visible accumulation of fine sediment where MS4 discharges stormwater to ~~in~~ the Deschutes River or its tributaries.~~, nor Percival Creek and its tributaries including Black Lake Ditch.~~

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Figure B-40: City of Olympia, Pg. 8 of 8, Comments 26-27

Thurston County

Commissioner Cathy Wolfe provided the following comments in an attached letter to an email sent by Heather Saunders Benson on May 27, 2015.

THURSTON COUNTY
WASHINGTON
SINCE 1852

COUNTY COMMISSIONERS
Cathy Wolfe
District One
Sandra Romero
District Two
Bud Blake
District Three

BOARD OF COUNTY COMMISSIONERS

May 27, 2015

Lydia Wagner
Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775

Subject: Thurston County Comments on the *Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan*

Dear Ms. Wagner:

On behalf of the Board of County Commissioners for Thurston County, I want to thank you for the opportunity to review and provide comments on the "*Draft Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan*", hereafter referred to as "Deschutes TMDL".

Thurston County reviewed the document, and coordinated both internally and externally with other stakeholders, to provide the Washington State Department of Ecology (Ecology) with concise, relevant, and thoughtful comments. As the on-the-ground implementers of the draft Deschutes TMDL, we are uniquely positioned to comment and provide feedback on the application of loading allocations and narrative recommendations such as those presented in the draft Deschutes TMDL. Enclosed are our comments in the excel format provided by you for your use and review (Table 1). In addition to specific comments on draft language, the enclosures contain narrative comments detailing our process and/or programmatic concerns. These are provided in the context of wanting our TMDLs to be as effective and meaningful as possible.

We hope you will find the comments useful as you work to revise and amend the draft Deschutes TMDL. Thurston County remains fully committed to working collaboratively with Ecology to improve and protect the quality of our waters in the Puget Sound, and to working collaboratively with Ecology and others to address the parameters of concern identified in Deschutes TMDL.

Please do not hesitate to contact Water Resources Utility Planner Heather Saunders Benson, if you have any questions or need any additional information. Mrs. Saunders Benson can be reached by phone at 360.867.2075 or by email at bensonh@co.thurston.wa.us. In addition, we would like to request an in-person meeting to review the details of our comments, and respectfully request that you work with Mrs. Saunders Benson to arrange a time to meet with her prior to finalizing the Deschutes TMDL.

Sincerely,

Cathy Wolfe

Cathy Wolfe
Chair

Enclosures

Building #1, Room 269, 2000 Lakeridge Drive SW, Olympia, Washington 98502-6045 (360) 786-5440
TDD (360) 754-2933

Figure B-41: Thurston County, Pg. 1 of 11

THURSTON COUNTY COMMENTS ON THE DRAFT DESCHUTES TMDL AND IMPLEMENTATION PLAN
MAY 27, 2015

PROCESS AND PROGRAMMATIC CONCERNS

TMDLs offer a platform from which we can address water quality impairments by identifying sources of impairment and developing strategies to address them. In this context, the Deschutes TMDL offers the region an opportunity to develop solutions for problems that have been mutually identified by local jurisdictions, the Washington State Department of Ecology (Ecology), and Region 10 of the Environmental Protection Agency (EPA), such as high temperature, low dissolved oxygen, high pH, eutrophication, high fecal coliform bacteria, and excessive sediments in the Deschutes River and its tributaries.

The public review draft of the Deschutes TMDL provides a series of recommendations for addressing these concerns with a strong emphasis on riparian reforestation and bank stabilization. We agree that conservation and protection of riparian corridors can, in theory, be one of the most cost-effective tools for addressing all of the parameters listed above. However, there are significant implementation challenges associated with this approach, and the county feels that important aspects of implementation have not been fully acknowledged or addressed in the draft plan. In Thurston County, most of the Deschutes watershed falls outside of NPDES municipal stormwater permit boundaries. Thus, successful TMDL outcomes will rely heavily on the implementation of voluntary measures and the enforcement of existing (and possibly limited) regulatory tools by the local jurisdictions and the state. The county remains concerned that a failure to account for these considerations increases the likelihood that our obligations for implementing corrective measures will continue to increase with no additional effective recovery of the Deschutes.

In regards to the Deschutes TMDL and implementation plan, the county has articulated its process and programmatic concerns in the narrative below. We look forward to working with the state and other partners to identify and deploy effective strategies to address these concerns for the betterment of the water quality in our region.

Reliance on voluntary measures to achieve water quality standards

Overall, the TMDL implementation plan relies heavily on the improvement and restoration of riparian areas and channel conditions to restore water quality in the Deschutes River. Most of the opportunities identified occur outside of Thurston County's NPDES municipal stormwater permit boundary. Therefore, most all of the activities recommended will be voluntary in nature and will have to occur on private land, or will rely heavily on the utilization of existing (and somewhat limited) regulatory mechanisms. The TMDL implementation plan, as it is currently written, tends to lack a robust and frank discussion on the barriers to implementing these types of projects on private lands and the lack of resources available to do so.

It is possible to identify and prioritize these types of projects as suggested in Table 33 (Identify and implement projects to improve or restore riparian and channel conditions or reduce sediments released into the watershed), and efforts are already underway to identify riparian restoration projects in

Page 1 of 10 Thurston County Comments on the Draft Deschutes TMDL and Implementation Plan May 27, 2015

Figure B-42: Thurston County, Pg. 2 of 11

Thurston County. However, it is not practical or reasonable to expect Thurston County to be able to implement these activities on private lands or on any type of schedule. The county has begun taking steps to strengthen its relationships with local conservation districts, the Washington State Conservation Commission, outreach and education coordinators, and others in order to leverage existing efforts, align goals and priorities, and implement quality programs and projects. However, in the end, we cannot force landowners to implement projects; we can only work to identify common interests and implement projects where there is a willing landowner.

In consideration of these concerns, it seems that more discussion about the benefits of conservation to prevent further degradation should be included in the TMDL. This will help drive resources and funding to local land trusts and other entities who work regularly to protect lands through voluntary conservation easements or purchases. Some consideration should also be given to collaborative arrangements and projects that meet multiple objectives such as riparian and channel preservation and restoration, fish recovery, and flood control. Furthermore, we recommend including more language in the TMDL document regarding barriers to implementation of voluntary measures as well as ideas for overcoming those barriers.

Enforcement issues and recommended actions

Much like the previous section, addressing impairments in the majority of the watershed will occur outside of NPDES municipal stormwater permit boundary and will require enforcement of existing local and state regulations. However, the draft TMDL document provides no robust discussion regarding the challenge of enforcement. Ecology has the authority to enforce and regulate nonpoint source pollution on private lands through RCW 90.48, but Ecology rarely exercises this authority. This is not meant to be a criticism, but rather to point out that to make implementation meaningful and effective, we need to be able to acknowledge these challenges and incorporate strategies for overcoming them into the TMDL implementation plan. For example, Table 38 of the Draft Deschutes lists *"oversee implementation of the Forest and Fish Program"* as an action item for Ecology. However, it may be more meaningful to include an action item that asks Ecology to review existing monitoring data to determine if the existing state water quality, forestry, agricultural, and fisheries laws are effective in protecting beneficial uses and if not, work within the adaptive management framework to revisit the rule.

We also recommend that the state include some further discussion in the TMDL documents regarding the state's commitments to assisting with restoration efforts and protection efforts, whether it be strengthening the nonpoint source plan to make it more operational in nature (e.g., increasing funding for protection and restoration efforts) and/or making a commitment to more fully utilize Ecology's regulatory authority. Furthermore, a frank discussion on the challenges associated with this would illustrate the need for work in these areas and would also indicate the state's commitment and stake in the process.

For Thurston County, many of the actions listed in Table 23 (General land use category implementation actions) and Table 33 (Thurston County) fall outside of the local governments' jurisdiction and/or are voluntary in nature. Collectively, we need to think about how practical or meaningful these proposed actions are in terms of implementation and effectiveness. In some cases it may be within our

Page 2 of 10 Thurston County Comments on the Draft Deschutes TMDL and Implementation Plan May 27, 2015

Figure B-43: Thurston County, Pg. 3 of 11

jurisdiction's authority, but in practicality there are insufficient resources for enforcement. For example, monitoring ATV usage, installing gates, and patrolling are not practical options both in terms of resources to implement, but also because this activity predominantly occurs on private land. Another example would be the recommendation for golf courses to "use the salmon safe certified" program. As a voluntary program, it would help to include discussion on who would coordinate this and what would incentivize the landowner to participate. Recommended activities such as these would be more meaningful if implementation strategies accompanied them. In many cases, the way they are described is vague and impractical.

Choice to separate the freshwater and marine areas into two TMDLs

In January of 2014, Thurston County submitted a letter to Ecology, urging the state to develop one comprehensive strategy for the entire watershed system. Among the concerns noted was that meaningful and effective loading allocations and load reduction targets cannot be established without considering the external influx of nitrates entering into Puget Sound. Even if Thurston County initiates and implements all the recommended TMDL strategies, the marine water portions of the Deschutes may still not meet water quality standards because of these external influences. Furthermore, the current draft of the TMDL and Implementation Plan refers to the future TMDL that will be developed for Capital Lake and the marine waters of Budd Inlet but does not provide any discussion about the timeline for developing that plan or how Ecology envisions the two TMDLs working together. We have several questions about the impact of this decision and request that Ecology update the plan to address the following concerns associated with the decision to split the Deschutes watershed cleanup plan into two TMDLs:

- How does Ecology envision the two TMDLs working together? Will this current freshwater TMDL be updated with revised loading allocations once the modeling work for Capital Lake and the marine waters of Budd Inlet is completed?
- What are Ecology's plans for working with other wastewater point dischargers beyond the LOTT Clean Water Alliance (LOTT) to address external pollution sources?
- Acknowledging that there are large nitrogen polluters outside of the Deschutes watershed that contribute to the pollutant load, how will the state determine when the County's obligations are met?

It is inappropriate to expect the county to continue to develop and fund additional programs without reasonable assurance that loading allocations were developed appropriately and that the TMDL's prescribed actions can actually achieve the desired outcome of improving water quality. The county requests that Ecology include narrative in the TMDL describing the challenges associated with this approach and explicitly provide cleanup entities with the flexibility and latitude to delay or re-prioritize efforts regarding nutrient reduction practices in consideration of the uncertain outcome of future nutrient modeling efforts.

Inclusion of nutrients

In the draft TMDL, it is very difficult to evaluate the basis for using a nutrient loading allocation for addressing dissolved oxygen and pH. In some cases, it appears that these parameters are within the limit for anthropogenic influence. For example, on Pages 44 and 45, the TMDL reads: "*The reduction of*

Figure B-44: Thurston County Pg. 4 of 11

nutrient inputs from tributaries and groundwater to estimated natural conditions will improve the average daily minimum DO in the Deschutes River by only 0.03 mg/L and 0.02 mg/L, respectively. This improvement is well within the 0.2 mg/L allowance in the water quality standards for anthropogenic influences on minimum DO". Later, on Page 46, it reads: "*The temperature, DO, and pH regimes are highly influenced by Black Lake and wetlands at the headwaters in both branches, and natural conditions may not meet the numeric criteria*". Further on, on Page 101, the TMDL reads: "*A future TMDL will set the appropriate allocations for nitrogen*". Despite this confusion, the draft TMDL includes stringent loading allocations for dissolved inorganic nitrogen (72.3% reduction) and orthophosphate (10.1% reduction) as well as DO and pH loading allocations.

The county requests the opportunity to have a face to face meeting with Ecology to discuss the nutrient allocations in order to better understand the rationale prior to the finalization of the Deschutes TMDL.

Reasonable Assurance

The technical advisory group began work on this TMDL in 2003. It has taken 12 years to complete a draft TMDL for a portion of the Deschutes watershed (Capital Lake and the marine waters to Budd Inlet are to be completed in a subsequent phase). It seems unreasonable to expect that the Deschutes will be meeting water quality standards by 2025 (10 years) in consideration of two principal factors:

1. This TMDL relies heavily on the implementation of voluntary practices, and
2. Parameters of concern (temperature, DO, and pH) in the Deschutes River are influenced by marine waters which will be addressed through development of a future TMDL.

Therefore, we request that Ecology revise the TMDL and Implementation Plan to reflect a more realistic timeframe for meeting water quality standards. Some indication of the timeline for release of the marine portion of the TMDL would also be helpful as well as describing additional regulatory mechanisms that may be employed should voluntary measures prove insufficient in achieving water quality standards.

Interagency Project Team

Many of the comments noted in the narrative of this letter relate to the overall policy associated with TMDL development and implementation in the state. We also recognize that the state is under enormous pressure to produce multiple TMDLs for very complex systems in a short amount of time. Therefore, in order to assist in the effort to improve policy and implementation of TMDLs in a more systematic, comprehensive, and effective way, Thurston County has been participating in an Interagency Project Team (Team). The Team consists of staff from the surface water departments of Clark, King, Kitsap, Pierce, Snohomish and Thurston Counties, as well as staff from the Washington State Department of Transportation. The Team aims to work with Ecology and EPA to improve implementation of the Clean Water Act and TMDL programs in the state. In 2014, the Team hired a consultant to compare water quality assessment (WQA) and TMDL programs in Washington State against five other states in order to identify potential improvements. Subsequently, the Team developed a report and set of nine key recommendations for improving TMDL development including the following:

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Figure B-45: Thurston County, Pg. 5 of 11

1. Establish a multi-stakeholder standing committee to improve coordination and engagement with the regulated community;
2. Implement existing regulatory authority related to unpermitted and nonpoint sources;
3. Refine water quality standards and water quality assessment methodologies;
4. Improve and employ consistent processes for collecting, assessing, and utilizing credible data in WQA and TMDL development;
5. Refine water quality assessment categories to improve clarity and aid in defining priority water bodies;
6. Update the current biological assessment and listing methodology;
7. Define TMDL prioritization methodology, timelines, and process for public involvement;
8. Define TMDL development methodology; and
9. Develop consistent TMDL implementation expectations.

The Interagency Team, with Ecology and EPA, has already started to look at the recommendations listed above. If implemented, these recommendations will help to address many of the challenges of TMDL implementation we identified in this comment submittal. Thurston County looks forward to working with the Team and Ecology to further refine and implement the recommendations noted above, as a way to address many of the policy-related limitations identified in our review of the Draft Deschutes TMDL.

Page 5 of 10 Thurston County Comments on the Draft Deschutes TMDL and Implementation Plan May 27, 2015

Figure B-46: Thurston County, Pg. 6 of 11

Table 1. Deschutes Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan
Comments from Thurston County

Reviewer Information	
Name:	Heather Saunders Benson
Representing:	Thurston County
E-mail:	bensonh@co.thurston.wa.us
Phone:	360-867-2075

Comment Number	Pg., Paragraph, & Line Number	Comments, Questions, and Suggestions
1	Pg. xii, Paragraph 2 (Line 4) and Paragraph 6 (Line 2)	The abstract indicates that the technical study collected data in order to determine the loading capacity for fecal coliform bacteria, temperature, DO, pH, and fine sediment; however, the report establishes numeric targets for nutrients in this report. Please clarify how data collected during the study can be used to establish these nutrient targets. This also was changed from the last version provided which stated in the abstract that this TMDL would not establish numeric targets for watershed nutrient reductions. Please provide justification for the change.
2	Pg. xiii, Paragraph 2, Line 2	This is also a change from the last version which stated that compliance with the TMDL would be based on meeting water quality standards. Please explain the change.
3	Pg. xviii, Paragraph 2, Line 1	Editorial comment: "...list for fecal coliform bacteria, temperature, DO, pH, ~~or~~ and/or fine sediment."
4	Pg. xxii, Paragraph 4, Line 1 (What needs to be done in this watershed)	Because much of the Deschutes river basin is located outside the NPDES municipal stormwater permit boundary, many of the recommended actions will need to be voluntary in nature. Recommend including a section before "Wasteload allocations" on voluntary actions that will be needed to bring the water quality back into compliance (e.g., stream buffers, in-channel and bank restoration, manure storage, and livestock exclusion). This will provide more emphasis on these measures and will help drive resources to programs that help implement these types of activities.
5	Pg. xxvi, Paragraph 4, Bullets 1-3	These bullets are inconsistent with the TMDL success criteria listed in the abstract. Please use consistent language throughout.
6	Pg. 33, Paragraph 2, Line 4	Please clarify if the language here to describe if the loading targets for the Budd Inlet model will be used for the future (i.e., marine) TMDL or this current TMDL.
7	Pgs. 44, 45, 46, 70, and 101	In the draft TMDL, it is very difficult to evaluate the basis for using a nutrient loading allocation for addressing dissolved oxygen and pH. In some cases, it appears that these parameters are within the limit for anthropogenic influence. For example, on Pages 44 and 45, the TMDL reads: "*The reduction of nutrient inputs from tributaries and groundwater to estimated natural conditions will improve the average daily minimum DO in the Deschutes River by only 0.03 mg/L and 0.02 mg/L, respectively. This improvement is well within the 0.2 mg/L allowance in the water quality standards for anthropogenic influences on minimum DO*". Later, on Page 46, it reads: "*The temperature, DO, and pH regimes are highly influenced by Black Lake and wetlands at the headwaters in both branches, and natural conditions may not meet the numeric criteria*". Further on, on Page 101, the TMDL reads: "*A future TMDL will set the appropriate allocations for nitrogen*". Despite this confusion, the draft TMDL includes stringent loading allocations (Pg. 70, Table 11) for dissolved inorganic nitrogen (72.3% reduction) and orthophosphate (10.1% reduction), as well as DO and pH loading allocations. The county requests the opportunity to have a face to face meeting to discuss the nutrient allocations in order to better understand the rationale prior to the finalization of the Deschutes TMDL.
8	Pg. 71-73, Figure 27 (Sources of Dissolved Inorganic Nitrogen...)and Figure 28 (Map showing the difference between the DO criterion and expected...)	The county requests the opportunity to have a face to face meeting to discuss the nutrient allocations in order to better understand the rationale prior to the finalization of the Deschutes TMDL.
9	Pg. 73, Figure 29 (OSS density)	It seems that the urban area should be far more red than it is considering we know that there are ~17,000 OSS with densities greater than 3 per acre. Request that Ecology verify the accuracy of that map.
10	Pg. 87, Paragraph 2, Line 4	Recommend changing this language to "both new development and redevelopment must not worsen DO and pH conditions in the system," as it may be unrealistic to expect that development activities will *reduce* DO and pH impacts. There are several references to this throughout the document.
11	Pg. 88, Bullets 3, 5 and 6	More references to nutrients here. This is not a nutrient TMDL and requirements for monitoring and/or quantification are not appropriate here.

Figure B-47: Thurston County, Pg. 7 of 11, Comments 1-11

Table 1. Deschutes Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan
Comments from Thurston County

Comment Number	Pg., Paragraph, & Line Number	Comments, Questions, and Suggestions
12	Pg. 87-88 Conclusions and Recommendations Section	• Edit and clarify language for these sections: –"*Septic systems, particularly those near a surface water body or sited in highly drained soils could be contributing excess nutrient loads. Existing management programs by Thurston County should continue and intensify. In addition, future efforts should examine and implement options to reduce nutrient loading from OSS systems, including conversion to sewer in urban areas and state-of the-art nitrogen-reducing onsite systems in rural areas, if and when reliable and affordable technology becomes available.*" • "*Future groundwater* (reclaimed water and/or stormwater? – This needs to be clear) *Infiltration facilities should quantify the potential increases in nutrient loads to the Deschutes River and tributaries and offset any inputs by reducing other local sources so that DO and pH do not worsen.*" • "*Agricultural operations, including livestock operations, should eliminate offsite transport of sediments, bacteria, and nutrients. Existing operations in the Deschutes watershed should be further evaluated for facility management and manure applications. Water quality monitoring should be considered.* (What does "offsite transport" mean? This needs to be clear. Does it mean that all nutrients from agricultural facilities need to be managed on site and that they can't adversely affect water resources? Or, does it mean that all nutrients from agricultural facilities need to be stored and managed as described in an approved nutrient management (farm) plan? Something else?)"
13	Pg. 89, Paragraph 2 (Line 1) and Paragraph 3 (Line 4)	No supporting evidence is provided to suggest that the Deschutes will be meeting all water quality standards within the next 10 years. Please provide examples of other successful TMDLs or provide more evidence to support this timeline.
14	Pg. 90, Table 15 (Legal Authority)	Please add bullets for -Thurston County Sanitary Codes: Article III -Rules and Regulations of the Thurston County Board of Health Governing Water Supplies, Article IV -Rules and Regulations of the Thurston County Board of Health Governing Treatment and Dispersal of Sewage; and Article VI - Rules and Regulations of the Thurston County Board of Health Governing Nonpoint Source Pollution.
15	Pg. 98, Table 18 (Education and Outreach)	Please add a section for Thurston County Resource Stewardship. Current activities include the following: **Stream Team** Stormwater Stewards and Salmon Stewards program training, classes on Naturescaping for Water and Wildlife, rain gardens, marine and riparian zone restoration planning and techniques. http://www.co.thurston.wa.us/stormwater/streamteam/streamteam-home.html http://streamteam.info/ **Stormwater Education and Outreach** Information and programs on neighborhood stormwater retention pond care, polluted runoff reduction, stewardship opportunities, spill reporting, pet waste reduction, drainage technical assistance. http://www.co.thurston.wa.us/stormwater/
16	Pg. 101, Paragraph 4, Lines 2 and 3	The report again indicates that a future TMDL will set appropriate numeric allocations for nitrogen. Recommend changing line 3 to "...stakeholders should ~~also~~ aim to reduce nitrogen loads to the Deschutes River."
17	Pg. 103, WA DOA Section	WSDA authority and responsibility for dairy enforcement should be clearly stated.
18	Pg. 109, Thurston County Public Health Section	Add "Solid Waste Permitting and Enforcement, Group B and single family drinking water supplies," to the 1st sentence. In lines 6 & 7 delete the language, "*... purchasing property to be used to construct community drain fields where on-site repairs are not possible*," (While this has been done, it is not the mission or responsibility of the department.) In line 10, add the language, "*agriculture* and solid waste *complaint response* ..."
19	Pg. 113, Table e 21, Line 1 (Implement Forests to Fish Law)	Recommend changing action to "*Review monitoring data and existing law to determine if existing language is strong enough to support water quality standards and uses. Work within the adaptive management framework to revise as necessary*."
20	Pg. 114, Paragraph 1, Line 2	Please clarify if this language is intended to mean that the "General Actions" will apply to entities listed is <u>subsequent</u> tables (i.e., Thurston County). Report says "These actions do not apply to entities already assigned specific actions in <u>previous</u> tables."
21	Pg. 114, Table 23, Row 1 "All Terrain Vehicle (ATV) Use – Illegal"	We understand that these are general actions items and not considered require for Thurston County. However, the enforcement mechanism for this recommendation has not been identified. Recommend including who should perform the suggested actions.
22	Pg. 114, Table 23, Row 5 "Golf Courses"	There is no enforcement action identified. This is a voluntary action. Recommend identifying the group who would work with golf courses to incentivize the use of the "salmon safe certified" program.
24	Pg. 115, Table 23, Row 6	Replace the language in the parenthesis with "at least every three years for standard gravity systems and annually for all other system types" as is stated in state law.

Figure B-48: Thurston County, Pg. 8 of 11, Comments 12-24

Table 1. Deschutes Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan
Comments from Thurston County

Comment Number	Pg., Paragraph, & Line Number	Comments, Questions, and Suggestions
25	Pg. 115, Table 23, Row 8	How are we to comply with this? What does it mean to have a 35-ft wide vegetation corridor on "constructed ditches"? – Does that mean every stormwater conveyance swale has to have a buffer? Seems like it should only apply to those water courses that fit the definition of waters of the state.
26	Pg. 122, Table 33, Row 1	In the context of the permit, we wonder if the following language is necessary as it seems redundant and circular: "*. . . and compliance with TMDL requirements*."
27	Pg. 122, Table 33, Row 5	Replace the last sentence in the action that begins with "*Fix all failing OSS ...*" with "Assure that all failing OSS are repaired using..."
28	Pg. 113, Paragraph 5	The TMDL states that "landowners and activities within the watershed must not cause any discharge of pollutants to state waters (according to RCW 90.48). This code refers to Ecology's authority to regulate and enforce nonpoint source pollution sources. However the language in the TMDL does not further address Ecology's intention to utilize this enforcement mechanism in order to meet the 2025 timeline. Nor does it include any language of monitoring performance within the 10 year timeframe in order to make adjustments so that the timeline can reasonably be met. We request revising the language to more explicitly state how Ecology intends to use its authority under RCW 90.45 to address nonpoint source pollution violations on private lands.
29	Pg. 116, Table 23, Row 4 (Stormwater Runoff)	• The 2012 Stormwater Management Manual for Western Washington does not contain BMPs for all the TMDL-listed pollutants. Suggest revising to read: "Use best management practices (BMPs), as applicable, from the 2012 Stormwater Management Manual for Western Washington . . . ." • Suggest deleting the last sentence as it adds little value and is too narrow in its potential applicability. • States to use BMPs from the 2012 Stormwater Management Manual -- Does this mean if we allow alternative BMPs or approaches outside of our NPDES municipal stormwater permit area (where we are required to use the 2012 Ecology Stormwater Manual) that we would be in violation of the TMDL? We currently do allow some approaches outside our NPDES municipal stormwater permit boundary that are not strictly equivalent to the 2012 Stormwater Manual. This provision would appear to effectively extend the application of the 2012 Ecology Manual to the entire Deschutes Basin.
30	Pg. 121, Table 32, Row 4	Expand Action 4 to include the need to prepare and implement nutrient management plans for farms throughout the watershed that apply commercial fertilizers and manure; and routinely conduct nutrient soil testing to ensure that over-applications are prevented, to help address the elevated ground water nitrogen problem and achieve the nutrient load allocation identified in Table 11.
31	Pg. 121, Table 32	Insert the following action item "Identify agriculture-related pollution sources, and prepare and implement farm plans and restoration projects to correct them." Under Comments state "TCD contract with Thurston County using NEP Round 4 grant awarded April 2014". Schedule is July 1, 2014 - Oct 31, 2016. (Mirror action on pg. 123, Table 33, Row 5)
32	Pg. 122, Table 33, Row 2	• Suggest revising to read as follows: *Stormwater Retrofits~~control and management~~: Identify priority locations (i.e., pollutant hotspots)~~where stormwater controls are needed~~ using stormwater runoff models or other acceptable methods, where retrofitting the County's municipal separate storm sewer system is considered an effective strategy. ~~Develop a plan~~ to reduce nutrient, bacteria, and sediment loading. ~~with a schedule of~~For identified priority~~ized~~ locations, scope projects for inclusion in the County's~~to add to their~~ stormwater capital facilities~~management~~ plan (CIP) ~~during the first permit cycle. The prioritized projects will need to be implemented during subsequent permit cycles.~~* • Language referring to schedules and permit cycles seems more appropriate for inclusion in the "Schedule" column. Suggest revising *schedule* language to read: *Identify priority locations: **During the first two years of the next NPDES permit cycle (2018 to 2020)*** *Scope and schedule projects for inclusion in CIP: **By the end of the next NPDES permit cycle (2023)*** *Initiate project implementation per CIP schedule: By the end of the next NPDES permit cycle (2023). Prioritize and incorporate projects into the SSWU Capital Facilities Program for Construction within a 20-year planning horizon based on prioritization criteria of the Thurston County SSWU and SSWAB.*

Figure B-49: Thurston County, Pg. 9 of 11, Comments 25-32

Table 1. Deschutes Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan
Comments from Thurston County

Comment Number	Pg., Paragraph, & Line Number	Comments, Questions, and Suggestions
33	Pg. 122, Table 33, Row 3	In order to accurately reflect Plan's name and the County's regulatory jurisdiction for enforcement of its IDDE ordinance, please revise language in the Comments column to read as follows: "Continue to implement localthe Thurston County hHazardous wWaste Management pPlans (adopted July 2014) for existing businesses and new development. This plan includes the IDDE ordinance. This Plan Aapplies to Thurston County and all local jurisdictions contained within."
34	Pg. 122, Table 33, Row 4	• This requires plan development within 18 months of the permit-required action and then an implementation start date 12 months following the plan's completion. A better requirement would be development of the plan within the permit period – or at least provide us up to 3 years. •Define "Implementation" - Does having the projects identified and programmed into our Capital Facilities Plan suffice, or do we have to have started construction within 12-month? The latter interpretation is not reasonable. Our Capital Program prioritizes projects on a wide range of criteria, and any projects identified as a result of the TMDL study would compete against projects in other basins including flooding projects.
35	Pg. 123, Table 33, Row 1 "Investigate and remediate high nitrogen sources"	This language is broad and vague. The comments imply that it refers to groundwater. Please clarify the language if that is the intent. This is not an ongoing Thurston County activity, so please change schedule status to "As funding allows". Implementing this action will require a major groundwater study, that could be done by others, like WDOE, USEPA, or USGS, so please add this action to those agencies tables as well.
36	Pg. 123, Table 33, Row 8 "Conduct source identification..."	In the Henderson Inlet Watershed Fecal Coliform Bacteria Water Quality Improvement Project, this recommendation was translated into an NPDES municipal stormwater permit requirement to sample wet-weather discharges between November and April specifically between river miles 1.6 to 0.2 of Woodland Creek and on Jorgenson Creek upstream of Pleasant Glade Road. Unfortunately, this recommendation became a permit requirement without consideration of access or applicability to stormwater. There are no relevant sampling locations accessible to the County as most of the reach is on private property. Furthermore, there are no county right-of-ways that discharge into that section of stream through any conveyance. Nonetheless, the county has expended resources to establish monitoring locations and conduct monitoring at sites located far away from the main stem where the county has access in order to be in compliance with the permit. The county questions the effectiveness of such monitoring to identify illicit discharges along the main stem, or its applicability to stormwater. Therefore, the county requests to have input on whether or not there are relevant stormwater discharges and/or whether there are suitable sampling sites and what a monitoring design may or may not accomplish prior to any formalized NPDES municipal stormwater permit requirements for monitoring.
37	Pg. 127, Table 38	Table 11 states that a 72.3% reduction in the dissolved inorganic nitrogen concentration is needed, and Figure 27 shows ~ 3/4 is from groundwater. Suggest including an action for Ecology to conduct a groundwater study to define the groundwater recharge area for the middle Deschutes basin, identify the areas with elevated levels and the predominant contributing sources.
38	Pg. 129, Row 3 (Oversee Implementation of the Forest and Fish Program	Suggest revising this action item to read "Review monitoring data and existing law to determine if existing language is strong enough to support water quality standards and uses. Revise as necessary."
39	Pg. 157, Reference 6	Please include a year as part of this reference.
40	Pg. 175, Table C-3, Line 2 (TMDL Monitoring and Reporting Requirements)	In the first bullet, please specify that this condition applies only for those sites that use and process water. Some sites are used only for storage. Suggest re-wording to read "Process water (if applicable) must be sampled weekly..."
41	Pg. 175, Table C-3, Line 2 (TMDL Monitoring and Reporting Requirements)	In the second bullet, please specify that this condition only applies if stormwater facilities are present (see comment above).
42	Pg. 175, Table C-3, Line 2 (TMDL Monitoring and Reporting Requirements)	In the second bullet, it is unclear under what conditions the monitoring frequency should be increased. This rows says that if water sampling results demonstrate compliance with the WQBEL them monitoring frequency can return to the schedule in Tables 2 and 3 of the Sand and Gravel permit. However, it does not state under which conditions this additional monitoring would be triggered in the first place.

Figure B-50: Thurston County, Pg. 10 of 11, Comments 33-42

Table 1. Deschutes Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan Comments from Thurston County

Comment Number	Pg., Paragraph, & Line Number	Comments, Questions, and Suggestions
43	Pg. 123, Table 33, Row 8 "Conduct source identification…"	• Special Condition S5.C.3.c.i of the Phase II Municipal Stormwater Permit is in the context of implementing an illicit discharge detection and elimination program (IDDE) to detect and identify non-stormwater discharges and illicit connections into out municipal separate storm sewer system. Please clarify whether the intent of this proposed action is for the County to extend our existing IDDE program to also include the portion of the County's jurisdiction in the Deschutes TMDL area that falls outside the municipal stormwater permit coverage area. If this is the intent, we suggest revising the language as follows: *Conduct source identification of potential bacteria pollutants by extending the County's existing IDDE program field screening methodology (consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.c.i.) to include the portion of the County's jurisdiction in the Deschutes TMDL area falling outside its municipal stormwater permit coverage area. These could include agricultural operations, recreational use, and homeless encampments.* ~~*If results indicate there are areas exceeding state water quality standards, develop a plan to identify sources consistent with the Phase II Municipal Stormwater Permit Special Condition S4.F.*~~ *In the bacteria pollutant sources are identified, the County will implement a compliance strategy consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.b.v.* The proposed deletion of the last sentence recognizes that the very existence of the TMDL means that the receiving waters do currently not meet water quality standards, thus making the reference to S4.F nonsensical and inappropriate. As an appropriate alternative, we included language proposing the implementation of a compliance strategy consistent the Permit Special Condition S5.C.3.b.v. • Regarding the language in the *Comments* column, the designated priority areas listed for illicit discharge detection and elimination screening should only list the County-owned roads. For example, in the Deschutes River watershed, Route 507 is a state road which should be WSDOT's responsibility. Old Camp Lane and Vail Cutoff Road are outside of the permit boundary area and Old Camp Lane is a private road. There are two bridge crossings along Vail Cutoff Road. Furthermore, most of Indian and Mission creeks are located within Olympia. *Designated priority areas for illicit discharge detection and elimination routine field screening include:* *Deschutes River watershed:* ~~*Route 507*~~*;* ~~*Old Camp Lane*~~*; Vail Cutoff Rd. SE* *Budd Inlet tributaries within the Phase II permit boundary: Adams, Butler, Ellis,* ~~*Indian, Mission*~~*, and Percival Creeks* • In general, the County has some concerns about this approach to IDDE in terms of including it as a stormwater issue. In most of the priority areas identified, the land uses upstream of any conveyance are residential, commercial (e.g. golf course) or agriculture. Therefore, any fecal coliform issues are not generated by runoff from impervious surface (stormwater). We recommend ensuring that the responsibility to detect and enforce fecal coliform issues is designated to the appropriate authorities including Environmental Health, the Department of Ecology, and the Department of Agriculture and not included as part of any NPDES stormwater permit. Suggested ReWording Re-wording for Action Item: "Identify bacteria nonpoint pollution from sources such as agriculture, homeless camps, and recreational activities and use available county codes to correct identified violations."

Figure B-51: Thurston County, Pg. 11 of 11, Comment 43

Squaxin Island Tribe

Erica Marbet provided the following comments by email on May 27, 2015.

From: Erica Marbet [mailto:emarbet@squaxin.us]
Sent: Wednesday, May 27, 2015 4:21 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>
Subject: RE: Final Reminder! Draft Deschutes Phase 1 Plan Public Comment Ends today

Hello Lydia,
Attached are comments from the Squaxin Island Tribe. We made some modifications to our past comments and added four additional comments at the bottom.
Thanks,
Erica

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Comment Number	Page, Paragraph, & Line Number	Comments, questions, suggestions
1		Our first overall comment is, well done in that the document does a good job of bringing together all of the data and analysis collected over the years.
2		Our second overall comment is that it is clear that the implementation plan cannot and will not meet several of the required water quality parameters even if fully implemented. This is shown by Ecology's own modeling as evidenced by Figures 10 and 11. The TMDL, however, must result in water quality standards being met. Further, if flow reduction by permit-exempt wells is not stopped or mitigated, then the temperature standard: (1) will not be met by 2065; and (2) will continue to be unmet by larger amounts as new permit-exempt wells are drilled (which violates anti-degradation requirements). Further, where the implementation plan relies on voluntary actions on private property for parameters such as temperature the plan as outlined is so ambitious that it is likely to be unsuccessful.
3		As a third overall comment we suggest that Ecology include the general recommendations found on pages 114 and 115 that are not already included in load allocation reduction targets. Specifically, increased flows should be included as a prescription for decreasing temperatures. Large woody debris should be used for allocations designed to reduce temperatures and decrease fine sediment.
4	40-41	Comment- Figures 10 and 11. These figures are important in that they succinctly show that all restoration options, including increasing flows, must be considered to achieve temperature goals.
5	10, 40-42, 60 and 115	Comment- The temperature reductions are almost entirely predicated upon increases in riparian shade. As shown by the modeling, shade clearly has the biggest impact on temperature; however, several other attributes will ultimately be needed to achieve targets. Figures 10 and 11 suggest that "channel improvements" can decrease water temperature by 1.3 degrees. Calculating and displaying channel improvements in an "allocations" like format, for example as found in Figure 20, would be very helpful for implementation. The Deschutes River is listed for impairment due to lack of large woody debris (page 10). Like shade, large woody debris is not a pollutant regulated by the TMDL, but it is a means to addressing the regulated pollutants. Channel improvements as modeled by Ecology in the 2012 technical report include increased channel roughness and greater interaction with the hyporheic zone, both of which would result from the presence of large woody debris in the channel. Rather than relegating large woody debris to a general implementation action (page 115), more specific actions should be prescribed. Any current assessments of large woody debris deficit should be listed by reach or kilometer, with targets for increases, just as they are with shade.

Figure B-52: Squaxin Island Tribe, Comments 1-5

6	10, 42, and 114-115	Modeling scenario 5 was used to estimate system potential for temperature (page 42). It includes historical 7Q10 low flow discharge values from the period of 1949-1969. Increased river flow causes a decrease in temperature, though small compared to other changes. Because full riparian shade is unlikely, and because the river will still not meet the temperature standard, increasing river flow should be part of the solution. Decreased flows are a source of the problem. Furthermore, the Deschutes River is listed for impairment due to decreased instream flows, regardless of temperature (page 10). To that end, Ecology has included general recommendations for increasing flow in the river (pages 114-115). But these recommendations are just a side note, lacking any details, and so easily overlooked. Through the TMDL process, the flow deficit has been apparent in modeling of temperature, dissolved oxygen, and pH. To meet the Clean Water Act's requirements, a more detailed plan for restoring instream flows to the Deschutes should be included in the water quality improvement report: • Flow deficit at USGS gaging stations should be quantified for every month of the year. • All water systems and exempt wells should be inventoried and mapped (including those not on record with Ecology, because they do exist), and their total water use quantified. • A detailed groundwater model of the Deschutes basin should be created and calibrated. • Using the model, the effect of increasing exempt wells should be quantified as a whole and by river reach. • Using the model, the effect of solutions such as water conservation, reinfiltration, low impact development, and alternate water sources should be quantified and illustrated spatially in the county, so that local entities have a road map for returning flows to the Deschutes. • Existing and future limits on any water withdrawals should be enforced. • A timeline should be placed on the above actions.
7	74	Comment- Fine Sediment- This implementation plan does a good job of laying out areas of load allocation by reach and land use type. This should be useful in prioritizing work in the system. Ecologies reliance on existing BMP's is, in our opinion, unlikely to achieve goals. Adding channel complexity, for example large wood, has been shown as an effective way to trap sediment and keep it away from spawning areas. We believe it would be helpful to implementers to show a reach by reach or kilometer by kilometer index for necessary stream stream channel improvements.
8	83	Comment and question- The document states that the cities and County must implement low impact development practices (LID). Even if correctly implemented using LID does not fully remove impacts. With full implementation and full build out how much function is estimated to be lost for TMDL parameters? These should be quantified.
9	89	Comment- In our opinion the riparian goals are extremely ambitious and unlikely to be met. Dedicated funding has not been identified, political will for enforcement has not been demonstrated and past and ongoing efforts have been very limited. We do not agree that it is reasonable to assume that voluntary actions will lead to essentially the whole rive system being planted with a functioning riparian zone in any reasonable time frame.
10	133	Question- Table 45. Where does the 2050 date for good habitat conditions come from? While existing sediment in the system will take time to work its way through downstream, project designed to stop or remediate sediment sources will have an almost immediate effect.

Figure B-53: Squaxin Island Tribe, Comments 6-10

11	135	Comment- The Tribe does not believe an adaptive management process is needed to implement the TMDL. Ecology has the information it needs and has identified the prescriptions needed to achieve water quality standards. A workable plan needs to be implemented and it will become readily apparent if the interim goals are not being met. Ecology has the existing capacity to adaptively manage the project from the first day of implementation. *If a committee or group is required, waiting until 2020 to begin for a plan that is supposed to be effective by 2025 is far too late to be effective. We recommend starting the process in 2016.* As stated earlier, the riparian goals are ambitious and it would become apparent very soon that interim goals will or will not be met.
12	42	Scenario 4 on page 42 is the temperature modeling scenario used for the water quality improvement report. It assumes that headwaters of and tributaries to the Deschutes are at water quality standards. Is that safe to assume that those tributaries will meet that condition in the near future? For the headwaters, this has to do with whether Washington Forest Practices laws are sufficient.
13	115	Regarding the prescribed riparian buffer widths of 75ft and 35ft. We understand that you have set a buffer width that seems "technically defensible and reasonably feasible". That wording makes the 75 ft. for the mainstem Deschutes River seem like a compromise. It seems inadequate if the buffer distance is measured from the edge of the active channel rather than the edge of the channel migration zone. Given the active bank erosion in the Deschutes, a riparian replanting project 75 feet from the active channel could be eroded and eventually become the active channel. Ecology appears to be focusing on shade when prescribing a 75 foot buffer in the TMDL, in the long term this 75 ft. may be inadequate to provide healthy riparian function for the Deschutes, due to the need for large woody debris structural input (which also affects temperature by changing channel roughness and depth of the hyporheic zone). We recommend using the riparian buffer widths as called out in the NMFS 2008 Biological Opinion (BiOp) for FEMA's National Flood Insurance Program for Puget Sound. This includes the latest and best available science on this topic and is designed to ensure healthy watersheds.
14	114-116	The "general land use" BMPs violate the Clean Water Act because they are wholly ineffective. Ecology: (a) assigns no implementing entity; (b) exempts itself and Thurston County from the responsibility of implementing them; and (c) illogically states that in order to meet TMDL requirements, these BMP / actions must be completed by 2025 (by whom?) and that ongoing actions must be in place and continue past 2025. Ecology should move some if not all of the BMPs in Table 23 to Ecology's and Thurston County's assigned tasks in Tables 38 and 33, respectively, with directive language and corresponding completion dates.
15	128	The Implementation Plan assigns Ecology the task of protecting cool water sources identified in the TIR imagery from flow depletion or temperature increases, but provides no deadline for doing so.
16	122-123	Thurston County's assigned tasks are non-directive, wholly discretionary and fail to meet its GMA water availability requirements and 1971 Water Resources Act requirements, as well as Ecology's water-related statutory duties (e.g., administer consistent with the priority system, protect instream flows, etc.).
17		The Clean Water Act does not allow Ecology to draw a bright line between its water quality and quantity programs. Rather, the Act requires "comprehensive solutions" to prevent, reduce and eliminate pollution in concert with programs for managing water; and (2) establishes the supreme goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. Drawing a bright line is a prohibited "artificial distinction." *PUD No. 1 v. Ecology*, 511 U.S. 700, 719 (1994).

Figure B-54: Squaxin Island Tribe, Comments 11-17

Deschutes Estuary Restoration Team

Dave Peeler provided the following comments by email on May 27, 2015.

From: Dave Peeler [mailto:davepeeler@hotmail.com]
Sent: Wednesday, May 27, 2015 4:27 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>
Cc: Sue Patnude <suepatnude@gmail.com>
Subject: RE: Final Reminder! Draft Deschutes Phase 1 Plan Public Comment Ends today

Lydia,

Thank you for the opportunity to comment on the draft Deschutes River, Percival Creek and Budd Inlet Tributaries Phase 1 TMDL. In general, I think you have done an excellent job of data collection and analysis and of encouraging discussion of different points of view at the advisory group meetings. The technical and program presentations at advisory group meetings have been superb, and I especially appreciate the staff willingess to respond to questions, comments and suggestions for further analysis and information.

My primary concern for the TMDL is not with the technical work but with the ability to accomplish it's goals of meeting state water quality standards. Since the majority of the sources of water quality impacts in this basin are nonpoint sources and activities, Ecology has little or no direct control over those sources and activities. While I was impressed by the recent presentations by the tribe and some local governments about a few of their programs (many already underway) to implement the TMDL, it nevertheless will be a huge undertaking to implement and maintain enough actions to actually make and detect a long term difference in the water quality of this watershed.

Over the long term, the commitment to and funding for the necessary actions will be extremely difficult to maintain. In addition, some sources of pollution, such as on-site systems, will increase in number and add more pollution rather than less as additional properties are developed. Additional development is also likely to increase stormwater runoff, even with the newer, more stringent requirements under the latest stormwater permits and development regulations. As I understand it, the TMDL does not contain a set aside for future growth, so any and all impacts from future population increases and increased commercial, industrial and agricultural activities must fit within the allocations of the TMDL. That means not only do the current sources need to be reduced to meet the TMDL, but they must be reduced even further if we are to accommodate future growth and still meet water quality standards, assuming future growth is not "zero impact". It also means that there is no allowance for future point sources that would cause or contribute to exceedances of the standards and pollutants addressed in this TMDL. Any new point sources, such as fish hatcheries, storm water outfalls or sewage discharges, would need to ensure that there are sufficient offsets to any incremental increase in pollution caused by the new point souce.

Unfortunately, there are no large, existing point source discharges in this watershed that can be signficantly reduced in order to attain the TMDL goals. That means that most of the attention needs to be paid to the future implementation, tracking, reporting and assessing the effectiveness of the large number of actions in the Water Qualty Improvement Plan that are primarily aimed at reducing nonpoint sources of pollution. Ecology needs to develop a tracking and reporting system to ensure that these actions take place and are successfully implemented.

Finally, in order to sustain this effort into the future and provide some level of public oversight and accountability, I urge Ecology to work with the advisory committee and others to establish a permanent Deschutes Watershed Committee that meets on a regular (perhaps semi-annually or quarterly) basis to review implementation activities and help provide direction and support for key actions.

Thank you for your personal investment in the development of this TMDL as well as the efforts of all the other state, local and tribal staff who have been involved.

Sincerely,

Dave Peeler
Deschutes Estuary Restoration Team

City of Tumwater

Dan Smith provided the following comments in an attached letter to an email sent on May 27, 2015.

City Hall
555 Israel Road SW
Tumwater, WA 98501-6515
Phone: 360-754-5855
Fax: 360-754-4126

May 27, 2015

Ms. Lydia Wagner
WA Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

Re: Deschutes River TMDL Report and Implementation Plan Comments

Dear Lydia:

Thanks to you and Ecology for the opportunity to comment on the draft Deschutes River TMDL Report and Implementation Plan. In general, a substantial amount of work has been done on this watershed, by Ecology staff, external organizations and the advisory committee, which I am glad to have been a part. The technical report provides an excellent basis to draft the Improvement Report and Implementation Plan, and I commend Ecology staff on well-written and documented plans that evaluate multiple interactive conditions toward improving water quality.

Attached is a summary of my comments for your consideration. If you have any questions about my comments, please contact me at (360-754-4140, or by email to: desmith@ci.tumwater.wa.us. We also look forward to the staff presentation to our Council in July of this year. Should additional coordination for that presentation be needed, let me know at your earliest convenience.

It has been a long time coming to this point and I look forward to continuing work with Ecology to see many of the actions identified in the plan implemented.

Regards,

Dan Smith
Water Resources Program Manager

cc: File

C:\Users\lbla461\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\179OFTJH\Implementation Plan Comments 2015-5-27.docx

www.ci.tumwater.wa.us

Figure B-55: City of Tumwater, Pg. 1 of 5

Requirement / Recommendation	Section / Page	Comment
Technical Assistance	Table 16, Page 93	The City of Tumwater provides technical assistance for stormwater related needs, water conservation and low impact development, similar to the other jurisdictions listed in the table. Please revise the "Subject/Title" category under Tumwater to reflect this level of service.
Grants / Loans	Table 17, Page 96	The City of Tumwater received four stormwater retrofit grants from Ecology, but are not listed in the section. Grant #'s include: G1200503 – Tumwater Valley Regional Stormwater Facility G1200504 – Cleveland Avenue Stormwater Outfall Retrofit G1200505 – Somerset Hill Stormwater Outfall Retrofit G1200506 – E Street Stormwater Outfall Retrofit
Education / Outreach	Table X, Page 98	Stream Team is an interjurisdictional program funded and operated by the Cities of Olympia, Lacey and Tumwater. The Stream Team program operates its own website, and resources can be found at the end of this comment sheet. In addition, the City of Tumwater maintains educational information on its website, www.ci.tumwater.wa.us. Those resources are also included.
General background on the City of Tumwater.	Page 110	Please expand the function of Water Resources in this section. "Water Resources is also under this division, responsible for the implementation and management of water-related programs, such as the NPDES Phase II permit, utilities planning, water quality, water conservation, wellhead protection and associated education and outreach functions."
Stream Team	Page 112	As a general note, Stream Team no longer provides litter pick-up under its primary function. A reference to "Natural Yard Care" can be added in its place.
Table 20: Capitol Land Trust Actions	Page 113	There are multiple non-governmental organizations working toward water quality improvement – through a variety of mechanisms in South Puget Sound and the Deschutes Watershed. While I am supportive of the Capitol Land Trust and the projects they engage, it seems odd to specifically call out this organization with an action, particularly since they had a limited role, if any, related to the TMDL or the advisory group to describe their role toward water quality improvement. These actions should be listed under the "General Land Use" category for implementation actions, or list all organizations in the region with a potential role relevant to their missions.
Table 23: General Land Use Category Implementation Actions	Page 114	As a general comment, all these actions are voluntary and no agency/responsible party is identified to oversee or assist with implementation within the watershed, leaving a sense that while that actions may be laudable, they may never actually be implemented. Per the statement in the

Figure B-56: City of Tumwater, Pg. 2 of 5

		preceding paragraph, relating to RCW 90.48, property owners in the watershed are responsible for implementing these actions by 2025. Will Ecology be the responsible party for outreach to the affected property owners, including implementation support, funding and enforcement as needed?
Stormwater control and management	Table 34, Page 124	Under this action, the City is requested to "develop a plan to reduce nutrient, bacteria and sediment loading…" however nutrients are not identified as a parameter of concern in this TMDL and no wasteload allocation was provided. Is there a specific target for nutrient reduction in specific areas?
Develop and implement plan to identify and fix any cross connections to the MS4 within the City limits.	Table 34, Page 124	The City currently inspects its MS4 on a routine basis. Illicit connections identified during these routine inspections are required to be fixed immediately upon notice. TMC 13.12.020(E) addresses how any illicit connection to the MS4 will be addressed, and provides the regulatory authority to ensure it is remedied. In addition, the action specifically calls out "video inspection" which is costly and not the only viable method for determining cross connections. Please remove this specific reference, providing additional flexibility on how the City addresses this requirement.
General note on "Schedule"	Table 34, Page 124-125	For a number of the Tumwater requirements, an implementation start date of 2015 or 2016 is unrealistic. The City operates on a 2-year budget, as well as a 6-year CIP that is updated every two years. For many of the actions identified, additional time is needed to request funding through the normal budget process. The last adopted budget covers expenses planned through the end of 2016 – the earliest any action beyond current operating practice could be implemented is 2017.
Conduct Source Identification of potential bacteria pollutants… including pet waste, wildlife, or homeless encampments.	Table 34, Page 124	The action calls for compliance with the City's NPDES permit, yet requires a plan to address bacteria loading in 2016. The permit requires initial screening to be complete by the end of 2017, with additional limited monitoring thereafter. The City is currently in compliance with its permit. The timeline for actions requiring permit modification should be extended to match the modification schedule, currently post July 31, 2018.
Implement a pet waste program	Table 34, Page 124	This, and other actions identified on the table, are currently being implemented by the City of Tumwater. It is unclear what is meant by a "Regional Pet Waste Control Program" or the milestones and outcomes necessary to achieve compliance with this TMDL. Are additional actions being requested?
Work with existing commercial businesses to identify pollution sources and best	Table 34, Page 124	This has been underway in Tumwater since at least 2001, and targeted sectors have been identified in the City's NPDES permit. Are there specific milestones or outcomes, in excess of the City's permit, that the TMDL is requiring?

Figure B-57: City of Tumwater, Pg. 3 of 5

management practices		The word "existing" should be removed, unless there is an intention to focus efforts on a particular age of business, and not new or future businesses.
Evaluate current land use and potential future development.	Table 34, Page 125	Work is currently underway by Thurston County to evaluate conditions that would be supportive of improving water quality in the Deschutes Watershed. This action is non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision.
Identify and implement projects to improve or restore riparian and channel conditions	Table 34, Page 125	Please note, most of the Percival Creek channel is largely developed in private ownership, and City capacity to complete any project in these areas is extremely limited, and likely will require voluntary landowner participation. This action is also non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision.
Reduce anthropogenic sources of heat.	Table 34, Page 125	Please note, most of the Percival Creek channel is largely developed in private ownership, or outside City limits, and City capacity to complete any project in these areas is extremely limited, and likely will require voluntary landowner participation.
Adopt and implement a regional strategy for converting onsite septic systems in high priority/high density neighborhoods within the urban areas.	Table 34, Page 125	The City continues to participate in regional discussions for developing a strategy to address high density septic systems; however, regional implementation may or may not be an eventual outcome. The City is committed to the protection of groundwater and will continue evaluating options toward that goal. This action is also non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision. Of final note on this action, the 2015 strategy adoption and implementation is very unrealistic, as discussions continue. It is likely that a strategy may be identified within the next year; however, funding for implementation may still likely be a number of years following.

Stream Team Web Resources:

Clean Cars Clean Streams	http://www.streamteam.info/actions/carwashing/
Don't Drip and Drive	http://www.streamteam.info/actions/vehiclecare/
Pet Waste	http://www.streamteam.info/actions/petwaste/
Storm Drain Marking	http://www.streamteam.info/pdf/newsletter-2015-summer.pdf
Monitoring	http://www.streamteam.info/getinvolved/monitor/streambugs/
Salmon Stewards	http://www.streamteam.info/getinvolved/educate/salmon/
Naturescaping	http://www.streamteam.info/getinvolved/learn/naturescaping/
Rain Gardens	http://www.streamteam.info/actions/raingardens/
Lawn Care	http://www.streamteam.info/actions/lawncare/
Stormwater Stewards	http://www.streamteam.info/getinvolved/educate/stormwater/
ST Newsletter	http://www.streamteam.info/about/newsletter/
Habitat Enhancement	http://www.streamteam.info/getinvolved/plant/

City of Tumwater Web Resources:

Figure B-58: City of Tumwater, Pg. 4 of 5

Go Green Natural Lawn Care*	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/natural-lawn-care-973
LID	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/low-impact-development
Stormdrains/Spill Reporting	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/storm-drains
Stormwater Ed Info	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/stormwater-faqs
Stormwater Facilities	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/private-system-maintenance
Barnes Lake Mnmt Dist	http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/barnes-lake-management-district
*w/Oly & TC	
Public Outreach Events	Earth Day, Juvenile Chinook, 4th of July, Tum Com Day, Return of the Chinook, Tum Library/Schools (by request)

Figure B-59: City of Tumwater, Pg. 5 of 5

Note: The following comments were received after the close of the comment period. They are included here for reference only. Ecology is not providing any responses to these comments in this report.

Washington Farm Bureau

Evan Sheffels provided the following comments by email on May 28, 2015.

From: Evan Sheffels [mailto:ESheffels@wsfb.com]
Sent: Thursday, May 28, 2015 3:37 PM
To: Doenges, Rich (ECY)
Cc: Bartlett, Heather (ECY); Toteff, Sally (ECY); Evan Sheffels
Subject: RE: thanks and contact info -- Deschutes TMDL

Thanks Rich,

I very much appreciate that you and Sally took the time to discuss implementation of the Deschutes TMDL with me. Your description of the process was encouraging.

I do hope you can come to a Thurston Voluntary Stewardship Program (VSP) Working Group meeting to explain what the Deschutes TMDL will mean for agriculture in that watershed, and to work directly with participating farmers to better understand their perspectives on workable solutions, where needed.

The goal of the VSP Work Plan being developed is to promote programmatic (instead of opportunistic) stewardship efforts and address priority natural resource concerns in targeted focus areas where agricultural activities are conducted, while also maintaining and improving the long-term viability of agriculture and reducing the conversion of farmland to other uses.

Your assistance can help the VSP Work Group focus incentive programs to encourage positive critical area and water quality outcomes. We hope that includes reliance on trusted natural resource conservation service standards, guidelines and conservation planning tools to determine what is reasonable and needed in the context of agricultural activities. Pragmatic standards that are consistent with agricultural viability and workable for producers are needed to concurrently protect water quality and working agricultural lands.

On that note, and in preparation for future discussions, please note how the Puget Sound Action Agenda (PSPAA) describes the importance of retaining working agricultural lands. The most current PSPAA notes that, "since 1950 we have lost more than half of the farmland in the Puget Sound region. Effectively preserving agricultural land will involve tackling a complex set of interrelated issues including real work to ensure that agriculture continues to be a viable, and vibrant, industry in Puget Sound. … Analyses indicate **that 1 acre converted from agricultural to urban development produces 10 to 15 times the runoff and runoff-borne pollutants**, **including far higher concentrations of heavy metals, petroleum and other key pollutants**. Farmland also provides habitat and food resources for migratory bird species, promotes aquifer recharge."

Thus, once again borrowing from the most recent PSPAA …"**Maintaining the vibrancy of agriculture is crucial to recovering Puget Sound and instrumental in providing a high quality of life in the region**. However, farming in the Puget Sound basin faces an uncertain future. Global competition for agricultural commodities has reduced prices for Puget Sound farm products while costs of land and raw materials continue to rise. Low profit margins have forced many farmers out of business and farmland is being converted to other uses at an alarming rate. Rural areas have a low density of impervious surfaces and farmland provides greater flood plain function than developed areas. **The continued loss of farms in the region and conversion to non-farm uses is not only detrimental to individual farmers and to the regional farm economy; but is detrimental to the recovery of Puget Sound**."

So, bottom line, as the PSPAA notes, protecting agricultural viability is crucial to both critical areas and water quality protections in Puget Sound. We trust Ecology will consider these points as TMDL implementation moves forward.

Thanks again for taking the time to meet with me. And thank you for your consideration of these comments on the Deschutes TMDL.

Evan

Evan Sheffels | Washington Farm Bureau | 360.870.4165

Washington Forest Protection Association

Karen Terwilleger provided the following comments by email on May 29, 2015.

From: Karen Terwilleger [mailto:KTerwilleger@wfpa.org]
Sent: Friday, May 29, 2015 4:58 PM
To: Wagner, Lydia (ECY) <LBLA461@ECY.WA.GOV>
Cc: Doenges, Rich (ECY) <rdoe461@ECY.WA.GOV>

Subject: Washington Forest Protection Association Comments on the Draft Deschutes TMDL
Importance: High

Ms. Wagner,
I have attached WFPA's comments on the Draft Deschutes TMDL. I apologize for the tardiness of the document and hope that you will accept it into the record.
If you have additional questions, please let me know.

Have a wonderful weekend!

kt

Karen Terwilleger
Senior Director of Forest and Environmental Policy
Washington Forest Protection Association
Cell: 360-480-0927
Office: 360-352-1500

WASHINGTON FOREST PROTECTION ASSOCIATION
724 Columbia St NW, Suite 250
Olympia, WA 98501
360-352-1500 Fax: 360-352-4621

May 29, 2015

Transmitted via Email

Lydia Wagner
Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775
Lydia.Wagner@ecy.wa.gov

Subject: Comments on Draft Water Quality Improvement Report and Implementation Plan for the Deschutes River, Percival Creek, and Budd Inlet Tributaries Temperature, Fecal Coliform Bacteria, Dissolved Oxygen, pH, and Fine Sediment Total Maximum Daily Load (Draft Deschutes TMDL)

Dear Ms. Wagner:

The Washington Forest Protection Association (WFPA) appreciates the opportunity to comment on the Department of Ecology's (Ecology) Draft Deschutes TMDL. WFPA is a forestry trade association representing large and small forest landowners and managers of nearly 4 million acres of productive working timberland located in the coastal and inland regions of the state. Our members support rural and urban communities through the sustainable growth and harvest of timber and other forest products for U. S. and international markets. WFPA members actively participate with other partners in various salmon recovery grant programs. For more information about WFPA, please visit our website at www.wfpa.org.

Ecology is currently considering comments on specific plans to recover and maintain water quality standards in the Deschutes River basin. Forestry is a key land use in the watershed. However, in Washington, forest practices are regulated under a very different and separate system than other land uses. WFPA's major concern with Ecology's draft is that it does not adequately recognize the considerable effort, investment, and success of the buffering systems and water quality protection embedded in the Forests & Fish Rules developed by state agencies, federal services, public and private landowners, counties, Tribes, and the environmental community. Nor does it recognize the reality that NOAA Fisheries (previously NMFS) and the US Fish & Wildlife Services have already approved these HCP riparian buffering systems. As outlined below, WFPA respectfully requests that Ecology update forestry-specific data and information, and incorporate a more thorough description of forest practices regulations in the final Deschutes TMDL.

Washington State has a unique and complex forest practices regulatory system. While the Forest

We're managing private forests so they work for all of us. ®

Figure B-60: WA Forest Protection Association, Pg. 1 of 5

Practices Board (Board) and the Department of Natural Resources (DNR) have specific regulatory authority over forest practices, as a statutory member of the Board, Ecology plays a significant role in the development and approval of forestry regulation. RCW 90.48.420 specifically requires: "Adoption of forest practices rules pertaining to water quality by the forest practices board shall be accomplished after reaching agreement with the director of the department or the director's designee on the board. Adoption shall be accomplished so that compliance with such forest practice[s] rules will achieve compliance with water pollution control laws."

Washington State forest landowners have a long history of developing collaborative, science-based programs leading to extremely protective forest practices rules and habitat conservation plans (HCPs) approved under the federal Endangered Species Act. The 1999 Washington Forests & Fish Law was developed in collaboration with federal, state, Tribes, county governments, and private forest landowners. In 2001, the Board adopted new permanent forest practice rules to address impacts to aquatic species on all private forest lands not covered under an existing HCP and DNR lands east of the Cascade Crest. Representatives from each collaborating FFR partner worked together for 18 months to make changes to the forest practices rules to protect clean water and riparian habitat on non-federal forestland in Washington.

Regulatory changes were made to improve forest roads and culverts, enlarge buffer zones along stream banks, and identify and protect unstable slopes. An Adaptive Management monitoring program was also put into place to review the effectiveness of the new rules. As one of the most comprehensive pieces of state environmental legislation in the U.S., the Forests & Fish Law and accompanying rules are designed to fully comply with both the federal Endangered Species Act (ESA) and the Clean Water Act (CWA) to protect Washington's native fish and aquatic species and assure clean water compliance. In 2006, the Forests & Fish Law was endorsed by the federal government through a statewide Forest Practices Habitat Conservation Plan (FP-HCP). Key components of the state's forest practices rules and the FP-HCP deal with riparian functions, buffering requirements and road enhancements. In particular, the state forest practices rules and the FP-HCP provisions addressing significant potential sources of heat or sediment include:

- Harvest buffers (substantially wider fish stream riparian buffers, expanded perennial stream riparian buffers, new equipment limitation zones on all streams, wider wetland management zones);
- Wider forest chemical application buffers;
- New road construction / stream crossing standards;
- Road Maintenance and Abandonment Plan (RMAP) requirements; and
- Compliance monitoring, including forest practices rule compliance for roads and haul routes.

While the Draft Deschutes TMDL references the 1999 Forests & Fish report (FFR), it fails to note that most of the associated forest practice rules did not go into effect until 2001. The Konovsky and Puhn (2005) publication cited by the Draft Deschutes TMDL collected data and reported on trends which may not adequately reflect conditions in the forested parts of the watershed that existed <u>prior to the implementation of F&F rules</u>. To the best of WFPA's knowledge, no fine sediment data has been collected specifically on these five Deschutes stream segments since the full implementation of the FFR-based rules. This data should be updated to provide a current picture of water quality compliance in the forested areas of the watershed.

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Figure B-61: WA Forest Protection Association, Pg. 2 of 5

WFPA also suggests that a more equitable and detailed description of the impact of FFR-based rules would assist the public in better understanding the regulatory processes and the rules that govern forest practices. The primary focus in the Draft Deschutes TMDL consists almost entirely on describing the Clean Water Act Assurances and what may happen in the event that certain milestones are not met. We do not believe this is an appropriate explanation to provide adequate information to the public about why the FFR-based rules protect water quality. For instance, the FFR stakeholders, including Ecology and the Environmental Protection Agency (EPA), are in the ongoing process of providing the assurances described in Appendix M and Schedule M-2 of the FFR. In addition to new forest practices rules protecting aquatic habitat and water quality, state and federal governments are currently being allotted implementation dollars. These dollars provide agencies and Tribes with the "assurance" they will be able to effectively implement the FFR. Implementation includes adding staff to conduct compliance and effectiveness monitoring developing diagnostic tools, and changes in the make-up of the Forest Practices Board.

The current language in the Draft Deschutes TMDL is too focused on the assurances with no details provided to the public that describe the actual rules that will protect water quality. Ecology originally determined that TMDLs did not need to be prepared prior to July 1, 2009 on private and state land subject to forest practices regulations; those assurances continue today. The Draft Deschutes TMDL is silent as to reason why. These assurances were provided, in part, on the anticipated adequacy of FFR riparian buffer widths in relation to providing adequate shade to address temperature criteria.

The final Deschutes TMDL should describe that forest practices rules contain a set of specific rules for managing shade across the landscape. These rules will address heat inputs from forest practices. The forest practices measures are focused to protect resources at locations where water temperature is a concern for water quality and fish and other aquatic resources. WFPA recommends that Ecology more fully acknowledge the benefits from FFR-based rules in providing for key aquatic habitat functions beyond shade, e.g., LWD recruitment, coarse and fine sediment control, hydrology, and litter fall. In addition to new road construction standards and road maintenance planning, FFR-based rules require considerable improvements to forest practices permitting processes with the goal of preventing forest practices from causing an increased rate of landslide-related sediment delivery. To date, private industrial landowners have spent nearly $200 million statewide to improve forest roads and correct fish passage blockages. Improved topographic and geologic mapping provide landowners and the DNR with more accurate tools to predict where landslides may occur. Additionally, the buffers and leave-tree areas for riparian management zones and potentially unstable slopes will maintain LWD supplies and substantially reduce sediment entry into streams.

Specific provisions that should be included in the final Deschutes TMDL related to forest land use include:

- The Forests & Fish program is a problem-specific plan to limit sediment delivery from forest roads, timber harvest and morphological channel erosion caused by excessive forestry related water runoff and delivery. The program also addresses the problem of insufficient large woody debris (LWD) delivery to stream channels that in the past likely resulted in an increased rate of sediment delivery to downstream fish habitat. The plan is specific to streams, wetlands and other waters and to the protection of their associated riparian areas. Waters covered by the plan are those on state and private forest lands -- those lands regulated

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Figure B-62: WA Forest Protection Association, Pg. 3 of 5

under the Washington Forest Practices Act. DNR maintains a GIS database containing the land subject to the Forest Practices Act and a hydro- layer identifying streams and other water bodies covered by the Forest Practices Act.

- The schedule of completion for forest road improvements to address runoff water and sediment delivery is specified in the forest practices rules. Since 2001, large landowners have been required to establish Road Management and Abandonment Plans (RMAP), with individual actions scheduled in each approved RMAP as specified by rule. Riparian forest protection rules addressing stream shading, bank erosion and large woody debris (LWD) were implemented in the Forests and Fish forest practices rules, effective date in 2001. Individual riparian and unstable slope actions are implemented immediately upon initiation of related forest practice activity.

- Statutes and rules governing the Forests & Fish program include a multi-stakeholder monitoring component that systematically evaluates the effectiveness of the forest practices rules. The program includes a full time administrator, a scientific monitoring committee, independent scientific peer review, and a policy committee. To date, the program has completed more than 28 peer reviewed monitoring and effectiveness studies. Seventeen studies are under way and several more are in the process of being scoped. An additional$5.9 million/biennium for studies and science is currently being considered by the Washington Legislature and supported by all of the Forests & Fish collaborators. DNR established a compliance monitoring program in 2006 that is now in its fifth biennial measurement cycle. The compliance monitoring team includes specialists from the Department of Ecology and the Department of Fish and Wildlife. Tribes are also invited to participate.

- The Forest Practices Adaptive Management Program (AMP) is established in statute. The AMP functions to produce peer review science that is reported to a policy advisory group and directly to the Forest Practices Board. To date, at least two technical reports have resulted in changes to the riparian rules for timber harvest, resulting in improved effectiveness. The forest road rules and Board Manual have also been strengthened to assure compliance with the road management and unstable slope standards. Adaptive management has included policy recommendations and Board action to address small landowner concerns over road maintenance planning and the complexity of riparian rules. Adaptive management has also dealt with the economic stress in the forest products industry that has delayed completion of some road upgrades while assuring that upgrades on active haul roads are in place.

- Forests & Fish pollution control actions are deemed adequate by the Ecology through the agency's special position on the Forest Practices Board in regard to rules pertaining water quality protection. By law, the Ecology can require DNR to enforce forest practices rules designated for water quality protection. The rules are also monitored by the federal Services and EPA through their participation in the Adaptive Management Program. Forest practices rules are enforced by the DNR through field compliance foresters with civil authority, including on-site authority to protect water quality with notices to comply and stop work orders. Ecology maintains forestry expertise in the field to monitor DNR's field compliance function. Forest practices are monitored by a number of tribal resource specialists supported by state and federal funding, specifically for the purpose of protecting fish habitat though the proper implementation of the Forests & Fish program.

more

Figure B-63: WA Forest Protection Association, Pg. 4 of 5

- The Forests & Fish program and forest practices rules have proven to be feasible and enforceable thought the 14-year history of the program. The compliance monitoring has reported on riparian protection and road construction and maintenance activities -- the two areas of forest practices most likely to affect water quality. Each time, substantial overall compliance with the rules exceeds 80% or better.2 The Forests & Fish Program is implemented through the forest practice rules and regulatory procedures. Private and state landowners and managers are required by law to conduct forestry activities in accordance with these rules. Civil enforcement authority is also in place for these activities.

- The program is actively implemented with each forest practices application and approval involving a regulated water or wetland in the state. Through 2014, RMAP for industrial forest landowners alone has resulted in the opening of 4,846 barriers to fish passage and 2,569 miles of fish habitat, as well as 20,025 miles of road with drainage improvements to minimize water and sediment delivery to streams.3 An AMP study shows that delivery of sediment and water to streams is eliminated or minimized on 89% of industrial forest roads under the plan. Water Quality Assurances articulated by the Department of Ecology provide the benchmarks and oversight for continued progress of the Forests & Fish program monitoring program.

Thank you for your consideration of our comments. We look forward to working with you in the future. Please let me know if you have any questions.

Sincerely,

Karen Terwilleger
Senior Director of Forest and Environmental Policy

Figure B-64: WA Forest Protection Association, Pg. 5 of 5

Appendix C. Wasteload Allocation (WLA) Summary Tables

The following tables include all of the WLA and implementation information that pertain to each general permit type. The information is a condensed form of what is in the body of this TMDL WQIR/IP and intended to be one-page (front and back) summary for ease of use by permit managers, general permittees, and others.

Table C-1

Construction Stormwater General Permits	**Discharge to:** Surface Water within the Deschutes TMDL Boundary
Facility Name and NPDES Permit No. Construction stormwater permits, authorized under the conditions of the Western Washington Phase II Municipal Stormwater Permit, must ensure the conditions of this TMDL wasteload allocation are a part of all necessary permits granted within this TMDL boundary. It is the responsibility of the individual permittee to comply with the conditions of their permit.	
	Bacteria, Fine Sediment, Temperature, Dissolved Oxygen, and pH
Surface Water Quality Standard	pH: must be within a range within 6.5-8.5, with a human-caused variation within the above range of < 0.5 standard units (Deschutes River and tributaries, and Budd Inlet tributaries), and <0.2 standard units for Percival Creek and its tributaries. Turbidity: Turbidity shall not exceed 5 NTU over background when background is ≤ 50 NTU *or* 10% increase in turbidity when background is > 50 NTU
Current WQ Based Effluent Limits (WQBELs) and last permit revision date	Construction Stormwater General Permit (effective January 1, 2011) pH: weekly sampling (with a calibrated pH meter) of stormwater discharges must not exceed 8.5 standard units and not less than 6.5 standard units. Turbidity: weekly sampling of discharges must be < 25 NTU (using a turbidity meter).
Means of Compliance with TMDL	Compliance with the TMDL will be achieved by: • Compliance with the current WQBELs for all permittees within the TMDL Boundary • Implementation of actions from the TMDL Implementation Plan described in this summary.
Waste Load Allocation and Critical Period	*The critical period for the following WLAs applies, from June-September, to any stormwater discharge from a permitted facility.* **Fine Sediment**: Fine sediment is the direct pollutant to be reduced with this WLA. No visible accumulation of fine sediment in the Deschutes River or its tributaries. **Turbidity** will be used as a surrogate measurement for fine sediment. All CSWGP permittees within the TMDL boundary must comply with permit requirements S8.B, S8.C (shall apply to the TMDL boundary), and S4.C "Monitoring Requirements, Benchmarks, and Reporting Triggers" for turbidity. **pH**: S8.D requirements apply to stormwater discharges to any surface water in the TMDL boundary. The pH of any stormwater discharge must be in the rage of 6.5 - 8.5 standard units. **Temperature**: All discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.3°C due to the combined effects of all human activities **Bacteria**: Discharges from stormwater systems to the Deschutes River and tributaries shall be ≤ 100 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 200 cfu/100mL. Discharges from stormwater systems to Percival Creek and Black Lake Ditch shall be ≤ 50 cfu/100mL (geometric mean) and not more than 10% of the samples shall be > 100 cfu/100mL. **Dissolved Oxygen**: All discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water due to the combined effects of all human activities.
Special Operating Effluent Conditions	None specified
Flow-based Limits	None specified

<table>
<tr><th colspan="1">Construction Stormwater General Permits</th><th>**Discharge to:** Surface Water within the Deschutes TMDL Boundary</th></tr>
<tr><td colspan="2">**Facility Name and NPDES Permit No.** Construction stormwater permits, authorized under the conditions of the Western Washington Phase II Municipal Stormwater Permit, must ensure the conditions of this TMDL wasteload allocation are a part of all necessary permits granted within this TMDL boundary. It is the responsibility of the individual permittee to comply with the conditions of their permit.</td></tr>
<tr><td>**Implementation Actions**</td><td>• Implement existing permit limits
• Implement enhanced permit requirements to ensure TMDL compliance:
o Permit required stormwater runoff BMPs to control and remove turbidity, phosphorus, and pH levels outside the acceptable range from must be consistently maintained.</td></tr>
<tr><td>**TMDL Reporting Requirements**</td><td>Permittees must comply with all applicable S8 monitoring and reporting requirements.</td></tr>
</table>

Table: C-2

Industrial Stormwater GP	**Discharge to:** Surface Water within the Deschutes TMDL Boundary
Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.): O'Neill & Sons (WAR001404) Intercity Transit (WAR000084) Haney Truck Line Inc. (WAR003106) AmCor Packaging (WAR012411) Pepsi Northwest Beverage Co (WAR009988) Pepsi Northwest Beverages (WAR004082) Temtco Steel (WAR009171) Truss Components of WA, Inc. (WAR000758) Crown Cork & Seal Co. Inc. (WAR000231) Georgia Pacific Corrugated LLC (WAR000116)	
	Fecal Coliform Bacteria, Fine Sediment, pH, Temperature
Receiving water SWQS	Bacteria: (Deschutes and tribs) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL (Percival Creek and BLD) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL pH: within a range of 6.5-8.5, with a human-caused variation within the above range of < 0.5 units (Deschutes and Tribs), or < 0.2 standard units (Percival and Tribs) Turbidity: Turbidity shall not exceed 5 NTU over background when background is ≤ 50 NTU or 10% increase in turbidity when background is > 50 NTU Temperature: (Deschutes and Tribs) 7DADMax ≤ 17.5°C ; (Percival and Tribs) 7DADMax ≤ 16°C Dissolved Oxygen: (Deschutes and Tribs) 1DMin ≥ 8mg/L ; (Percival and Tribs) 1DMin ≥ 9.5mg/L
Current permit limits (include last permit revision date)	Industrial Stormwater General Permit (effective date: July 1, 2012) pH: discharges to surface water or ground water must be within the range of pH 5.0 to 9.0 (±0.5) standard units. Turbidity: ≤ 25 NTU (±0.5 NTU) sampled quarterly.0 Bacteria: none specified Dissolved Oxygen: none specified Temperature: none specified
Means of Compliance with TMDL	Compliance with the current permit is compliance with the TMDL for permittees identified in this TMDL, and for new permittees with similar discharges.
Waste Load Allocation and Critical Period	*The critical period for the following WLAs applies, from June-September, to any stormwater discharge from a permitted facility*. **The WLA for pH and Turbidity is equal to the current benchmark in S5 Table 2 in the permit for pH and Turbidity** **pH**: discharges from stormwater systems shall not raise the receiving water body pH by more than 0.5 standard units within the pH range of 6.5 – 8.5 standard units. **Fine Sediment**: No visible accumulation of fine sediment in the Deschutes River or its tributaries. **Turbidity:** Turbidity will be used as a surrogate measurement for fine sediment and monthly average measurements should not exceed 25 NTU. Discharges of excessively warm temperatures, fecal coliform bacteria, and low dissolved oxygen water or nutrients are not expected in excess of the following limits: **Temperature**: discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.2°C **Bacteria**: (Deschutes and tribs) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL (Percival Creek and BLD) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL **Dissolved Oxygen**: Discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water.
Special Operating Effluent Conditions	S2 through S5 of the Modified Industrial Stormwater General Permit apply.
Flow-based Limits	None specified

Industrial Stormwater GP	**Discharge to:** Surface Water within the Deschutes TMDL Boundary
Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.): O'Neill & Sons (WAR001404) Intercity Transit (WAR000084) Haney Truck Line Inc. (WAR003106) AmCor Packaging (WAR012411) Pepsi Northwest Beverage Co (WAR009988) Pepsi Northwest Beverages (WAR004082) Temtco Steel (WAR009171) Truss Components of WA, Inc. (WAR000758) Crown Cork & Seal Co. Inc. (WAR000231) Georgia Pacific Corrugated LLC (WAR000116)	
	Fecal Coliform Bacteria, Fine Sediment, pH, Temperature
Implementation Actions	• Each facility must have an up-to-date Stormwater Pollution Prevention Plan (SWPPP) • Structural BMPs must be properly maintained and managed. • BMP implementation activities, specified under the current permit, may need to be improved or inspected based on current DMR results.
TMDL Monitoring and Reporting Requirements	Sampling parameters and frequency will be modified through the adaptive management process upon review of each facility's sampling results reported in their DMRs.

Table: C-3

Sand & Gravel General Permits	Discharge to: Surface Water within the Deschutes TMDL Boundary
Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.): Holroyd Co Tumwater Plant 6 (WAG501029) Concrete Recyclers Inc. (WAG501507) Alpine Sand & Gravel (WAG501037) Thurston County PW Rainier Pit (WAG501275)	K&M Quarry (WAG501118) Cal Portland Tumwater Ready Mix Plant (WAG501199) Lakeside Industries- Olympia Airport (WAG501042) CW O'Neil Pit (WAG501236)
	Bacteria, Fine Sediment, pH, Temperature Dissolved Oxygen
Receiving water SWQS	pH: must be within a range within 6.5-8.5, with a human-caused variation within the above range of < 0.5 standard units (Deschutes River and tributaries, and Budd Inlet tributaries), and <0.2 standard units for Percival Creek. Turbidity: Turbidity shall not exceed 5 NTU over background when background is ≤ 50 NTU <u>or</u> 10% increase in turbidity when background is > 50 NTU
Current WQ Based Effluent Limits (WQBELs) and last permit revision date	**Sand and Gravel General Permit (effective October 1, 2011)** pH: discharges to surface water or ground water must be within the range of pH 6.5 to 8.5 standard units. Turbidity: For process water and stormwater, 50 NTU as a maximum daily and monthly average. TSS: Monthly values cannot exceed 40 mg/L; Industrial sand facilities cannot exceed an average quarterly value of 25 mg/L.
Means of Compliance with TMDL	Compliance with the current WQBELs and implementation of actions and monitoring requirements described in the TMDL and summarized in this table is compliance with the TMDL.
Waste Load Allocation and Critical Period	*The critical period for the following WLAs applies, from June-September, to any surface water discharge from a permitted facility.* **The wasteload allocation for any inactive mining site is zero for all pollutants covered by this TMDL.** **For active mining sites the wasteload allocations are:** **Fine Sediment**: No visible accumulation of fine sediment in the Deschutes River or its tributaries. **Turbidity** is a surrogate measurement for fine sediment; and the effluent limit is the same as described in Table 2 and Table 3 of S2. Monitoring frequency is increased to weekly. **pH**: stormwater discharges must not increase the receiving water pH by > 0.5 SU downstream of Offutt Lake and > 0.2 SU upstream of Offutt Lake above the range of 6.5 - 8.5 SU. Discharges of excessively warm temperatures, fecal coliform bacteria, and low dissolved oxygen water or nutrients is not expected in excess of the following limits: **Temperature**: discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.2°C **Bacteria**: (Deschutes River, its tributaries and those tributaries to Budd Inlet) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL (Percival Creek and tributaries) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL **Dissolved Oxygen**: Discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water.
Special Operating Effluent Conditions	Condition S3 of the Sand & Gravel General Permit applies.
Flow-based Limits	None specified
Implementation Actions	• Each permittee must demonstrate, to Ecology, those BMPs and structures to control and treat process wastewater or Type 1, 2, or 3 stormwater are being followed or adequately maintained. • Sediment from track-out areas must be managed to prevent discharge of fine sediment, turbidity, and TSS to a surface water body within the TMDL boundary.

<table>
<tr><th colspan="2">Sand & Gravel General Permits</th><th>Discharge to: Surface Water within the Deschutes TMDL Boundary</th></tr>
<tr><td colspan="3">Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.):
Holroyd Co Tumwater Plant 6 (WAG501029) K&M Quarry (WAG501118)
Concrete Recyclers Inc. (WAG501507) Cal Portland Tumwater Ready Mix Plant (WAG501199)
Alpine Sand & Gravel (WAG501037) Lakeside Industries- Olympia Airport (WAG501042)
Thurston County PW Rainier Pit (WAG501275) CW O'Neil Pit (WAG501236)</td></tr>
<tr><td></td><td colspan="2">• Each permittee must have the conditions of their wasteload allocation incorporated into their stormwater management plan.
• For Inactive sites that become active again, a Tier II antidegradation analysis will be required to ensure that new or expanded actions will not degrade water quality within the TMDL boundary.
• Actions specific for Alpine Sand & Gravel (WAG501037):
o The Surface Mining Reclamation Plan, currently in development, must include a long-term plan for site stabilization/reclamation of settling ponds and measures to protect against avulsion into the ponds by the Deschutes River.</td></tr>
<tr><td>TMDL Monitoring and Reporting Requirements</td><td colspan="2">Permittees must comply with condition S2 and S4 except for the following:
• Process water must be sampled weekly for pH, Turbidity, and TSS for a period of time representative of normal operations (and no less than 3 months) to determine if the WQBELs are being met.
• Type 2 or 3 stormwater monitoring frequencies for pH and Turbidity listed in Table 3 of S2 shall be increased to weekly measurements when runoff occurs.
If water sampling results demonstrate compliance with the WQBEL then monitoring frequency can return to the schedule in Table 2 and Table 3 of condition S2.</td></tr>
<tr><td>Other Comments</td><td colspan="2">Sand & Gravel permitted facilities that go inactive but may potentially reopen must ensure that existing site conditions and stormwater management during inactivity does not contribute pollutants to any surface water body within the Deschutes River TMDL boundary.</td></tr>
</table>

Table: C-4

<table>
<tr><td colspan="2">W WA Phase II Municipal SW GP</td><td>Discharge to: Surface Water within the Deschutes TMDL Boundary</td></tr>
<tr><td colspan="3">Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.):
City of Olympia (WAR045015) Thurston County (WAR045025)
City of Tumwater (WAR045020) City of Lacey (WAR045011)</td></tr>
<tr><td></td><td colspan="2">Bacteria, Fine Sediment, pH, Temperature, Dissolved Oxygen</td></tr>
<tr><td>Receiving water SWQS</td><td colspan="2">Bacteria: (Deschutes and tribs) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL
(Percival Creek and BLD) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL
pH: within a range of 6.5-8.5, with a human-caused variation within the above range of < 0.5 units (Deschutes and Tribs), or < 0.2 standard units (Percival and Tribs)
Turbidity: Turbidity shall not exceed 5 NTU over background when background is ≤ 50 NTU <u>or</u> 10% increase in turbidity when background is > 50 NTU
Temperature: (Deschutes and Tribs) 7DADMax ≤ 17.5°C ; (Percival and Tribs) 7DADMax ≤ 16°C;
Dissolved Oxygen: (Deschutes and Tribs) 1DMin ≥ 8mg/L ; (Percival and Tribs) 1DMin ≥ 9.5mg/L</td></tr>
<tr><td>Current permit limits (include last permit revision date)</td><td colspan="2">WWA Phase II Permit (effective August 1, 2013): Authorized stormwater discharges of toxicants or pollutants, to surface water and ground water, which would violate any water quality standard is prohibited. The permittee shall reduce the discharge of pollutants to the maximum extent practicable. To comply with the permit, the permittee must comply with the activities and best management practices (BMPs) required in the permit.</td></tr>
<tr><td>Means of Compliance with TMDL</td><td colspan="2">Compliance with the TMDL will be achieved by compliance with the current WQBELs; and in addition, implementation of actions and monitoring requirements described in the TMDL and summarized in this table.</td></tr>
<tr><td>Waste Load Allocation and Critical Period</td><td colspan="2">The critical period for the following WLAs applies from June - September to any stormwater discharge from a Municipal Stormwater Permit Phase II permitted stormwater collection system.
Fine Sediment: No visible accumulation of fine sediment where MS4 discharges stormwater to the Deschutes River or its tributaries. Turbidity will be used as a surrogate for fine sediment and discharges shall not exceed 5 NTU over background when background is ≤ 50 NTU <u>or</u> 10% increase in turbidity when background is > 50 NTU.
Temperature: discharges shall not cause more than a 0.3°C increase of stream temperature, due to anthropogenic causes.
Bacteria: See Table 9 in the Deschutes WQIR for location specific bacteria allocations. The water quality standards for fecal coliform bacteria apply.
Dissolved Oxygen: Discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water.</td></tr>
<tr><td>Measurement Reduction goal</td><td colspan="2">Bacteria reduction goals apply to the identified areas with stormwater targets and the summer/winter load allocations and the percent reductions needed for meeting SWQS.</td></tr>
<tr><td>Special Operating Effluent Conditions</td><td colspan="2">None specified</td></tr>
<tr><td>Flow-based Limits</td><td colspan="2">None specified</td></tr>
<tr><td>Implementation Actions</td><td colspan="2">Implement Existing Permit requirements:
• Implement the schedules and activities in S5.C.1 in the Western Washington Phase II Permit. The Public Education, Outreach and Involvement plan shall target the reduction of fecal coliform pollution, and reduce nutrient sources by increasing public awareness and affecting behavior changes (resulting in nutrient reductions) and shall include: goals, target audiences, messages, format, distribution and evaluation methods.</td></tr>
</table>

W WA Phase II Municipal SW GP	**Discharge to:** Surface Water within the Deschutes TMDL Boundary
Applies to all new permittees and these existing permittees (Facility Name and NPDES Permit No.): City of Olympia (WAR045015) City of Tumwater (WAR045020)	Thurston County (WAR045025) City of Lacey (WAR045011)
	Implement additional requirements through the MS4 permit or other mechanisms as documented in Table 25: City of Lacey, Table 27: City of Olympia, Table 33: Thurston County, and Table 34: City of Tumwater.
TMDL Monitoring and Reporting Requirements	Compliance with S8 Monitoring and Assessment requirements in the Phase II permit is required

Table: C-5

<table>
<tr><td>WSDOT Municipal Stormwater Permit</td><td>Discharge to: Surface Water within the Deschutes TMDL Boundary</td></tr>
<tr><td colspan="2">NPDES Permittee: Washington State Department of Transportation (WAR043000)</td></tr>
<tr><td></td><td>Fecal Coliform Bacteria, Fine Sediment, pH, Temperature</td></tr>
<tr><td>Receiving water SWQS</td><td>Bacteria: (Deschutes River, its tributaries, and Budd Inlet tributaries) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL
(Percival Creek) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL
pH: within a range of 6.5-8.5, with a human-caused variation within the above range of < 0.5 units (Deschutes River, its tributaries, and Budd Inlet tributaries), or < 0.2 standard units (Percival Creek)
Turbidity: Turbidity shall not exceed 5 NTU over background when background is ≤ 50 NTU <u>or</u> 10% increase in turbidity when background is > 50 NTU
Temperature: (Deschutes River, its tributaries, and Budd Inlet tributaries) 7DADMax ≤ 17.5°C ; (Percival Creek) 7DADMax ≤ 16°C
Dissolved Oxygen: (Deschutes River, its tributaries, and Budd Inlet tributaries) 1DMin ≥ 8mg/L ; (Percival Creek) 1DMin ≥ 9.5mg/L</td></tr>
<tr><td>Current permit limits (include last permit revision date)</td><td>WSDOT NPDES Municipal Stormwater Permit (effective date: April 5, 2014)
S4.A. and S4.B. Prohibits discharge of toxicants to waters of the state of Washington which would violate any water quality standard, including toxicant standards, sediment criteria and dilution zone criteria.</td></tr>
<tr><td>Means of Compliance with TMDL</td><td>Compliance with the WSDOT Municipal Stormwater Permit is compliance with this TMDL. Future changes to WSDOT infrastructure or activities that would contribute pollution to their stormwater will need to be evaluated as part of the TMDL adaptive management process.</td></tr>
<tr><td>Waste Load Allocation and Critical Period</td><td>The critical period for the following WLAs applies year round to any stormwater discharge from a WSDOT maintained road or a road which they have responsibility for maintaining.

Fine Sediment: No visible accumulation of fine sediment where WSDOT discharges stormwater to the Deschutes River.
Bacteria: (Deschutes River, its tributaries, and Budd Inlet tributaries) Geometric mean ≤ 100 cfu/100mL and not more than 10% > 200 cfu/100mL (Percival Creek and Black Lake Ditch) Geometric mean ≤ 50 cfu/100mL and not more than 10% > 100 cfu/100mL
Dissolved Oxygen: Discharges shall not cause a greater than 0.2 mg/L decrease in the receiving water.
pH: discharges from stormwater systems shall not raise the receiving water body pH by more than 0.5 SU (for Deschutes River and tributaries) or 0.2 SU (for Percival Creek) within the pH range of 6.5 - 8.5 SU.

Discharges of excessively warm temperatures (while not expected under most normal conditions) must not exceed the following limit:
Temperature: discharges from stormwater systems shall not raise the receiving water body temperature by more than 0.2°C due to the combined effects of all human activities.</td></tr>
<tr><td>Special Operating Effluent Conditions</td><td>None specified.</td></tr>
<tr><td>Flow-based Limits</td><td>None specified</td></tr>
<tr><td>Implementation Actions</td><td>In addition to the S5 requirements for WSDOT's stormwater management program, the following activities will be incorporated into the next permit cycle according to S6. in the WSDOT stormwater permit:
If discharges of pollutants addressed in this TMDL occur outside of WSDOT's stormwater permit area (but within this TMDL boundary), WSDOT will implement best management practices (BMPs) included in the Highway Runoff Manual (HRM).
If stormwater discharges that transport bacteria over natural background levels to listed receiving waters are found from sources within WSDOT's right-of-way and control,</td></tr>
</table>

WSDOT Municipal Stormwater Permit	**Discharge to:** Surface Water within the Deschutes TMDL Boundary
NPDES Permittee: Washington State Department of Transportation (WAR043000)	
	Fecal Coliform Bacteria, Fine Sediment, pH, Temperature
	WSDOT will apply BMPs from their SWMPP or perform remediation to correct bacteria discharges. For run-on sources of bacteria identified by WSDOT that are from outside of WSDOT's right-of- way, WSDOT will notify Ecology and work cooperatively with Ecology, the local jurisdiction, and other parties involved for their resolution. • If evidence exists demonstrating the WSDOT is a significant contributor of pollutants addressed in this TMDL, or this evidence becomes available in the future, stormwater retrofits at specific locations may be appropriate. • Participate in annual adaptive management meetings.
TMDL Monitoring and Reporting Requirements	Existing S7 monitoring requirements apply.

Appendix D. Funding Sources – Detailed Information

Centennial Grants, Clean Water Act Section 319 Federal Grants, Clean Water State Revolving Fund Loans, and Stormwater Grants: The first three funding sources are managed by the Washington State Department of Ecology through one combined application program.

Centennial Grants: This program is funded by state dollars, provided primarily via the State Building Construction Account. The Centennial program provides grants for water quality infrastructure and nonpoint source pollution projects to improve and protect water quality. Eligible infrastructure projects are limited to wastewater treatment construction projects for financially distressed communities. Eligible nonpoint projects include stream restoration and buffers, on-site septic repair and replacement, education and outreach, and other eligible nonpoint activities.

Clean Water Act Section 319 Federal Grants: The federal Environmental Protection Agency (EPA) provides Section 319 grant funds to Washington State with the state required to provide 40 percent match in funding. The Section 319 program provides grants to eligible nonpoint source pollution control projects similar to the state Centennial program.

Clean Water State Revolving Fund Loans: Provided for by the federal Clean Water Act (CWA), the Clean Water State Revolving Fund (CWSRF) program is funded via an annual EPA capitalization grant, state matching funds, and principal and interest repayments on past CWSRF loans. This program provides low interest and forgivable principal loan funding for wastewater treatment construction projects, eligible nonpoint source pollution control projects, and eligible Green projects.

Stormwater Financial Assistance: Funding sources include Stormwater Capacity Grants, Grants of Regional or Statewide Significance (GROSS), and capital construction grants. Capacity Grants are non-competitive and are awarded to holders of Phase I and Phase II NPDES Municipal permittees for activities and equipment necessary to permit implementation. GROSS are competitive grants that assist permittees in completing projects that will benefit multiple permittees. The capital grants have had several different names over the years including Low Impact Development and State Wide Retrofit, Low Impact Development Grants, and Supplemental Statewide Stormwater Grants. Beginning in CY2014/FY2016, the capital stormwater grant monies became known as the Stormwater Financial Assistance Program (SFAP). Application for these funds is made through the annual Combined Water Quality Program Financial Assistance Program. Funding to develop constructions plans for stormwater capital projects is available through the SFAP Pre-Construction Grants. Pre-construction funding may be available as part of the combined program or may run as a stand-alone program.

Conservation Reserve Enhancement Program (CREP): This federal program provides incentives to restore and improve salmon and steelhead habitat on private land. This is a voluntary program to establish forested buffers along streams where streamside habitat is a significant limiting factor for salmonids. In addition to providing habitat, the buffers improve water quality and increase stream stability. Land enrolled in CREP is removed from production and grazing under 10-15 year contracts. In return, landowners receive annual rental, incentive, maintenance, and cost-share payments. The annual payments can equal twice the weighted average soil rental rate (incentive is 110% in areas designated by the Growth Management Act). The Thurston Conservation District administers this program in conjunction with the U.S. Department of Agriculture, Natural Resource Conservation Service.

Conservation Reserve Program (CRP): This is a voluntary program that offers annual rental payments, incentive payments for certain activities, and cost-share assistance to establish approved cover on eligible cropland. Assistance is available in an amount equal to not more than 50% of the participant's costs in establishing approved practices. Contract duration is between 10-15 years. The Thurston Conservation District administers this program in conjunction with the U.S. Department of Agriculture, Natural Resource Conservation Service.

Craft3 *(formerly Enterprise Cascadia)*: This is an FDIC-insured commercial bank helping businesses adopt sustainable practices and contribute to the long-term health of their local communities. Sustainability means creating a healthy environment, vibrant communities, and a strong economy that will thrive for many generations. Craft3 entered the natural resources arena by providing loan-funding opportunities for repair or replacement of individual on-site septic systems.

Emergency Watershed Protection: The U.S Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) may purchase land vulnerable to flooding or easements on floodplain lands and the right to conduct restoration activities in exchange for limited future use by the landowner.

Environmental Quality Incentives Program (EQIP): The U.S Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) program, provides technical assistance, cost share payments, and incentive payments to assist crop and livestock producers with environmental and conservation improvements on the farm. This funding source provides 75% cost-share but allows 90% if a producer is a limited resource or beginning farmer or rancher. Program funding is divided up between livestock-related practices (60%) and crop land needs (40%). Contracts are for one to ten years.

Forestry Riparian Easement Program (FREP): The Washington State Department of Natural Resources (DNR) provides funding through its Small Forest Landowner Office to protect wildlife habitat. The intent of the program is to help small forest landowners keep their land in forestry. The Forestry Riparian Easement Program partially compensates landowners for not cutting or removing qualifying timber under a 50-year easement. The landowner still owns property and retains full access, but has "leased" the trees and their associated riparian function to the state.

National Estuary Program (NEP): The U.S. Environmental Protection Agency (EPA) receives federal funding to support efforts to protect and restore Puget Sound. Most of the funds are used for financial assistance to state, local and tribal governments for their efforts to implement the

Puget Sound Action Agenda. The EPA uses Lead Organizations (LO) to implement targeted strategies, largely through sub-awards to a variety of other entities. For Puget Sound area projects, the LO include the Washington State Departments of Ecology, Health, Fish & Wildlife, and the Puget Sound Partnership, and the Northwest Indian Fisheries Commission.

Riparian Open Space Program: The Washington State Department of Natural Resources (DNR) provides funding for the acquisition (through purchase or donation) of lands within unconfined avulsing channel migration zones (CMZs). The DNR may acquire the free interest of the CMZ land or a permanent conservation easement over such lands.

Rural Housing Repair and Rehabilitation Program: Authorized by Section 504 of the Housing Act of 1949, 7 CFR Part 3550, the U. S. Department of Agriculture (USDA) provides grant and loan funding to low-income rural residents who own and occupy a dwelling in need of repairs. Funds are available for repairs to improve or modernize a home or to remove health and safety hazards. One percent loans are given for up to 20 years.

Salmon Recovery Funding Board: In 1999, the Washington State Legislature created the Salmon Recovery Funding Board (SRFB) composed of five citizens appointed by the Governor and five state agency directors. The board provides grant funds to protect or restore salmon habitat through habitat protection, land acquisition, and habitat assessments. It also supports restoration projects and related programs and activities that produce sustainable and measurable benefits for fish and their habitat. It works closely with local watershed groups known as lead entities. SRFB has helped finance over 500 projects.

Washington Conservation Commission: The Washington State Conservation Commission (WCC) works in conjunction with local conservation districts to provide grant funding for various environmental programs and needs. Annual appropriations are used by the conservation districts to address priority projects.

Wetland Reserve Program: The U.S Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS), provides incentives to individual landowners to enhance wetlands in exchange for retiring agricultural lands that are marginal in terms of production.

Appendix E. Effective Shade Targets for the Deschutes River and Percival Creek Watersheds

The following tables are the reach averaged, system potential effective shade load allocation for each 1 kilometer model reach as displayed graphically in Figures 21 and 22 in the main body of this report. Highest priority reaches include areas with a large recommended increase in effective shade and where the greatest improvements in dissolved oxygen are needed.

Table E-1: Deschutes River Effective Shade Reductions

Distance from upstream boundary (km)	Current	Potential	Load Allocations	
	Reach-averaged effective shade	Mature vegetation and channel modifications	Recommended increase in effective shade (%)	DAve decrease in solar Radiation (W/m^2)
0	89.1%	91.1%	2.0%	6
1	79.7%	92.3%	12.6%	37
2	34.4%	82.1%	47.7%	140
3	51.3%	81.5%	30.3%	88
4	49.1%	89.8%	40.7%	119
5	44.7%	87.2%	42.5%	125
6	46.8%	76.3%	29.5%	86
7	51.0%	75.5%	24.6%	72
8	56.0%	83.3%	27.4%	80
9	46.7%	87.5%	40.8%	119
10	53.1%	85.9%	32.8%	96
11	25.8%	79.0%	53.2%	155
12	15.7%	82.7%	67.0%	196
13	29.0%	81.7%	52.7%	154
14	49.7%	82.1%	32.4%	95
15	43.1%	85.7%	42.6%	125
16	62.8%	83.8%	21.1%	62
17	27.3%	89.2%	61.9%	181
18	44.8%	86.3%	41.4%	121
19	14.8%	74.4%	59.7%	174
20	61.3%	87.4%	26.1%	76
21	67.7%	87.8%	20.1%	59
22	20.8%	77.5%	56.7%	165
23	57.7%	84.7%	27.0%	79
24	85.1%	96.4%	11.3%	33
25	86.2%	92.6%	6.4%	19
26	62.8%	87.3%	24.5%	72
27	58.2%	86.3%	28.1%	82
28	72.4%	90.2%	17.8%	52
29	48.6%	87.1%	38.5%	113
30	60.9%	83.0%	22.0%	65
31	62.5%	89.6%	27.1%	80
32	38.5%	82.5%	44.0%	129
33	56.0%	89.6%	33.6%	99

Distance from upstream boundary (km)	Current	Potential	Load Allocations	
	Reach-averaged effective shade	Mature vegetation and channel modifications	Recommended increase in effective shade (%)	DAve decrease in solar Radiation (W/m^2)
34	43.4%	82.5%	39.1%	115
35	32.6%	80.5%	47.9%	141
36	21.4%	74.7%	53.3%	156
37	63.3%	91.0%	27.7%	81
38	55.6%	88.1%	32.4%	95
39	66.9%	93.5%	26.6%	78
40	51.4%	88.5%	37.2%	110
41	58.5%	86.9%	28.5%	84
42	47.9%	84.3%	36.5%	107
43	34.5%	86.1%	51.6%	151
44	53.3%	89.3%	35.9%	106
45	47.7%	85.2%	37.6%	110
46	28.7%	70.5%	41.7%	122
47	66.6%	87.5%	20.9%	61
48	42.4%	79.8%	37.4%	110
49	34.9%	85.9%	51.0%	150
50	40.7%	86.2%	45.5%	134
51	45.8%	83.1%	37.3%	109
52	45.2%	88.4%	43.2%	127
53	39.7%	78.4%	38.7%	114
54	51.2%	80.2%	29.0%	85
55	54.7%	85.1%	30.3%	89
56	30.0%	79.1%	49.1%	144
57	30.5%	70.0%	39.5%	116
58	15.7%	79.0%	63.4%	185
59	32.7%	66.3%	33.6%	99
60	43.9%	72.9%	29.0%	85
61	30.2%	78.9%	48.7%	143
62	26.1%	79.0%	52.9%	155
63	19.1%	82.0%	63.0%	185
64	26.0%	77.5%	51.6%	151
65	26.2%	64.5%	38.2%	112
66	46.7%	83.2%	36.5%	107
67	38.0%	87.8%	49.7%	146
68	30.3%	60.3%	30.0%	88
69	84.4%	95.4%	11.0%	33

Table E-2: Percival Creek shade reductions

Distance from upstream boundary to end of reach (km)	River mile from mouth of Percival Creek (mi)	Current reach-averaged effective shade (%)	Potential reach-averaged effective shade (%)	Load Allocations	
				Recommended increase in effective shade (%)	DAve decrease in solar Radiation (W/m^2)
0.0	3.4	98%	99%	2%	6
0.5	3.1	70%	96%	26%	87
1.0	2.8	81%	96%	14%	36
1.5	2.5	69%	93%	25%	64
2.0	2.2	54%	99%	45%	141
2.5	1.9	98%	99%	1%	3
3.0	1.6	99%	99%	0%	1
3.5	1.2	99%	99%	0%	2
4.0	0.9	84%	99%	15%	47
4.5	0.6	96%	99%	3%	9
5.0	0.3	90%	99%	9%	27
5.5	0.0	67%	99%	32%	93

Table E-3: Black Lake Ditch Shade Reductions

Distance from upstream boundary to end of reach (km)	River mile from mouth of Percival Creek (mi)	Current reach-averaged effective shade (%)	Potential reach-averaged effective shade (%)	Load Allocations	
				Recommended increase in effective shade (%)	DAve decrease in solar Radiation (W/m^2)
0.0	3.4	26%	81%	55%	172
0.5	3.1	25%	76%	52%	162
1.0	2.8	46%	83%	38%	117
1.5	2.4	77%	87%	10%	31
2.0	2.1	28%	78%	50%	156
2.5	1.8	9%	77%	68%	213
3.0	1.5	73%	92%	19%	59
3.5	1.2	92%	99%	8%	21

Table E-4: Scenario 3C Channel Width Improvements Needed

Model Reach	Current Wet Width (m)	Current NSDZ Width (m)	Scenario 3C Wet Width (m)	Scenario 3C NSDZ Width (m)	Scenario 3C NSDZ Width Percent Reduction
1	9.62	10.17	8.66	9.15	10.0
2	13.51	17.47	12.16	14.18	18.8
3	10.13	20.98	9.12	16.80	19.9
4	11.18	24.21	10.06	17.72	26.8
5	12.60	23.28	11.34	15.38	33.9
6	12.35	14.29	11.12	12.86	10.0
7	15.63	24.10	14.07	16.32	32.3
8	13.82	17.71	12.44	15.07	14.9
9	12.98	21.79	11.68	16.04	26.4
10	15.16	29.95	13.64	16.51	44.9
11	15.18	27.30	13.55	16.34	40.1
12	16.71	31.58	14.11	17.63	44.2
13	14.83	34.50	12.95	17.39	49.6
14	15.98	31.34	14.38	18.00	42.6
15	13.14	27.94	11.83	16.62	40.5
16	16.67	21.42	14.81	16.25	24.1
17	15.93	19.48	13.63	16.52	15.2
18	17.59	27.06	15.06	16.99	37.2
19	17.67	23.91	15.14	17.03	28.8
20	18.66	29.05	15.56	17.84	38.6
21	12.44	15.80	11.20	13.50	14.5
22	16.11	16.61	14.50	14.83	10.7
23	13.18	15.60	11.86	13.93	10.7
24	11.75	11.76	10.58	10.58	10.0
25	12.17	12.17	10.95	10.95	10.0
26	12.02	12.02	10.82	10.82	10.0
27	15.60	15.61	14.04	14.05	10.0
28	14.29	15.05	12.86	13.51	10.2
29	17.18	17.18	15.46	15.46	10.0
30	16.19	16.64	14.23	14.64	12.0
31	16.52	16.67	14.31	14.44	13.4
32	14.76	19.06	13.29	15.22	20.2
33	17.12	22.41	14.78	16.81	25.0
34	19.27	19.89	14.99	15.23	23.4
35	16.34	19.69	14.40	16.24	17.5
36	16.24	22.02	14.52	17.12	22.3
37	16.78	22.67	14.63	17.52	22.7
38	15.89	15.89	14.30	14.30	10.0
39	16.40	16.77	14.52	14.70	12.3
40	13.49	14.23	12.14	12.81	10.0
41	20.20	20.20	16.93	16.93	16.2
42	17.31	17.31	15.50	15.50	10.5
43	18.34	19.53	16.06	16.92	13.3

Model Reach	Current Wet Width (m)	Current NSDZ Width (m)	Scenario 3C Wet Width (m)	Scenario 3C NSDZ Width (m)	Scenario 3C NSDZ Width Percent Reduction
44	16.21	17.16	14.28	15.06	12.3
45	19.75	24.37	16.85	17.15	29.7
46	17.37	19.97	14.98	16.25	18.6
47	14.91	28.34	13.36	16.17	42.9
48	16.22	16.47	14.29	14.35	12.9
49	16.73	20.71	14.89	16.13	22.1
50	14.66	25.96	12.71	16.42	36.7
51	16.00	17.61	14.06	14.54	17.4
52	16.36	18.89	14.60	15.17	19.7
53	15.37	16.40	13.74	14.32	12.7
54	15.35	18.35	13.81	15.70	14.4
55	14.41	14.89	12.97	13.40	10.0
56	17.84	18.96	14.97	15.61	17.7
57	17.60	22.93	15.35	17.12	25.3
58	17.51	19.93	15.50	15.85	20.5
59	19.17	33.25	16.12	18.00	45.9
60	16.20	23.28	14.36	16.86	27.6
61	16.83	19.18	14.87	15.27	20.4
62	17.41	25.18	15.00	16.77	33.4
63	17.31	31.31	15.39	17.45	44.3
64	16.85	28.17	14.53	17.68	37.2
65	17.36	19.62	15.09	15.66	20.2
66	15.72	23.27	14.15	17.17	26.2
67	12.57	13.16	11.06	11.55	12.2
68	11.13	11.20	10.02	10.08	10.0
69	20.80	21.92	16.38	16.53	24.6
70	14.60	14.60	13.14	13.14	10.0

Appendix F. Response to Public Comments

The following pages include Ecology's responses to the comments received during the public comment period. They are in alphabetical order and the comments text is duplicated from the original letter or email. Please note all references to pages numbers, tables, and figures pertain to the draft April-May 2015 public review and comment version of this report. Many have changed in the final version.

Deschutes Estuary Restoration Team (DERT)

DERT1 Comment: Thank you for the opportunity to comment on the draft Deschutes River, Percival Creek and Budd Inlet Tributaries Phase 1 TMDL. In general, I think you have done an excellent job of data collection and analysis and of encouraging discussion of different points of view at the advisory group meetings. The technical and program presentations at advisory group meetings have been superb, and I especially appreciate the staff willingness to respond to questions, comments and suggestions for further analysis and information.

> **DERT1 Response**: Thank you for your comments and your participation.

DERT2 Comment: My primary concern for the TMDL is not with the technical work but with the ability to accomplish it's [sic] goals of meeting state water quality standards. Since the majority of the sources of water quality impacts in this basin are nonpoint sources and activities, Ecology has little or no direct control over those sources and activities. While I was impressed by the recent presentations by the tribe and some local governments about a few of their programs (many already underway) to implement the TMDL, it nevertheless will be a huge undertaking to implement and maintain enough actions to actually make and detect a long term difference in the water quality of this watershed.

> **DERT2 Response**: Ecology acknowledges this is one of the most difficult aspects of TMDL implementation. The federal Clean Water Act (CWA) provides authority to regulate point sources under the National Pollutant Discharge Elimination System (NPDES). Ecology is the delegated permitting authority for the NPDES program in Washington State. The federal CWA has no legal authority to enforce implementation of nonpoint pollution reduction activities; however, the state Water Pollution Control Act (RCW 90.48) does provide Ecology with authority to respond to nonpoint sources (NPS) of pollution. Ecology's approach to address NPS is to first provide technical assistance to achieve compliance through voluntary implementation of best management practices (BMPs) and other activities to reduce nonpoint pollution. County and municipal ordinances also provide some protection of critical areas and require activities to reduce pollution (often as direct results of implementing the NPDES Phase I and II Municipal Stormwater permits). Where particularly egregious NPS pollution occurs, Ecology reserves the right to take appropriate action to reduce or eliminate nonpoint pollution by using our legal authority under RCW 90.48. Improving the water quality and ecological function of the watersheds in this TMDL will only be successful with the combined efforts of all stakeholders that live, recreate, or conduct business in these watersheds. Ecology encourages eligible entities to seek and apply for funding because continued

financial assistance through state and federal grants and loans are critical to help fund these improvements.

DERT3 Comment: Over the long term, the commitment to and funding for the necessary actions will be extremely difficult to maintain. In addition, some sources of pollution, such as on-site systems, will increase in number and add more pollution rather than less as additional properties are developed. Additional development is also likely to increase stormwater runoff, even with the newer, more stringent requirements under the latest stormwater permits and development regulations. As I understand it, the TMDL does not contain a set aside for future growth, so any and all impacts from future population increases and increased commercial, industrial and agricultural activities must fit within the allocations of the TMDL. That means not only do the current sources need to be reduced to meet the TMDL, but they must be reduced even further if we are to accommodate future growth and still meet water quality standards, assuming future growth is not "zero impact". It also means that there is no allowance for future point sources that would cause or contribute to exceedances of the standards and pollutants addressed in this TMDL. Any new point sources, such as fish hatcheries, storm water outfalls or sewage discharges, would need to ensure that there are sufficient offsets to any incremental increase in pollution caused by the new point souce [sic].

DERT3 Response: This TMDL and the modeling analysis show water quality improvements in the Deschutes River Watershed must be comprehensive and maintained over time to meet the water quality goals and objectives. Even then we might not be able to meet water quality standards for temperature, dissolved oxygen, and pH in certain parts of the watershed given existing build out conditions and population pressures. There will continue to be pressure from expanding population growth in Thurston County and the effects of climate change from both radically altered hydrology and increasing air temperatures which negatively counter improvements to water quality achieved through implementation of the TMDL. New point sources discharging to surface water will have to demonstrate their compliance with the TMDL before being granted a NPDES permit. New point sources affecting groundwater will have to consider their impacts where there is a hydrologic connection to surface water. It is the responsibility of the county and the municipalities within the Deschutes River Watershed to use their authority under the Growth Management Act (GMA) to control and direct growth (urbanization) in ways that protect water quality.

DERT4 Comment: Unfortunately, there are no large, existing point source discharges in this watershed that can be signficantly [sic] reduced in order to attain the TMDL goals. That means that most of the attention needs to be paid to the future implementation, tracking, reporting and assessing the effectiveness of the large number of actions in the Water Qualty [sic] Improvement Plan that are primarily aimed at reducing nonpoint sources of pollution. Ecology needs to develop a tracking and reporting system to ensure that these actions take place and are successfully implemented.

DERT4 Response: Improving Ecology’s tracking and reporting of TMDL implementation activities is one of the Water Quality Program’s objectives for the next agency budget cycle. Ecology has invested a significant amount of resources to develop the Ecology Administration of Grants and Loans (EAGL) system to better manage information about the financial investments and outcomes Ecology makes in the watershed using a combination of state and federal funding. There are also partners in the watershed who collect information relating to implementation of this TMDL. Ecology will continue to improve its system for tracking information and will seek to leverage work by other watershed partners to adaptively manage the TMDL with good information.

DERT5 Comment: Finally, in order to sustain this effort into the future and provide some level of public oversight and accountability, I urge Ecology to work with the advisory committee and others to establish a permanent Deschutes Watershed Committee that meets on a regular (perhaps semi-annually or quarterly) basis to review implementation activities and help provide direction and support for key actions.

DERT5 Response: Ecology agrees with the need for a comprehensive strategy and commitment to achieve the goals established in this TMDL. We will continue working with the Advisory Committee to oversee implementation and adaptive management. We encourage and support appropriate Near Term Action (NTA) proposals by the Alliance for a Healthy South Sound (AHSS); a Local Integrating Organization (LIO), targeting the highest priority actions identified in the Puget Sound Partnership Action Agenda. We support other innovative ideas such as the Deschutes Watershed Committee and welcome the opportunity to discuss this with interested parties. There are examples of similar entities in other watersheds and Ecology will take the lead in asking them to come to an Advisory Group meeting to explain how they formed their group, how it is funded, and who takes the lead.

DERT6 Comment: Thank you for your personal investment in the development of this TMDL as well as the efforts of all the other state, local and tribal staff who have been involved.

DERT6 Response: Thank you for your comments and participation.

U.S. Environmental Protection Agency (EPA)

EPA1 Comment: Does the proposed 303(d) list identify impairments that haven't been included on previous lists? If so, EPA recommends that Table 1 ("2012 303(d) listings for pollutants addressed by this TMDL") be updated to include waters that Ecology has identified as being impaired, but which haven't been identified on previous lists.

EPA1 Response: As of the writing of this final report version, Ecology had not submitted the 2014 draft Water Quality Assessment to EPA for approval. A table of eight new listings (Categories 2 and 5) within this TMDL boundary was added to the final report under the section titled "Impairments addressed by this TMDL" and noted as draft listings. Ecology's WQP Policy 1-11, Chapter 2: Ensuring Credible Data for Water Quality Management, identifies a process for the assessment of new water quality data after EPA has approved a TMDL. Any future data indicating waterbody impairment, meeting Category 5 listing criteria for the pollutants addressed by the TMDL, will be placed in Category 4a.

EPA2 Comment: Water Quality Standards & Numeric Targets. In this Section, please clearly explain which "numeric targets," if any, have been chosen by Ecology as the focus for TMDL development. For example, dissolved oxygen impairments are typically addressed by identifying specific pollutant targets; the pollutants that have been chosen, and the reason for choosing those particular pollutants targets, should be clearly explained. For example, the targets (used to calculate the loading capacity and the allocations) should be clearly explained for temperature (e.g. kcal/day), DO (e.g. kcal/day and nitrogen), sediment (e.g. turbidity and/or cubic yards/day) and pH.

EPA2 Response: Comments noted. We added three paragraphs in the "Water Quality Standards and Numeric Targets" section to explain the specific pollutant targets for DO, pH, and fine sediment.

EPA3 Comment: A numeric loading capacity for all pollutants should be included in the document, either in the LC section, or in the Appendix.

EPA3 Response: EPA raised this issue prior to the release of the public comment draft document. Based on EPA's comments, Ecology revised the text to include a discussion of numeric loading capacity for all pollutants.

EPA4 Comment: Loading Capacity for fine sediment. Is the loading capacity equal to the load allocation? If so, please state this in the LC section and refer the reader to the load allocation section (which currently contains the type of write-up that is typically found in the loading capacity section). The loading capacity section doesn't currently specific [sic] a numeric load, but the load allocation section does include a numeric load. Also, please explain the way in which the fine sediment targets are linked to the mass loading (either here, or in the Water Quality Standards & Targets discussion); and explain how the turbidity targets are related to the water quality standard.

EPA4 Response: The loading capacity is equal to the load allocation; the discussion of how we derived the loading capacity was moved from the load allocation section to the loading capacity section to make this clearer. Existing information was utilized to develop a loading capacity and load allocation (expressed as an annual and daily load in yd3/yr) for anthropogenic sources of fine sediment based on the analysis by Raines (2007) and Roberts et al (2012). In addition, a calculated daily load based on the annual load was added to the report to satisfy EPA's requirements for a daily load. The report also clarifies the five reaches identified as needing improvement to meet the <12% fine sediment in streambed gravels target are specific reach-based targets for improvement and not the load allocations themselves. The wasteload allocations address turbidity by changing the benchmarks to numeric effluent limits which are established to be protective of water quality standards; the standards for fine sediment is based on narrative criteria and is captured in the wasteload allocation as a narrative, "No visible accumulation of fine sediment in the Deschutes River or its tributaries".

EPA5 Comment: EPA appreciates the thorough identification of point sources that are currently covered by the Construction Stormwater general permit, Industrial Stormwater general permit, Sand and Gravel general permit, Phase II Municipal stormwater permit and the Washington State Department of Transportation Municipal stormwater permit. EPA also acknowledges the thorough work that has been done to translate WLAs into very specific stormwater permit requirements.

> **EPA5 Response**: Thank you for your comments and participation.

Martin McCallum (MM)

MM1 Comment: Thank you for the opportunity to offer comment on the Deschutes River Phase I TMDL Report and Implementation Plan. I thought the plan was thorough with recommendations based on good science.

> **MM1 Response**: Thank you for your comments and participation.

MM2 Comment: Thurston County's urban and rural areas are growing in population with many new houses being constructed. Rural homeowners drill exempt wells that are not metered. I am concerned that the proliferation of exempt wells in the Deschutes River watershed will have a negative effect on temperature and stream flow in the river and its tributaries. For this reason I support the fourth recommendation on page 87 proposing the Department of Ecology prepare a detailed groundwater model of the Deschutes watershed to help evaluate the effect of further groundwater withdrawals, as well as the effects of solutions such as water conservation, groundwater recharge, and low impact development. Are there any planned dates for this modeling?

> **MM2 Response**: Ecology recognizes there is a strong groundwater and surface water connection with critical summer flows in the Deschutes River watershed. TMDLs can provide information about the connection between instream flow and water quality. We added an implementation activity to the tables for Thurston County and Ecology. It explains the need for the county to explore options with Ecology and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells, along with other surface and groundwater uses in the Deschutes River Watershed. If appropriate, Ecology's Water Resources Program (WRP) can initiate an Instream Flow Rulemaking process. Ecology's WRP has a website dedicated to this issue. The site, State Water Use Laws: The Groundwater Permit Exemption RCW 90.44.050, is available at http://www.ecy.wa.gov/programs/wr/comp_enforce/gwpe.html.

MM3 Comment: I also support the fifth recommendation on page 88 to: "Maintain the current status that the Deschutes River watershed is closed to further withdrawals, eliminate illegal withdrawals, and quantify and mitigate the effect of exempt wells."

Here are some related facts:

1. Surface and groundwater interaction related to fish habitat
Groundwater exchange directly affects the ecology of surface water by:
• sustaining stream base flow and moderating water-level fluctuations of groundwater-fed lakes; Groundwater also indirectly affects surface water by providing water for riparian vegetation, and by controlling the shear strength of bank materials, thereby affecting slope stability and erosion processes. In streams, the mixing of groundwater and surface water in shallow sediments creates a unique environment called the hyporheic zone, an important feature of the stream ecosystem (paragraph from Hayashi and Rosenberry 2002).
• supplying nutrients and inorganic ions.
• providing stable-temperature habitats (i.e., thermal refugia for fish); and
• supplying nutrients and inorganic ions.

Groundwater also indirectly affects surface water by providing water for riparian vegetation, and by controlling the shear strength of bank materials, thereby affecting slope stability and erosion processes. In streams, the mixing of groundwater and surface water in shallow sediments creates a unique environment called the hyporheic zone, an important feature of the stream ecosystem (paragraph from Hayashi and Rosenberry 2002).

Groundwater from the phreatic aquifer influences channel water temperature when it enters the stream channel. Additionally, the two-way water exchange between the alluvial aquifer and the stream channel (hyporheic flow) is perhaps the most important stream temperature buffer. Various factors such as the stream channel pattern and streambed will determine the magnitude of the hyporheic flow. Poole and Berman also discuss human influences on stream temperature and groundwater. Human activities affect water temperatures in various ways. With respect to phreatic groundwater, reduced groundwater discharge via removal of upland vegetation or well pumping reduces the stream's ability to assimilate heat. (Quote from Review of Groundwater-Salmon Interactions in British Columbia report).

> **MM3 Response**: Thank you for your comments. The hydrologic connection between groundwater and surface water is important. More information is available in the Assessment of Surface Water/Groundwater Interactions and Associated Nutrient Fluxes in the Deschutes River and Percival Creek Watersheds, Thurston County, Sinclair and Bilhimer (2007), Publication No. 07-03-002, www.ecy.wa.gov/biblio/0703002.html.

City of Olympia (OLY)

OLY1 Comment: The TMDL implementation plan does not provide a clear path or understanding of how or when the TMDL is considered complete. Please provide a section within the TMDL document that outlines a clear path for delisting (i.e., how it is determined, when obligations are complete, and when it is appropriate to delist).

> **OLY1 Response**: Page xxvi of the Executive Summary lists three points that, when satisfied, complete the TMDL. Implementation of the TMDL is a success when water quality standards are met. Ecology's WQP Policy 1-11, Ensuring Credible Data for

Water Quality Management, details the process for delisting of impairments (for example, changing a Category 5 or 4a listings to Category 1). We added a reference to this policy in the list. The "Measuring Progress toward Goals" section includes more information on performance measures and targets, effectiveness monitoring, and adaptive management. These provide the process used to evaluate the completion of a TMDL.

OLY2 Comment: Because Wasteload Allocations (WLA's) and Implementation Actions (IA's) typically result in specific requirements imposed via a revision to the City's Phase II, MS4 NPDES Permit, we believe it is inappropriate to require specific IA's that are not stormwater related. Please remove any non-stormwater related WLA's and IA's from the TMDL document. Specifically those resulting in inappropriate requirements and actions to the City of Olympia (i.e., Smith Ranch mitigation, regional onsite septic system conversion program, riparian restoration, and homeless camp management).

OLY2 Response: The city of Olympia's implementation actions include both stormwater (permit) and non-stormwater related activities. The implementation plan includes all currently identified activities needed to meet the goals and objectives of this TMDL. We reformatted Olympia's implementation table to separate the stormwater permit activities from the other TMDL implementation activities.

OLY3 Comment: The City of Olympia is only responsible for pollutants we have control over (i.e., Property, Ownership) in the case of bacteria source tracking/tracing the City is limited to working within the public domain, providing limited access to private property. Source tracking/tracing may lead to a point source, a cause, or point of supply that the City does not have responsibility, ownership, or jurisdictional authority over. At that point we have completed our actionable TMDL obligations and turn the findings over to the appropriate authority for further review and action.

OLY3 Response: Comments noted.

OLY4 Comment: Ecology is the appropriate entity to conduct monitoring of streams and waterbodies. The City of Olympia requests Ecology take the lead for any monitoring or sampling of streams.

OLY4 Response: This TMDL identifies specific areas within the city of Olympia's stormwater jurisdiction for bacteria reductions. The City is responsible for monitoring discharges within their permit area. As a partner of the Puget Sound Regional Monitoring Program (PSRMP), the City participates in status and trends monitoring, stormwater management program effectiveness studies, and source identification and diagnostic monitoring. Ecology will work with the city to develop any waterbody specific monitoring plans.

OLY5 Comment: Please utilize Ecology's proposed Water Quality Assessment and 303(d) List for Washington State Using Fresh Water Data as current best available science to update the TMDL accordingly reflecting changes to waterbodies within the Deschutes TMDL watershed boundary.

> **OLY5 Response**: Ecology is required to use current EPA-approved Water Quality Assessments (WQA) in TMDLs. Since this TMDL will be submitted to EPA for approval prior to approval of the new proposed 303(d) list, we must reference the 2012 WQA. We added Table 4, Draft 2014 Water Quality Assessment Listings for Categories 2 and 5, to the “Impairments addressed by this TMDL” section for clarification. Proposed changes of listing categories are made through the WQA.

OLY6 Comment: Because Water Quality Assessments and best available science can identify changes to stream Listing Id's, we recommend that a section be included within the Deschutes TMDL document that allows for changes to IA's required by entities through an adaptive management process as Water Quality listings change.

> **OLY6 Response**: Ecology considers the implementation plan contained in this report a living document. Updating the plan is part of the TMDL adaptive management process and will include completed implementation activities or those no longer necessary. Even though a listing may change from Category 4a (impaired but has a TMDL) to Category 1 (not impaired) on one section of a waterbody within the TMDL boundary, there may be impairments in other parts of the watershed still requiring implementation activities and need to be part of the overall TMDL implementation plan. The section titled “Measuring Progress Towards Goals” provides a detailed explanation of the TMDL adaptive management process.

OLY7 Comment: The sediment problem in Deschutes River is an upper watershed and management issue involving DNR forest practices and Department of Agriculture laws regulating private landowner stewardship over their lands and operations. How are affected interests downstream ensured regulations are being applied appropriately, are effectively protecting water resources, and assurance that means of compliance are being met. How are others that are affected being included in the adaptive management process?

> **OLY7 Response**: Ecology’s TMDL program uses the road and forest management actions prescribed by the Forest Practices Act (RCW 76.09). Ecology and the Washington Department of Natural Resources (WDNR) enforce those rules. Ecology participates in the adaptive management process for Forest Practices Rules and strives to ensure the rules as implemented will meet water quality standards. The forest practices adaptive management process is a public process. Properly managing roads in forested lands in the upper watershed is a big part of improving water quality downstream. Another important component is the implementation of best management plans (BMPs) and All Known and Reasonable Technology (AKART) for point sources (including municipal stormwater) designated with wasteload allocations for turbidity and fine sediment to reduce fine sediment pollution to receiving water. The Deschutes River is a geologically young river system and channel migration and erosion is a natural function. Examination of areas with high levels of erosion due to anthropogenic influences should be conducted and projects completed to restore those reaches back to natural function to reduce the erosion amount to a more natural level. Ecology acknowledges the legacy load of sediment generated from past forest practices prior to the adoption of the 1999

Forests and Fish agreement. Additionally, we know roadside ditches, construction sites, and storm events continue to introduce sediments to the river.

OLY8 Comment: (Pg. 6, Table 1) - The water body Indian Creek has a 2012 Assessment Listing ID #45026. There is likely an incorrect number set as there is no matching listing in the 303(d) listing database. Please correct this Listing ID information or remove from the table.

OLY8 Response: Listing ID #45026 is separate from #3758 in the 2012 Assessment. It was rolled into #3758 during the conversion of the stream segments to the National Hydrography Dataset (NHD) framework. Because this TMDL must use the 2012 Water Quality Assessment for counting the listings (based on a Township-Range-Section segmentation framework), listing #45026 was included separately from #3758.

OLY9 Comment: (Pg. 8, Table 1) - The 2012 Assessment Listing ID #42337 for temperature is mistakenly labeled under the water body Black Lake Ditch and should be identified as water body Black *River* Ditch.

OLY9 Response: Both the Black Lake Ditch and the Black River drain from Black Lake. The Black Lake Ditch flows east from the lake and enters Percival Creek, located in WRIA 13. The Black River flows west from the lake and enters the Chehalis River, located in WRIA 23. The listing detail for #42337 identifies the data for this listing as pertaining to a monitoring station on the Black Lake Ditch at Jones Quarry, located within WRIA 13.

OLY10 Comment: (Pg. 53, 1st bullet) - *Fine sediment: No offsite transport via runoff of any materials is allowed.* This sentence is contradictory of the use of turbidity as a surrogate for fine sediment and discharges. Also, because of the natural occurence [sic] of sedimentation in the built environment through multiple non-point sources, it is unreasonable to expect "no offsite transport via runoff of any materials is allowed" is possible. Based on the current science and understanding of the stormwater infrastructure dynamic, this would be an ineffective and unattainable goal utilizing the current technologies and BMPs available for use. We recommend utilizing text similar to that of WSDOTs permit on page 57. **Recommended Text**: ~~No offsite transport via runoff of any materials is allowed.~~ <u>No visible accumulation of fine sediment where MS4 discharges stormwater to the Deschutes River, Percival Creek, and Budd Inlet Tributaries is allowed.</u>

OLY10 Response: Ecology recognizes there may be infrequent stormwater events when the stormwater best management practices (BMPs) and water treatment technology might fail, resulting in fine sediments being transported offsite and into the receiving surface water body. Ecology expects BMPs to be maintained properly so they meet their intended purposes, and BMP failures should be corrected as soon as possible. For consistency Ecology revised text as recommended throughout the document where stormwater fine sediment is mentioned.

OLY11 Comment: (Pg. 113, 2nd paragraph, 3rd sentence) - *To meet the requirements of the TMDL, these actions must be completed by 2025.* To be more consistent with the Schedule requirements *(implementation 2016 - 2030)* in the action tables, **we recommend** that the completion date be changed to 2030.

> **OLY11 Response**: Recommended change made throughout the document where appropriate.

OLY12 Comment: (Pg. 114, 2nd sentence) - *These actions do not apply to entities already assigned specific actions in previous tables.* We assume the intent of this sentence was to capture the action items required of entities in table 24 through 40. Because this sentence precedes these tables it effectively does not cover any of the entities it is identifying as already being assigned specific actions. The sentence as stands may be misinterpreted due to its placement in the document. **Recommended Text**: These actions do not apply to entities already assigned specific actions ~~in previous~~ <u>identified in</u> tables <u>24 through 40</u>. [Or something similar capturing the intent].

> **OLY12 Response**: We revised the text to provide clarity on the intent and purpose of Table 23, General Land Use Category Implementation Actions.

OLY13 Comment: (Pg. 118, Table 27) - Because the finalization of this TMDL will likely occur sometime in late 2015, **we recommend** that all Schedule dates be shifted a year back to allow for a more realistic implementation process. For instance instead of *Plan Development: 2015* and *Implementation start date: 2016* we would prefer a Plan Development date of 2016 and implementation start date of 2017.

> **OLY13 Response**: We revised the dates throughout the document for consistency.

OLY14 Comment: (Pg. 118, Table 27, Action #2, 1st sentence) - The action item requires the City to develop a plan to reduce bacteria and sediment loading. Further review of the Deschutes TMDL makes apparent the fine sediment problems are occurring within the Deschutes River mainstem. None of the priority areas identified for the City (Budd inlet tributaries and/or Percival Creek watershed) have been assigned pollutant impairment for fine sediment by Ecology's Water Quality Assessment and 303(d) listings. Because none of the priority waterbodies for the City have been determined as requiring a load allocation for fine sediment we recommend that sediment be removed from actionable items. **Recommended Text**: Develop a plan to reduce bacteria ~~and sediment~~ loading with a schedule of prioritized projects prior to expiration of the permit on July 31, 2018.

> **OLY14 Response**: The load allocation for fine sediment applies to the entire Deschutes River watershed including the tributaries and other non-priority areas. It does not apply to the Budd Inlet tributaries or Percival Creek Watershed. The wasteload allocation (WLA) for the city of Olympia includes limits for fine sediment and turbidity to help meet the reduction objectives as well. Wherever the city of Olympia’s Phase II Stormwater Permit boundary intersects with the Deschutes River watershed (for example, within upper parts of the Chambers Creek subwatershed), they must ensure their stormwater best management practices (BMPs) and other activities meet the WLA for these two pollutants.

OLY15 Comment: (Pg. 118, Table 27, Action #2, 2nd sentence) - *The prioritized projects will need to be implemented during subsequent permit cycles.* In order to be more consistent with Action Item #7. **Recommended Text**: The prioritized projects will need to be implemented during subsequent permit cycles <u>in the priority area</u>.

> **OLY15 Response**: Updated text and added Chambers Creek to the list of priority areas. According to their current permit, Olympia's Phase II Stormwater permit boundary includes parts of the Chambers Creek subwatershed.

OLY16 Comment: (Pg. 118, Table 27, Action #2) - Because Bacteria is the only pollutant of concern appropriately identified as requiring and assigning a WLA to the City we recommend removing any reference to Percival Creek watershed, Percival Creek, or Black Lake Ditch within the Deschutes TMDL as it relates to a Bacteria parameter. The Department of Ecology's proposed Water Quality Assessment and 303(d) list proposes to remove Percival Creek, Black Lake Ditch and Chambers Creek from a Category 5 (impaired) to a Category 1 (meets water quality standards) for Bacteria. We recommend that Ecology review the entire TMDL document for consistency and make changes to the document reflecting the current Best Available Science, by removing all references that bacteria is a parameter of concern for these waterbodies. There should not be any waste load allocations, loading reductions, or requirements for tracking or tracing bacteria sources in these watersheds or waterbodies. **Recommended Text**: **Priority areas:** <u>Budd Inlet tributaries</u>: Ellis, Indian, Mission, Moxlie, and Schneider Creeks~~; Percival Creek Watershed: Percival Creek~~

> **OLY16 Response**: The bacteria allocations set in this TMDL apply even if the proposed listings show improvement to meet Category 1. The load and wasteload allocations are satisfactory if water quality data continues to show non-impairment. Ecology expects these areas to continue meeting water quality standards in the future. To meet this expectation, it is important to implement the best management practices (BMPs) and objectives identified in this TMDL.

OLY17 Comment: (Pg. 118, Table 27, Action #3) - This action table requires source identification of potential bacteria pollutants. Because the best available science provided by Ecology's Water Quality Assessment and 303(d) list proposes to lower Black Lake Ditch and Percival Creek from waters of concern/impaired to a Category 1 (meets water quality standards) We recommend Percival Creek and Black Lake Ditch be removed from requirements of screening. **Recommended Text**: ...routine field screening include Budd Inlet tributaries: Butler, Ellis, Indian, Mission~~, and Percival Creeks; Percival Creek Watershed: Near Black Lake Ditch confluence~~.

> **OLY17 Response**: To ensure compliance with the TMDL goals and identify future problems early, the city should continue monitoring and screening in areas that have been delisted. See also OLY16 Response.

OLY18 Comment: (Pg. 118, Table 27, Action #5, 2nd sentence) - In order to be more consistent with Action Item #7. **Recommended Text**: ...including installing pet waste stations at established pet recreation areas to prevent or reduce bacteria released into local water bodies in the priority area.

> **OLY18 Response**: The priority areas identified in the Implementation Plan are areas to focus on first. However, these activities should be implemented anywhere within the city's jurisdictional area within the TMDL boundary.

OLY19 Comment: (Pg. 118, Table 27, Action #6) - **We recommend** striking and removing the action item altogether as riparian and channel restoration are non stormwater related and IA's required by the TMDL will likely be incorporated via the City of Olympia's MS4 NPDES Permit.

> **OLY19 Response**: Ecology appreciates the activity the city is doing. This TMDL Implementation Plan includes all activities that are necessary to achieve clean water. Implementing projects to improve or restore riparian and channel conditions help meet the TMDL objectives. We revised the appropriate tables to provide clarity on which actions are permit and non-permit related.

OLY20 Comment: (Pg. 118, Table 27, Action #7) - This action item is already a requirement and mandate of the City of Olympia's Shoreline Master Program. **We recommend** striking and removing the action item completely.

> **OLY20 Response**: This TMDL Implementation Plan includes all activities that are necessary to achieve clean water. This includes actions already required as part of a non-TMDL program.

OLY21 Comment: (Pg. 119, Table 27, Action #8) - Because WLA's and IA's typically result in specific requirements imposed via a revision to the City's Phase II, MS4 NPDES Permit, we believe it is inappropriate to require specific IA's that are not stormwater related. The Smith Ranch mitigation project is mandated as mitigation through other permittable actions as it relates to a ground water withdrawal permit. This mandate is currently being implemented through other legal avenues, requirements, and schedules. Including Smith Ranch mitigation into this TMDL will cause confusion and possible mismanagement of an existing mandate. Therefore **we request** it be removed as an actionable item within Table 27. It may be more appropriately placed within the body of the TMDL text as a background informational discussion item.

> **OLY21 Response**: Ecology wants to recognize this mitigation action as potentially meeting the TMDL effective shade allocations on the river frontage of this property, and restoration of the riparian area should be included in the city's plans for this property. There is a load allocation for effective shade that the city (as the owner of this property) should meet. It should not be confused with implementation of their stormwater wasteload allocations (WLA). Changes to the format of this table will separate this action from others that need to be incorporated into the city's MS4 permit.

OLY22 Comment: (Pg. 119, Table 27, Action #9) - The City is actively participating on an inter-jurisdictional work team with the City of Tumwater and Thurston County along with Public

Health. Because onsite septic is already being managed through other regulations and mandates, **we recommend** striking and removing the entire action item.

> **OLY22 Response**: Ecology appreciates the activity that this inter-jurisdictional work team is doing. This TMDL Implementation Plan includes all activities that are necessary to achieve clean water. Improved management of onsite septics and conversion to sewer, where feasible, will help meet the TMDL objectives.

OLY23 Comment: (Pg. 119, Table 27, Action #10) - This action item is essentially describing the City of Olympia's Drainage Design Manual which already addresses this issue. We recommend referencing the City's Drainage Manual. **Recommended Text**: Reduce anthropogenic sources of heat <u>through implementation of the City of Olympia Drainage Design Manual</u>. ~~Possible actions include: where feasible, retain runoff and encourage infiltration; evaluation runoff from large areas of impervious surface, with focus on on-site retention and infiltration; or where feasible, increase native vegetative cover in sensitive areas.~~

> **OLY23 Response**: Revised text as recommended.

OLY24 Comment: (Pg. 119, Table 27, Action #11) - The City Utility is currently implementing habitat enhancement projects in riparian areas throughout the City of Olympia. **We recommend** striking and removing the action item altogether as riparian and channel restoration are non stormwater related and IA's required by the TMDL will be incorporated via the City of Olympia's MS4 NPDES Permit.

> **OLY24 Response**: Ecology appreciates the activity that the City Utility is doing. This TMDL Implementation Plan includes all activities that are necessary to achieve clean water. Implementing projects to improve or restore riparian and channel conditions helps meet the TMDL objectives.

OLY25 Comment: (Pg. 119, Table 27, Action #13) - This action item is duplicative of action #3, **we recommend** striking and removing the action item completely.

> **OLY25 Response**: Comment noted. Action item deleted.

OLY26 Comment: (Pg. 162, Appendix 1, Glossary) - Near Stream Disturbance Zone (NSDZ) is defined as *The active channel area without riparian vegetation that includes features such as gravel bars*. Based on this definition, it is difficult to understand and visualize where this would be in relation to applying in the field. The Ordinary High Water mark is also within the active channel at a location devoid of vegetation. **We request** Ecology provide or develop a diagram that allows for visual representation of the NSDZ in relation to other stream boundary indicators (i.e., OHWM, OHWL, CMZ, Bankfull Channel Width, and flood plain).

> **OLY26 Response**: Ecology already defined this in the TMDL document (Appendix A). Individual site conditions will determine where this feature occurs on the landscape and assessments are needed on a project by project basis. Ecology is available to answer questions about implementation projects as needed. More information is available from

Ecology's Environmental Assessment Program website, **Quality Assurance at Ecology**, under "Standard Operating Procedures (SOPs) for sampling, auditing, and field methodology Environmental Assessment Program", Total Maximum Daily Load (TMDL) Studies SOPs. Specifically, look for the *Standard Operating Procedure for Conducting Riparian Vegetation and Stream Channel Surveys in Wadeable Streams for Temperature Total Maximum Daily Load Studies*, EAP084, June 2013, available online at http://www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP_SOP_ConductingRiparianVegAndStreamChannelSurveysInWadeableStreams4TempTMDLs_v1_0EAP084.pdf.

OLY27 Comment: (Pg. 176, Appendix C, Table C-4) - Recommended Text: ~~No offsite transport via runoff of any materials is allowed.~~ No visible accumulation of fine sediment where MS4 discharges stormwater to ~~in~~ the Deschutes River or its tributaries~~, nor Percival Creek and its tributaries including Black Lake Ditch~~.

OLY27 Response: Text was revised as recommended.

Squaxin Island Tribe (SIT)

SIT1 Comment: Our first overall comment is, well done in that the document does a good job of bringing together all of the data and analysis collected over the years.

SIT1 Response: Thank you for your comment and participation.

SIT2 Comment: Our second overall comment is that it is clear that the implementation plan cannot and will not meet several of the required water quality parameters even if fully implemented. This is shown by Ecology's own modeling as evidenced by Figures 10 and 11. The TMDL, however, must result in water quality standards being met. Further, if flow reduction by permit-exempt wells is not stopped or mitigated, then the temperature standard: (1) will not be met by 2065; and (2) will continue to be unmet by larger amounts as new permit-exempt wells are drilled (which violates anti-degradation requirements). Further, where the implementation plan relies on voluntary actions on private property for parameters such as temperature the plan as outlined is so ambitious that it is likely to be unsuccessful.

SIT2 Response: Ecology recognizes the strong groundwater and surface water connection with critical summer flows in the Deschutes River watershed. TMDLs can provide information about the connection between instream flow and water quality. We added an implementation activity to the tables for Thurston County and Ecology. It explains the need for the county to explore options with Ecology and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells, along with other surface and groundwater uses in the Deschutes River Watershed. This activity explains the need for the county to explore options with Ecology and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells, along with other surface and groundwater uses in the Deschutes River Watershed. If appropriate, Ecology's Water Resources Program (WRP) can initiate an Instream Flow Rulemaking process. Ecology's WRP has a website dedicated to this issue. The site, *State Water Use Laws: The Groundwater Permit Exemption RCW 90.44.050*, is available at http://www.ecy.wa.gov/programs/wr/comp_enforce/gwpe.html.

SIT3 Comment: As a third overall comment we suggest that Ecology include the general recommendations found on pages 114 and 115 that are not already included in load allocation reduction targets. Specifically, increased flows should be included as a prescription for decreasing temperatures. Large woody debris should be used for allocations designed to reduce temperatures and decrease fine sediment.

SIT3 Response: The TMDL Conclusions and Recommendations section already include recommendations for developing a detailed groundwater model of the Deschutes River Watershed to help evaluate effects of current and future groundwater withdrawals, and to quantify and mitigate the effect of exempt wells. We added an implementation activity to the tables for Thurston County and Ecology. It explains the need for the county to explore options with Ecology and watershed stakeholders to effectively manage the cumulative use of domestic exempt wells, along with other surface and groundwater uses in the Deschutes River Watershed.

SIT4 Comment: (Pgs. 40-41) - Comment- Figures 10 and 11. These figures are important in that they succinctly show that all restoration options, including increasing flows, must be considered to achieve temperature goals.

SIT4 Response: Comment noted. See SIT2 and SIT3 Responses.

SIT5 Comment: (Pgs. 10, 40-42, 60 and 115) - Comment- The temperature reductions are almost entirely predicated upon increases in riparian shade. As shown by the modeling, shade clearly has the biggest impact on temperature; however, several other attributes will ultimately be needed to achieve targets. Figures 10 and 11 suggest that "channel improvements" can decrease water temperature by 1.3 degrees. Calculating and displaying channel improvements in an "allocations" like format, for example as found in Figure 20, would be very helpful for implementation. The Deschutes River is listed for impairment due to lack of large woody debris (page 10). Like shade, large woody debris is not a pollutant regulated by the TMDL, but it is a means to addressing the regulated pollutants. Channel improvements as modeled by Ecology in the 2012 technical report include increased channel roughness and greater interaction with the hyporheic zone, both of which would result from the presence of large woody debris in the channel. Rather than relegating large woody debris to a general implementation action (page 115), more specific actions should be prescribed. Any current assessments of large woody debris deficit should be listed by reach or kilometer, with targets for increases, just as they are with shade.

SIT5 Response: This TMDL does not include an analysis of where specific large woody debris (or engineered log jams) could be placed to help achieve the desired water quality improvements. This TMDL does recommend that enhanced channel complexity, including large woody debris, should be implemented in key locations such as Henderson Blvd., Waldrick Road, State Route 507, and Old Camp Lane. These are areas of heavy summer recreation by swimmers and rafters. Projects may need to be designed to meet both recreational and aquatic uses. It is likely there are many other locations throughout this watershed where water quality and fish habitat would benefit from restoration of channel complexity. Ecology encourages the development of projects to meet this implementation objective. We support projects such as those undertaken by the Squaxin Island Tribe to restore wood in the most appropriate locations along the Deschutes River.

SIT6 Comment: (Pgs. 10, 42, and 114-115) - Modeling scenario 5 was used to estimate system potential for temperature (page 42). It includes historical 7Q10 low flow discharge values from the period of 1949-1969. Increased river flow causes a decrease in temperature, though small compared to other changes. Because full riparian shade is unlikely, and because the river will still not meet the temperature standard, increasing river flow should be part of the solution. Decreased flows are a source of the problem.

Furthermore, the Deschutes River is listed for impairment due to decreased instream flows, regardless of temperature (page 10). To that end, Ecology has included general recommendations for increasing flow in the river (pages 114-115). But these recommendations are just a side note, lacking any details, and so easily overlooked.
Through the TMDL process, the flow deficit has been apparent in modeling of temperature, dissolved oxygen, and pH.

To meet the Clean Water Act's requirements, a more detailed plan for restoring instream flows to the Deschutes should be included in the water quality improvement report:
• Flow deficit at USGS gaging stations should be quantified for every month of the year.
• All water systems and exempt wells should be inventoried and mapped (including those not on record with Ecology, because they do exist), and their total water use quantified.
• A detailed groundwater model of the Deschutes basin should be created and calibrated.
• Using the model, the effect of increasing exempt wells should be quantified as a whole and by river reach.
• Using the model, the effect of solutions such as water conservation, reinfiltration, low impact development, and alternate water sources should be quantified and illustrated spatially in the county, so that local entities have a road map for returning flows to the Deschutes.
• Existing and future limits on any water withdrawals should be enforced.
• A timeline should be placed on the above actions.

SIT6 Response: Please refer to SIT2 Response which describes how we accounted for stream flow and SIT3 Response for the added implementation objective for Thurston County and Ecology to begin a closer examination of this issue including many of the points made in this comment.

SIT7 Comment: (Pg. 74) - Comment- Fine Sediment- This implementation plan does a good job of laying out areas of load allocation by reach and land use type. This should be useful in prioritizing work in the system. Ecologies [sic] reliance on existing BMP's is, in our opinion, unlikely to achieve goals. Adding channel complexity, for example large wood, has been shown as an effective way to trap sediment and keep it away from spawning areas. We believe it would be helpful to implementers to show a reach by reach or kilometer by kilometer index for necessary stream [sic] channel improvements.

> **SIT7 Response**: Ecology recognizes the water quality improvements created by restoration of instream channel complexity. The TMDL study did not include an analysis of channel improvements on a reach by reach or kilometer by kilometer based index to guide implementation. Ecology supports that approach as another next step in the implementation of this TMDL's objectives. We agree improving large wood debris will also help manage fine sediment throughout the Deschutes River system. Besides the Squaxin Island Tribe's sediment survey, we do not have results for individual reaches. However, the fine sediment targets apply throughout the system.

SIT8 Comment: (Pg. 83) - Comment and question- The document states that the cities and County must implement low impact development practices (LID). Even if correctly implemented using LID does not fully remove impacts. With full implementation and full build out how much function is estimated to be lost for TMDL parameters? These should be quantified.

> **SIT8 Response**: A detailed analysis of future growth and land use is the purview of Thurston County and that process was initiated in 2014 with grant funding through the Environmental Protection Agency (EPA) National Estuary Program (NEP) funding source. Understanding where the county will expect and encourage or discourage growth will help them manage that growth to be protective of water quality and water resources. The Phase II Municipal Stormwater permit requires implementation of LID practices for new development within their Urban Growth Area (UGA). The Growth Management Act (RCW 36.70A) also has requirements for counties to plan for growth while protecting critical areas.

SIT9 Comment: (Pg. 89) - Comment- In our opinion the riparian goals are extremely ambitious and unlikely to be met. Dedicated funding has not been identified, political will for enforcement has not been demonstrated and past and ongoing efforts have been very limited. We do not agree that it is reasonable to assume that voluntary actions will lead to essentially the whole rive [sic] system being planted with a functioning riparian zone in any reasonable time frame.

> **SIT9 Response**: This TMDL identifies existing funding sources that can be used to implement the goals and objectives of this TMDL. Additional and significant investments above the current funding levels must be made for this TMDL to be successful. Funding for nonpoint proposals to Ecology incorporating TMDL implementation actions generally score higher than other nonpoint proposals. Ecology recognizes these goals are extremely ambitious. Implementing riparian shade improvement, restoring natural channel function and complexity, implementing NPDES permits, and informed land use decisions are all part of improving water quality in the Deschutes River Watershed. Ecology reserves the ability to exercise its authority to enforce the state Water Pollution Control Act (RCW 90.48). We recognize it will take a combination of voluntary and legally required actions to implement the TMDL objectives and maintain them over time. See also DERT2 Response.

SIT10 Comment: (Pg. 133) - Question- Table 45. Where does the 2050 date for good habitat conditions come from? While existing sediment in the system will take time to work its way through downstream, project [sic] designed to stop or remediate sediment sources will have an almost immediate effect.

> **SIT10 Response**: The text should read 2065 and we updated it throughout the document as needed. We expect trees planted now to reach a size large enough to achieve our system potential shade objectives in about 50 years. Implementation of channel restoration and improvement projects will help decrease the overall time it will take to meet the fine sediment reduction goals. Extensive riparian restoration and channel improvements are required to meet the TMDL goals and objectives.

SIT11 Comment: (Pg. 135) - Comment- The Tribe does not believe an adaptive management process is needed to implement the TMDL. Ecology has the information it needs and has identified the prescriptions needed to achieve water quality standards. A workable plan needs to be implemented and it will become readily apparent if the interim goals are not being met. Ecology has the existing capacity to adaptively manage the project from the first day of implementation. *If a committee or group is required, waiting until 2020 to begin for a plan that is supposed to be effective by 2025 is far too late to be effective. We recommend starting the process in 2016.* As stated earlier, the riparian goals are ambitious and it would become apparent very soon that interim goals will or will not be met.

> **SIT11 Response**: Ecology has incorporated Adaptive Management as a key component to the TMDL program. This part of the process is designed to allow stakeholders time to implement the identified actions through the use of best management practices (BMPs) or permit requirements. After a reasonable amount of time, Ecology will, along with appropriate stakeholders and partners, evaluate those actions to determine if they are effective. The listed five years is a guideline only. Ecology can at any time work with affected parties and the Advisory Group to evaluate the implementation actions and make corrections or improvements as needed. It is also important to note implementation has already begun in this watershed and is not dependent on waiting for EPA to approve the TMDL. It is important to note many of the implementation actions identified in this TMDL are already underway or in development.

SIT12 Comment: (Pg. 42) - Scenario 4 on page 42 is the temperature modeling scenario used for the water quality improvement report. It assumes that headwaters of and tributaries to the Deschutes are at water quality standards. Is that safe to assume that those tributaries will meet that condition in the near future? For the headwaters, this has to do with whether Washington Forest Practices laws are sufficient.

> **SIT12 Response**: We assumed that under system potential conditions, the model boundary conditions would include meeting the water quality standards for stream temperature. The Washington Forest Practices Act (RCW 76.09) and associated rules and guidance is the framework for management of riparian areas within commercial forest lands. The multi-agency and stakeholder workgroup called Cooperative Monitoring, Evaluation, and Research (CMER) committee was established by the Forest Practices Board to ensure and inform effective implementation of the Forest Practices Act. It is the forest landowners' responsibility to follow the guidelines appropriately. The

Washington State Department of Natural Resources (WDNR) is granted authority for enforcement of the Forest Practices Act (RCW 76.09.140) and Ecology has the right to enter upon forest land at any reasonable time to administer the provisions of the Forest Practices Act and the State Water Pollution Control Act (RCW 90.48).

SIT13 Comment: (Pg. 115) - Regarding the prescribed riparian buffer widths of 75ft and 35ft. We understand that you have set a buffer width that seems "technically defensible and reasonably feasible". That wording makes the 75 ft. for the mainstem Deschutes River seem like a compromise. It seems inadequate if the buffer distance is measured from the edge of the active channel rather than the edge of the channel migration zone. Given the active bank erosion in the Deschutes, a riparian replanting project 75 feet from the active channel could be eroded and eventually become the active channel. Ecology appears to be focusing on shade when prescribing a 75 foot buffer in the TMDL, in the long term this 75 ft. may be inadequate to provide healthy riparian function for the Deschutes, due to the need for large woody debris structural input (which also affects temperature by changing channel roughness and depth of the hyporheic zone). We recommend using the riparian buffer widths as called out in the NMFS 2008 Biological Opinion (BiOp) for FEMA's National Flood Insurance Program for Puget Sound. This includes the latest and best available science on this topic and is designed to ensure healthy watersheds.

SIT13 Response: We continue to believe that establishing a forested stream-side vegetation corridor with native plants at least 75 ft. wide on perennial waters is essential for implementing the TMDL. There may be site-specific areas where a wider buffer is more appropriate, such as the actively eroding channels described. If the 75 ft. buffer is insufficient in the long term as you predict, a larger minimum buffer could be adopted through the adaptive management process. Many of our funding programs do require larger buffers. The goal and purpose of the grant funding is not a regulatory focus but instead is designed to get the greatest amount of environmental benefit, improvement, and protection, for the public funds provided. Ecology fully supports wider buffer widths because they can provide additional benefits such as microclimate effects and large wood recruitment. We will encourage implementation actions that include restoring minimum buffers and preserving existing riparian buffers currently larger than the minimum.

SIT14 Comment: (Pgs. 114-116) - The “general land use” BMPs violate the Clean Water Act because they are wholly ineffective. Ecology: (a) assigns no implementing entity; (b) exempts itself and Thurston County from the responsibility of implementing them; and (c) illogically states that in order to meet TMDL requirements, these BMP / actions must be completed by 2025 (by whom?) and that ongoing actions must be in place and continue past 2025. Ecology should move some if not all of the BMPs in Table 23 to Ecology’s and Thurston County’s assigned tasks in Tables 38 and 33, respectively, with directive language and corresponding completion dates.

SIT14 Response: The General Land Use BMPs apply to all landowners and land use activities. The Clean Water Act does not require TMDLs to include implementation plans. Ecology believes it is important to have a complete implementation plan that includes all actions necessary to meet water quality standards. We revised the text to distinguish the general land use requirements from those of Tables 24 through 44 which apply to specific entities.

SIT15 Comment: (Pg. 128) - The Implementation Plan assigns Ecology the task of protecting cool water sources identified in the TIR imagery from flow depletion or temperature increases, but provides no deadline for doing so.

SIT15 Response: This information will be helpful for implementation of the temperature load allocations. Ecology will complete this map feature in 2016. The locations of these cool water refugia will be priority areas for restoration and protection of riparian shade.

SIT16 Comment: (Pgs. 122-123) - Thurston County's assigned tasks are non-directive, wholly discretionary and fail to meet its GMA water availability requirements and 1971 Water Resources Act requirements, as well as Ecology's water-related statutory duties (e.g., administer consistent with the priority system, protect instream flows, etc.).

SIT16 Response: Please refer to SIT2 Response which describes how we accounted for stream flow and SIT3 Response for the added implementation objective for Thurston County and Ecology to begin a closer examination of this issue including many of the points made in this comment.

SIT17 Comment: The Clean Water Act does not allow Ecology to draw a bright line between its water quality and quantity programs. Rather, the Act requires "comprehensive solutions" to prevent, reduce and eliminate pollution in concert with programs for managing water; and (2) establishes the supreme goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. Drawing a bright line is a prohibited "artificial distinction." PUD No. 1 v. Ecology, 511 U.S. 700, 719 (1994).

SIT17 Response: PUD No. 1 v. Ecology was a case that upheld Ecology's authority to condition a 401 Water Quality Certification to require a certain level of instream flow. The purpose of a TMDL is not to set an instream flow. There is a separate rulemaking process to do that. A TMDL sets the maximum amounts of a pollutant or pollutants that can be discharged to surface waters without violating the state's water quality standards. Ecology's Water Resources Program has a website dedicated to this issue. The site, *State Water Use Laws: The Groundwater Permit Exemption RCW 90.44.050*, is available at http://www.ecy.wa.gov/programs/wr/comp_enforce/gwpe.html.

Thurston County (TC)

TC1 Comment: (Pg. xii, Paragraph 2, Line 4, and Paragraph 6,Line 2) - The abstract indicates that the technical study collected data in order to determine the loading capacity for fecal coliform bacteria, temperature, DO, pH, and fine sediment; however, the report establishes numeric targets for nutrients in this report. Please clarify how data collected during the study can be used to establish these nutrient targets. This also was changed from the last version provided which stated in the abstract that this TMDL would not establish numeric targets for watershed nutrient reductions. Please provide justification for the change.

> **TC1 Response**: EPA reviewed the pre-public comment version of this report and stated they require nutrient allocations to approve the TMDL for dissolved oxygen (DO). The modeling scenarios run for dissolved oxygen on the Deschutes River indicated that upstream of Offut Lake, the lower temperature of the Deschutes and a reduction of tributary and groundwater nutrients to estimated natural conditions got the river closest to meeting water quality standards. We set the load allocations for dissolved inorganic nitrogen (DIN) and orthophosphate (OP) at their estimated natural conditions to help meet DO standards. Groundwater concentrations of nutrients were measured directly with the groundwater study by Sinclair and Bilhimer (2007). The estimated natural nutrient concentration for the tributaries was set to values no greater than the 10th percentile of the 2003-2004 monitoring results by geology type (See Roberts et al, 2012, for more detail).

TC2 Comment: (Pg. xiii, Paragraph 2, Line 2) - This is also a change from the last version which stated that compliance with the TMDL would be based on meeting water quality standards. Please explain the change.

> **TC2 Response**: Analysis from Roberts et al (2012) predicted that even if we were able to fix all of the problems in the watershed to revert it to estimated natural conditions, there would still be reaches that would not meet numeric criteria in the water quality standards for one or more TMDL pollutants. If the numeric criteria for temperature and DO are still unattainable after the TMDL has been fully implemented, then the Natural Conditions part of the water quality standards will apply so it will still meet that provision in the standards. After discussing the issue with EPA, we agreed the changes made to the text better described the outcome of a successful TMDL.

TC3 Comment: (Pg. xviii, Paragraph 2, Line 1) - Editorial comment: "…list for fecal coliform bacteria, temperature, DO, pH, ~~or~~ and/or fine sediment."

> **TC3 Response**: Revised text as suggested.

TC4 Comment: (Pg. xxii, Paragraph 4, Line 1) - Because much of the Deschutes river basin is located outside the NPDES municipal stormwater permit boundary, many of the recommended actions will need to be voluntary in nature. Recommend including a section before "Wasteload allocations" on voluntary actions that will be needed to bring the water quality back into compliance (e.g., stream buffers, in-channel and bank restoration, manure storage, and livestock exclusion). This will provide more emphasis on these measures and will help drive resources to programs that help implement these types of activities.

> **TC4 Response**: Ecology acknowledges this is one of the most difficult aspects of TMDL implementation. The implementation plan details all the nonpoint source (NPS) pollution reduction actions needed based on current and best available science. While Ecology's strongest authority is with the NPDES permit program and the state Water Pollution

Control Act (RCW 90.48), there is no specific permitting authority to require many of these actions. The federal CWA has no legal authority to enforce implementation of NPS pollution reduction activities. RCW 90.48 does provide Ecology with authority to respond to nonpoint sources (NPS) of pollution. Ecology's approach to address NPS is to first provide technical assistance to achieve compliance through voluntary implementation of best management practices (BMPs) and other activities to reduce nonpoint pollution. County and municipal ordinances also provide some protection of critical areas and require activities to reduce pollution (often as direct results of implementing the NPDES Phase I and II Municipal Stormwater permits). Improving the water quality and ecological function of the watersheds in this TMDL will only be successful with the combined efforts of all stakeholders that live, recreate, or conduct business in these watersheds. Ecology encourages eligible entities to seek and apply for funding because continued financial assistance through state and federal grants and loans are critical to help fund these improvements.

TC5 Comment: (Pg. xxvi, Paragraph 4, Bullets 1-3) - These bullets are inconsistent with the TMDL success criteria listed in the abstract. Please use consistent language throughout.

TC5 Response: As requested, we revised the text throughout the document to provide consistency in describing when a TMDL is considered successful. Note that where numeric criteria might be reached due to natural conditions (after the TMDL has been fully implemented) then natural conditions criteria will apply as determined by Ecology WQP Policy 1-11, Chapter 2: Ensuring Credible Data for Water Quality Management.

TC6 Comment: (Pg. 33, Paragraph 2, Line 4) - Please clarify if the language here to describe if the loading targets for the Budd Inlet model will be used for the future (i.e., marine) TMDL or this current TMDL.

TC6 Response: The load and wasteload allocations for this freshwater TMDL have been established to meet water quality standards in the Deschutes River, Percival Creek, and Budd Inlet tributaries. These loading targets will also be used as the starting place for modeling loads to Budd Inlet and Capitol Lake in Phase 2 of this project.

TC7 Comment: (Pgs. 44, 45, 46, 70, and 101) - In the draft TMDL, it is very difficult to evaluate the basis for using a nutrient loading allocation for addressing dissolved oxygen and pH. In some cases, it appears that these parameters are within the limit for anthropogenic influence. For example, on Pages 44 and 45, the TMDL reads: *"The reduction of nutrient inputs from tributaries and groundwater to estimated natural conditions will improve the average daily minimum DO in the Deschutes River by only 0.03 mg/L and 0.02 mg/L, respectively. This improvement is well within the 0.2 mg/L allowance in the water quality standards for anthropogenic influences on minimum DO"*. Later, on Page 46, it reads: *"The temperature, DO, and pH regimes are highly influenced by Black Lake and wetlands at the headwaters in both branches, and natural conditions may not meet the numeric criteria"*. Further on, on Page 101, the TMDL reads: *"A future TMDL will set the appropriate allocations for nitrogen"*. Despite this confusion, the draft TMDL includes stringent loading allocations (Pg. 70, Table 11) for dissolved inorganic nitrogen (72.3% reduction) and orthophosphate (10.1% reduction), as well as DO and pH loading allocations.

> **TC7 Response**: We acknowledge some of the referenced text was confusing. We revised the text to improve clarity. The 0.02 mg/L and 0.03 mg/L figures represented the average improvement in DOmin for the entire Deschutes River Watershed and not just for the area which received the nutrient load allocations. The total impact of effective shade and nutrient reductions is greater than the allowance for anthropogenic influence in the water quality standards and so nutrients should be included. The QUAL2k model was not applied to Percival Creek Watershed so there is no nutrient load allocations associated with it. The sentence you refer to regarding Black Lake and the wetlands at the headwaters is a qualitative statement regarding the system potential dissolved oxygen (DO) for this watershed. Similar to the Deschutes River, Percival Creek and Black Lake Ditch have effective shade allocations to address solar radiation loading that raises stream temperature. The shade allocations are expected to be the biggest contributor to improvements in DO and pH in that system. As for the other sentence referred to on page 101 (public review draft), a few clarifying changes were made to specify we are talking about nutrient allocations that may be needed in other freshwater sources to Budd Inlet.

TC8 Comment: (Pgs. 71-73, Figures 27 and 28) - The county requests the opportunity to have a face to face meeting to discuss the nutrient allocations in order to better understand the rationale prior to the finalization of the Deschutes TMDL.

> **TC8 Response**: Ecology staff will meet with Thurston County staff to discuss the nutrient allocations after the Deschutes TMDL is submitted to the EPA.

TC9 Comment: (Pg. 73, Figure 29) - It seems that the urban area should be far more red than it is considering we know that there are ~17,000 OSS with densities greater than 3 per acre. Request that Ecology verify the accuracy of that map.

> **TC9 Response**: The data used to develop the OSS Density map came from the Thurston County's assessment of OSS systems within the urbanized area of the county. The map was created by using the GIS data provided by the county identifying parcels serviced by LOTT or another publicly-owned treatment works and parcels that have septic. A point feature was created using the centroid of all parcels identified with OSS, and then the kernel density spatial analysis method was used to create the point density raster feature. Please note the legend showing the lowest density category is 3-38 OSS per square mile (not just 3 per acre) and the next category is 39-94 OSS per square mile. The scale at which the map is shown in the document, along with the hatching to identify Vashon recessional outwash, makes identifying some of the fine differences within the urbanized area difficult. This is a limitation of the pictorial representation of the data.

TC10 Comment: (Pg. 87, Paragraph 2, Line 4) - Recommend changing this language to "both new development and redevelopment must not worsen DO and pH conditions in the system," as it may be unrealistic to expect that development activities will *reduce* DO and pH impacts. There are several references to this throughout the document.

TC10 Response: The last sentence of the paragraph was amended to read "…both new development and redevelopment must improve DO and pH in surface waters to the maximum extent practicable."

TC11 Comment: (Pg. 88, Bullets 3, 5, and 6) - More references to nutrients here. This is not a nutrient TMDL and requirements for monitoring and/or quantification are not appropriate here.

TC11 Response: This TMDL does establish nutrient load allocations as surrogate measures for dissolved oxygen (DO). Reducing nutrients are an important part of meeting DO criteria. Reduction of nutrients effectively reduces the amount and rate of primary productivity in the Deschutes River and its tributaries which should lead to higher DO levels. The DO analysis described in Roberts et al (2012) and reiterated in this TMDL quantifies the level of nutrient reduction that correlates with an improvement in DO in the Deschutes River mainstem.

TC12 Comment: (Pgs. 87-88) - •Edit and clarify language for these sections: --*"Septic systems, particularly those near a surface water body or sited in highly drained soils could be contributing excess nutrient loads. Existing management programs by Thurston County should continue and intensify. In addition, future efforts should examine and implement options to reduce nutrient loading from OSS systems, including conversion to sewer in urban areas and state-of the-art nitrogen-reducing onsite systems in rural areas, if and when reliable and affordable technology becomes available ."*
•"*Future groundwater* (reclaimed water and/or stormwater? – This needs to be clear) *infiltration facilities should quantify the potential increases in nutrient loads to the Deschutes River and tributaries and offset any inputs by reducing other local sources so that DO and pH do not worsen.*"
•*"Agricultural operations, including livestock operations, should eliminate offsite transport of sediments, bacteria, and nutrients. Existing operations in the Deschutes watershed should be further evaluated for facility management and manure applications. Water quality monitoring should be considered.* (What does "offsite transport" mean? This needs to be clear. Does it mean that all nutrients from agricultural facilities need to be managed on site and that they can't adversely affect water resources? Or, does it mean that all nutrients from agricultural facilities need to be stored and managed as described in an approved nutrient management (farm) plan? Something else?)

TC12 Response: Thank you for your comments. Text was revised to provide clarification as requested.

TC13 Comment: (Pg. 89, Paragraph 2, Line 1, and Paragraph 3, Line4) - No supporting evidence is provided to suggest that the Deschutes will be meeting all water quality standards within the next 10 years. Please provide examples of other successful TMDLs or provide more evidence to support this timeline.

TC13 Response: The text in this paragraph was amended to clarify that (given full implementation) bacteria reduction goals will be met by 2030 and stream temperature, dissolved oxygen (DO), and pH goals by 2065. Reduction of fecal coliform bacteria to meet water quality standards with a 10 year implementation timeline is the standard schedule for bacteria TMDLs in Washington State. It is not easy to achieve full implementation for nonpoint sources in any watershed with only voluntary implementation. However, there has been incremental improvements in other watersheds with TMDLs around the state, including the Upper Chehalis River Watershed Bacteria TMDL, where some of the bacteria listings have been proposed to move to Category 1 (meets standards) in the 2014 draft Water Quality Assessment. Because stream temperature, DO, and pH improvements rely in large part on riparian shade improvements, and trees take a long time to grow, a 50 year implementation timeline is typical for those TMDLs. (See also DERT2 Response.)

TC14 Comment: (Pg. 90, Table 15) - Please add bullets for -Thurston County Sanitary Codes: Article III -Rules and Regulations of the Thurston County Board of Health Governing Water Supplies, Article IV -Rules and Regulations of the Thurston County Board of Health Governing Treatment and Dispersal of Sewage; and Article VI - Rules and Regulations of the Thurston County Board of Health Governing Nonpoint Source Pollution.

TC14 Response: Thank you for the additional resources. We updated the table as requested.

TC15 Comment: (Pg. 98, Table 18) - Please add a section for Thurston County Resource Stewardship. Current activities include the following:

Stream Team

Stormwater Stewards and Salmon Stewards program training, classes on Naturescaping for Water and Wildlife, rain gardens, marine and riparian zone restoration planning and techniques. http://www.co.thurston.wa.us/stormwater/streamteam/streamteam-home.html and http://streamteam.info/

Stormwater Education and Outreach

Information and programs on neighborhood stormwater retention pond care, polluted runoff reduction, stewardship opportunities, spill reporting, pet waste reduction, drainage technical assistance. http://www.co.thurston.wa.us/stormwater/

TC15 Response: Thank you for the additional resources. We updated the table as requested.

TC16 Comment: (Pg. 101, Paragraph 4, Lines 2 and 3) - The report again indicates that a future TMDL will set appropriate numeric allocations for nitrogen. Recommend changing line 3 to "…stakeholders should ~~also~~ aim to reduce nitrogen loads to the Deschutes River."

TC16 Response: Revised text as suggested.

TC17 Comment: (Pg. 103) - WSDA authority and responsibility for dairy enforcement should be clearly stated.

TC17 Response: Comment noted. Revised text after conferring with WSDA staff who provided clarifying information.

TC18 Comment: (Pg. 109) - Add "Solid Waste Permitting and Enforcement, Group B and single family drinking water supplies," to the 1st sentence. In lines 6 & 7 delete the language, *"... purchasing property to be used to construct community drain fields where on-site repairs are not possible,"* (While this has been done, it is not the mission or responsibility of the department.) In line 10, add the language, "*agriculture* and solid waste *complaint response* ...

TC18 Response: Thank you for the clarification. Revised text as requested.

TC19 Comment: (Pg. 113, Table 21, Line 1) - Recommend changing action to *"Review monitoring data and existing law to determine if existing language is strong enough to support water quality standards and uses. Work within the adaptive management framework to revise as necessary."*

TC19 Response: This action is not the responsibility of the Commercial Forest Landowners. Their responsibility is to implement the Forest Practices Act (RCW 76.09) correctly. The review of monitoring data and evaluation of the effectiveness of current forest practice rules is the responsibility of the multi-agency and stakeholder workgroup called the Cooperative Monitoring, Evaluation, and Research (CMER) committee. Ecology is an active member. CMER was established by the Forest Practices Board to ensure and inform effective implementation of the Forest Practices Act. It is the forest landowners' responsibility to follow the guidelines appropriately. Monitoring data in the Deschutes River Watershed will be evaluated during adaptive management steps to determine if the TMDL is meeting it performance goals and measurements. However, changes to forest practice activities in the Vail Tree Farm specifically must be conducted through the Forest Practices Board.

TC20 Comment: (Pg. 114, Paragraph 1, Line 2) - Please clarify if this language is intended to mean that the "General Actions" will apply to entities listed is [sic] subsequent tables (i.e., Thurston County). Report says "These actions do not apply to entities already assigned specific actions in previous tables."

TC20 Response: Revised text based on OLY12 Comment.

TC21 Comment: (Pg. 114, Table 23, Row 1) - We understand that these are general actions items and not considered require [sic] for Thurston County. However, the enforcement mechanism for this recommendation has not been identified. Recommend including who should perform the suggested actions.

TC21 Response: This falls under the responsibility of the property owner and enforcement may vary. For example, if there is a "private property – no trespassing sign" posted, the property owner would contact local law enforcement. If the site has permitted access, and the permittee is violating the permit restrictions, the property owner or permit issuer could revoke the permit.

TC22 Comment: (Pg. 114, Table 23, Row 5) - There is no enforcement action identified. This is a voluntary action. Recommend identifying the group who would work with golf courses to incentivize the use of the "salmon safe certified" program.

> **TC22 Response**: Ecology acknowledges this is a voluntary action. In order for Ecology to consider this an implementation action, it must demonstrate it is effective at reducing pollution. We revised the text to provide two resources, www.salmonsafe.org/getcertified/golf-courses and www.stewardshippartners.org/programs/salmon-safe-puget-sound/. Inclusion of these resources does not represent endorsement by Ecology.

TC23 Comment: *(None provided.)*

> **TC23 Response**: *Ecology note – The table provided by Thurston County is missing a Comment 23. Ecology contacted Thurston County for clarification and they confirmed they did not submit a Comment 23. For consistency between the comments and the report, we are keeping the comment numbers as they were submitted.*

TC24 Comment: (Pg. 115, Table 23, Row 6) - Replace the language in the parenthesis with "at least every three years for standard gravity systems and annually for all other system types" as is stated in state law.

> **TC24 Response**: Thank you for the clarification. We revised the text as suggested.

TC25 Comment: (Pg. 115, Table 23, Row 8) - How are we to comply with this? What does it mean to have a 35-ft wide vegetation corridor on "constructed ditches"? – Does that mean every stormwater conveyance swale has to have a buffer? Seems like it should only apply to those water courses that fit the definition of waters of the state.

> **TC25 Response**: Stormwater conveyance ditches (such as roadside ditches) are not required to have a 35 ft. wide vegetation corridor. The "constructed ditch" category applies to ditches created to drain or convey water from upland areas (for example, constructed ditches draining upland agricultural areas or the Black Lake Ditch). We also provided a definition of "stream-side vegetation corridor" to the glossary.

TC 26 Comment: (Pg. 122, Table 33, Row 1) - In the context of the permit, we wonder if the following language is necessary as it seems redundant and circular: *". . . and compliance with TMDL requirements."*

> **TC26 Response**: We agree the clause is redundant and removed it.

TC27 Comment: (Pg. 122, Table 33, Row 5) - Replace the last sentence in the action that begins with *"Fix all failing OSS …"* with "Assure that all failing OSS are repaired using…"

> **TC27 Response**: Revised text as suggested.

TC28 Comment: (Pg. 113, Paragraph 5) - The TMDL states that "landowners and activities within the watershed must not cause any discharge of pollutants to state waters (according to RCW 90.48). This code refers to Ecology's authority to regulate and enforce nonpoint source pollution sources. However the language in the TMDL does not further address Ecology's intention to utilize this enforcement mechanism in order to meet the 2025 timeline. Nor does it include any language of monitoring performance within the 10 year timeframe in order to make adjustments so that the timeline can reasonably be met. We request revising the language to more explicitly state how Ecology intends to use its authority under RCW 90.45 to address nonpoint source pollution violations on private lands.

> **TC28 Response**: The TMDL includes Ecology's intent to enforce the state Water Pollution Control Act (RCW 90.48). Table 38 and the "Measuring Progress toward Goals" section contain the TMDL's performance measures and targets as well as an effectiveness monitoring plan. Ecology's approach for utilizing and enforcing RCW 90.48 is characterized in the *Washington's Water Quality Management Plan to Control Nonpoint Sources of Pollution*, Publication No. 15-10-015. This plan is available at https://fortress.wa.gov/ecy/publications/publications/1510015.pdf.

TC29 Comment: (Pg. 116, Table 23, Row 4) - •The 2012 Stormwater Management Manual for Western Washington does not contain BMPs for all the TMDL-listed pollutants. Suggest revising to read: "Use best management practices (BMPs), as applicable, from the 2012 Stormwater Management Manual for Western Washington . . . ."

•Suggest deleting the last sentence as it adds little value and is too narrow in its potential applicability.

•States to use BMPs from the 2012 Stormwater Management Manual --- Does this mean if we allow alternative BMPs or approaches outside of our NPDES municipal stormwater permit area (where we are required to use the 2012 Ecology Stormwater Manual) that we would be in violation of the TMDL? We currently do allow some approaches outside our NPDES municipal stormwater permit boundary that are not strictly equivalent to the 2012 Stormwater Manual. This provision would appear to effectively extend the application of the 2012 Ecology Manual to the entire Deschutes Basin.

> **TC29 Response**: The best management practices (BMPs) listed in the 2014 Stormwater Management Manual for Western Washington have met Ecology's Technology Assessment Protocol (TAPE) standards to qualify as BMP. Using BMPs which meet the TAPE guidelines and result in reduction of discharged pollutants, is considered in compliance with the TMDL. The table was amended to clarify "Stormwater Runoff (outside of the Phase II Municipal Stormwater permit boundary)" and noted the manual was amended in December 2014. The amended version, referred to as the 2014 SWMMWW, is available at https://fortress.wa.gov/ecy/publications/documents/1410055.pdf. The Technical Guidance Manual for Evaluating Emerging Stormwater Treatment Technologies, Technology Assessment Protocol - Ecology (TAPE), publication no. 11-10-061, is available at https://fortress.wa.gov/ecy/publications/documents/1110061.pdf.

TC30 Comment: (Pg. 121, Table 32, Row 4) - Expand Action 4 to include the need to prepare and implement nutrient management plans for farms throughout the watershed that apply commercial fertilizers and manure; and routinely conduct nutrient soil testing to ensure that over-applications are prevented, to help address the elevated ground water nitrogen problem and achieve the nutrient load allocation identified in Table 11.

> **TC30 Response**: We expanded this action as follows: "Work with landowners with livestock or a commercial agricultural product (for example, hay, wheat, or vegetables) to identify (with a Nutrient Management or other equivalent plan) and implement best management practices (BMPs) that remove sources of fecal coliform bacteria and nutrients discharged to surface water or groundwater. Implementing BMPs is considered compliance with this TMDL." Under the **Comments** column added, "Recommended action: Routinely conduct nutrient soil testing to ensure prevention of over-applications."

TC31 Comment: (Pg. 121, Table 32) - Insert the following action item "Identify agriculture-related pollution sources, and prepare and implement farm plans and restoration projects to correct them." Under Comments state "TCD contract with Thurston County using NEP Round 4 grant awarded April 2014". Schedule is July 1, 2014 -Oct 31, 2016. (Mirror action on pg. 123, Table 33, Row 5)

> **TC31 Response**: This item was added to the expanded action identified in the TC 30 Comment and Response. The following text was added under the comments column: "The goal is for working lands to prevent or reduce over-application of nutrients on the land and encourage proper manure and stormwater management on-site".

TC 32 Comment: (Pg. 122, Table 33, Row 2) - • Suggest revising to read as follows:
Stormwater Retrofits ~~control and management~~: Identify priority locations (i.e., pollutant hotspots) ~~where stormwater controls are needed~~ using stormwater runoff models or other acceptable methods, where retrofitting the County's municipal separate storm sewer system is considered an effective strategy~~. Develop a plan~~ to reduce nutrient, bacteria, and sediment loading, ~~with a schedule of~~For identified priority~~ized~~ locations, scope projects for inclusion in the County's~~to add to their~~ stormwater capital facilities~~management~~ plan (CIP) (sic) ~~during the first permit cycle. The prioritized projects will need to be implemented during subsequent permit cycles~~.

• Language referring to schedules and permit cycles seems more appropriate for inclusion in the "Schedule" column. Suggest revising schedule language to read:
Identify priority locations: ***During the first two years of the next NPDES permit cycle (2018 to 2020)*** *Scope and schedule projects for inclusion in CIP: By the end of the next NPDES permit cycle (2023)*
Initiate project implementation per CIP (sic) schedule: ***By the end of the next NPDES permit cycle (2023)****, Prioritize and Incorporate projects into the SSWU Capital Facilities Program for Construction within a 20-year planning horizon based on prioritization criteria of the Thurston County SSWU and SSWAB.*

TC32 Response: Ecology revised this table and row based on the suggested improvement in TC 32. *Clarification: The referenced plan is part of the Thurston County Comprehensive Plan, Chapter 6: Capital Facilities Plan (CFP).*

TC33 Comment: (Pg. 122, Table 33, Row 3) - In order to accurately reflect Plan's name and the County's regulatory jurisdiction for enforcement of its IDDE ordinance, please revise language in the Comments column to read as follows: "Continue to implement localthe [sic] Thurston County hHazardous [sic] wWaste [sic] Management pPlans [sic] (adopted July 2014) for existing businesses and new development. This plan includes the IDDE ordinance. This Plan Aapplies [sic] to Thurston County and all local jurisdictions contained within."

TC33 Response: Thank you for the clarification. Ecology revised the table as recommended.

TC34 Comment: (Pg. 122, Table 33, Row 4) - •This requires plan development within 18 months of the permit-required action and then an implementation start date 12 months following the plan's completion. A better requirement would be development of the plan within the permit period – or at least provide us up to 3 years. •Define "Implementation" - Does having the projects identified and programmed into our Capital Facilities Plan suffice, or do we have to have started construction within 12-month [sic]? The latter interpretation is not reasonable. Our Capital Program prioritizes projects on a wide range of criteria, and any projects identified as a result of the TMDL study would compete against projects in other basins including flooding projects.

TC34 Response: Ecology consulted with Thurston County to clarity their intent with these comments. County staff stated the comments actually belong to Pg. 122, Table 33, Row 2, along with TC32 Comment. See also TC32 Response.

TC35 Comment: (Pg. 123, Table 33, Row 1) - This language is broad and vague. The comments imply that it refers to groundwater. Please clarify the language if that is the intent. This is not an ongoing Thurston County activity, so please change schedule status to "As funding allows". Implementing this action will require a major groundwater study that could be done by others, like WDOE, USEPA, or USGS, so please add this action to those agencies tables as well.

TC35 Response: More specific language was added to this action item, now under the "General" row in Table 33, Thurston County. It states: "Work with Ecology and other relevant partners to develop a groundwater model to evaluate the current impacts of nutrients in groundwater where there is a hydrologic connection with surface water. Use the model to inform growth management in priority areas". The Comments section was amended to read: "Priority areas: Chambers Lake and other vulnerable groundwater sites in the Deschutes Watershed identified as gaining reaches in Sinclair and Bilhimer (2007)." The Schedule was changed to "As funding is available."

TC36 Comment: (Pg. 123, Table 33, Row 8) - In the Henderson Inlet Watershed Fecal Coliform Bacteria Water Quality Improvement Project, this recommendation was translated into an NPDES municipal stormwater permit requirement to sample wet-weather discharges between

November and April specifically between river miles 1.6 to 0.2 of Woodland Creek and on Jorgenson Creek upstream of Pleasant Glade Road. Unfortunately, this recommendation became a permit requirement without consideration of access or applicability to stormwater. There are no relevant sampling locations accessible to the County as most of the reach is on private property. Furthermore, there are no county right-of-ways that discharge into that section of stream through any conveyance. Nonetheless, the county has expended resources to establish monitoring locations and conduct monitoring at sites located far away from the main stem where the county has access in order to be in compliance with the permit. The county questions the effectiveness of such monitoring to identify illicit discharges along the main stem, or its applicability to stormwater. Therefore, the county requests to have input on whether or not there are relevant stormwater discharges and/or whether there are suitable sampling sites and what a monitoring design may or may not accomplish prior to any formalized NPDES municipal stormwater permit requirements for monitoring.

> **TC36 Response**: Ecology will work with the county to develop a realistic monitoring plan to meet the goals and objectives of this TMDL. If the Henderson Inlet watershed is not meeting the monitoring goals and objectives established in that TMDL, we encourage the county to work with Ecology's Henderson Inlet TMDL Coordinator to revise the sample locations. This is considered part of the adaptive management process.

TC37 Comment: (Pg. 127, Table 38) - Table 11 states that a 72.3% reduction in the dissolved inorganic nitrogen concentration is needed, and Figure 27 shows ~ 3/4 is from groundwater. Suggest including an action for Ecology to conduct a groundwater study to define the groundwater recharge area for the middle Deschutes basin, identify the areas with elevated levels and the predominant contributing sources.

> **TC37 Response**: Thurston County has conducted studies of groundwater within the county boundary (for example, the study of the Scatter Creek aquifer). It is within the purview of the county to conduct such evaluations to inform their decisions and programs required under the Growth Management Act to protect critical areas. The county can apply for financial assistance from Ecology to help fund the study and Ecology is willing to provide technical assistance. This is already captured in Table 38.

TC38 Comment: (Pg. 129, Row 3) - Suggest revising this action item to read "Review monitoring data and existing law to determine if existing language is strong enough to support water quality standards and uses. Revise as necessary."

> **TC38 Response**: The review of monitoring data and evaluation of the effectiveness of current forest practice rules is the responsibility of the multi-agency and stakeholder workgroup called the Cooperative Monitoring, Evaluation, and Research (CMER) committee. Ecology is an active member. CMER was established by the Forest Practices Board to ensure and inform effective implementation of the Forest Practices Act. Monitoring data in the Deschutes River Watershed will be evaluated during adaptive management steps to determine if the TMDL is meeting it performance goals and measurements. It is the forest landowners' responsibility to follow the guidelines appropriately.

TC39 Comment: (Pg. 157, Reference 6) - Please include a year as part of this reference.

> **TC39 Response**: The reference was updated to include the year.

TC40 Comment: (Pg. 175, Table C-3, Line 2) - In the first bullet, please specify that this condition applies only for those sites that use and process water. Some sites are used only for storage. Suggest re-wording to read "Process water (if applicable) must be sampled weekly…"

> **TC40 Response**: Sites and facilities used for storage only are not required to obtain coverage under the Sand and Gravel General Permit. Only those actively mining, including batch processing plants, or those recycling or crushing rock, are required to obtain permit coverage at this time.

TC41 Comment: (Pg. 175, Table C-3, Line 2) - In the second bullet, please specify that this condition only applies if stormwater facilities are present (see comment above).

> **TC41 Response**: The requirements in this section of Table C-3 are aligned with the general permit requirements and applies to all activity at a site under the Sand and Gravel General Permit. The text was not changed. (See also TC40 Response.)

TC42 Comment: (Pg. 175, Table C-3, Line 2) - In the second bullet, it is unclear under what conditions the monitoring frequency should be increased. This rows says that if water sampling results demonstrate compliance with the WQBEL them [sic] monitoring frequency can return to the schedule in Tables 2 and 3 of the Sand and Gravel permit. However, it does not state under which conditions this additional monitoring would be triggered in the first place.

> **TC42 Response**: The following text was added to the end of the second bullet item in this section: "when runoff occurs".

TC43 Comment: (Pg. 123, Table 33, Row 8) - Special Condition S5.C.3.c.i of the Phase II Municipal Stormwater Permit is in the context of implementing an illicit discharge detection and elimination program (IDDE) to detect and identify non-stormwater discharges and illicit connections into out [sic] municipal separate storm sewer system. Please clarify whether the intent of this proposed action is for the County to extend our existing IDDE program to also include the portion of the County's jurisdiction in the Deschutes TMDL area that falls outside the municipal stormwater permit coverage area. If this is the intent, we suggest revising the language as follows:

> *Conduct source identification of potential bacteria pollutants <u>by extending the County's existing IDDE program field screening methodology</u> (consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.c.i) <u>to include the portion of the County's jurisdiction in the Deschutes TMDL area falling outside its municipal stormwater permit coverage area</u>. These could include agricultural operations, recreational use, and homeless encampments. ~~If results indicate there are areas exceeding state water quality standards, develop a plan to identify sources consistent~~*

~~with the Phase II Municipal Stormwater Permit Special Condition S4.F.~~ In [sic] the bacteria pollutant sources are identified, the County will implement a compliance strategy consistent with the Phase II Municipal Stormwater Permit Special Condition S5.C.3.b.v.

The proposed deletion of the last sentence recognizes that the very existence of the TMDL means that the receiving waters do currently not meet water quality standards, thus making the reference to S4.F nonsensical and inappropriate. As an appropriate alternative, we included language proposing the implementation of a compliance strategy consistent the Permit Special Condition S5.C.3.b.v.

·Regarding the language in the *Comments* column, the designated priority areas listed for illicit discharge detection and elimination screening should only list the County-owned roads. For example, in the Deschutes River watershed, Route 507 is a state road with should be WSDOT's responsibility. Old Camp Lane and Vail Cutoff Road are outside of the permit boundary area and Old Camp Lane is a private road. There are two bridge crossings along Vail Cutoff Road. Furthermore, most of Indian and Mission creeks are located within Olympia.

Designated priority areas for illicit discharge detection and elimination routine field screening include:
Deschutes River watershed: ~~Route 507; Old Camp Lane;~~ Vail Cutoff Rd. SE
Budd Inlet tributaries within the Phase II permit boundary: Adams, Butler, Ellis, ~~Indian, Mission,~~ and Percival Creeks.

·In general, the County has some concerns about this approach to IDDE in terms of including it as a stormwater issue. In most of the priority areas identified, the land uses upstream of any conveyance are residential, commercial (e.g. golf course) or agriculture. Therefore, any fecal coliform issues are not generated by runoff from impervious surface (stormwater). We recommend ensuring that the responsibility to detect and enforce fecal coliform issues is designated to the appropriate authorities including Environmental Health, the Department of Ecology, and the Department of Agriculture and not included as part of any NPDES stormwater permit. Suggested ReWording [sic] Re-wording [sic] for Action Item: "Identify bacteria nonpoint pollution from sources such as agriculture, homeless camps, and recreational activities and use available county codes to correct identified violations."

TC43 Response: Discharges of any type reaching the MS4 are covered by the Municipal Stormwater Permit, and are appropriate for inclusion in the TMDL as a County requirement. The text was revised as recommended.

City of Tumwater (TUM)

TUM1 Comment: (Pg. 93, Table 16): The City of Tumwater provides technical assistance for stormwater related needs, water conservation and low impact development, similar to the other jurisdictions listed in the table. Please revise the "Subject/Title" category under Tumwater to reflect this level of service.

TUM1 Response: Thank you for the additional information. Revised table as requested.

TUM2 Comment: (Pg. 96, Table 17) - The City of Tumwater received four stormwater retrofit grants from Ecology, but are not listed in the section. Grant #'s include:
G1200503 – Tumwater Valley Regional Stormwater Facility
G1200504 – Cleveland Avenue Stormwater Outfall Retrofit
G1200505 – Somerset Hill Stormwater Outfall Retrofit
G1200506 – E Street Stormwater Outfall Retrofit

TUM2 Response: Thank you for the additional information. Revised table as requested and added brief project descriptions.

TUM3 Comment: (Pg. 98, Table X) - Stream Team is an interjurisdictional program funded and operated by the Cities of Olympia, Lacey and Tumwater. The Stream Team program operates its own website, and resources can be found at the end of this comment sheet. In addition, the Tumwater, City of maintains educational information on its website, www.ci.tumwater.wa.us. Those resources are also included.

TUM3 Response: Thank you for the additional information. Updated text as requested.

TUM4 Comment: (Pg. 110) - Please expand the function of Water Resources in this section. "Water Resources is also under this division, responsible for the implementation and management of water-related programs, such as the NPDES Phase II permit, utilities planning, water quality, water conservation, wellhead protection and associated education and outreach functions."

TUM4 Response: Thank you for the additional information. Updated text as requested.

TUM5 Comment: (Pg. 112) - As a general note, Stream Team no longer provides litter pick-up under its primary function. A reference to "Natural Yard Care" can be added in its place.

TUM5 Response: Thank you for the additional information. Updated text as suggested.

TUM6 Comment: (Pg. 113, Table 20) - There are multiple non-governmental organizations working toward water quality improvement – through a variety of mechanisms in South Puget Sound and the Deschutes Watershed. While I am supportive of the Capitol Land Trust and the projects they engage, it seems odd to specifically call out this organization with an action, particularly since they had a limited role, if any, related to the TMDL or the advisory group to describe their role toward water quality improvement. These actions should be listed under the "General Land Use" category for implementation actions, or list all organizations in the region with a potential role relevant to their missions.

TUM6 Response: Capitol Land Trust has been an active non-profit organization to help restore and preserve riparian areas in the Deschutes and other local watersheds. We hope they continue these efforts in the Deschutes River Watershed in the future. Since they are responsible for implementing BMPs on their land holdings like any other private landowner, their table was removed from this report. We added a row to Table 23, General Land Use Category Implementation Actions, to address land conservancy, preservation, and restoration.

TUM7 Comment: (Pg. 114, Table 23) - As a general comment, all these actions are voluntary and no agency/responsible party is identified to oversee or assist with implementation within the watershed, leaving a sense that while that [sic] actions may be laudable, they may never actually be implemented. Per the statement in the preceding paragraph, relating to RCW 90.48, property owners in the watershed are responsible for implementing these actions by 2025. Will Ecology be the responsible party for outreach to the affected property owners, including implementation support, funding and enforcement as needed?

TUM7 Response: Ecology will work with the county, conservation district, municipalities, and other watershed entities that need to be involved for outreach to the various different groups in the watershed including agricultural producers, residential homeowners, small forest landowners, and recreationalists. Each entity has different authorities, interests, and mandates for education and outreach. A coordinated effort is needed to have a holistic approach and to reach as many people was possible. While Ecology has authority under the state Water Pollution Control Act (RCW 90.48) to take corrective action if necessary, we try to resolve issues through technical assistance and compliance schedules before pursuing punitive actions. If funding is appropriated by the Legislature, Ecology will provide financial resources when possible for such actions as identified in this water cleanup plan.

TUM8 Comment: (Pg. 124, Table 34) - Under this action, the City is requested to "develop a plan to reduce nutrient, bacteria and sediment loading…" however nutrients are not identified as a parameter of concern in this TMDL and no wasteload allocation was provided. Is there a specific target for nutrient reduction in specific areas?

TUM8 Response: Ecology will establish numeric wasteload allocations (WLAs) for nutrients in Phase 2 of this project. The WLAs included in Phase 2 will apply to stormwater sources to Capitol Lake and Budd Inlet. We included the reference to nutrients because many of the activities to reduce bacteria in stormwater water will also contribute to nutrient reductions. Ecology encourages the cities and county to begin considering how they can further reduce nutrient loading to stormwater where it discharges to Capitol Lake and Budd Inlet.

TUM9 Comment: (Pg. 124, Table 34) - The City currently inspects its MS4 on a routine basis. Illicit connections identified during these routine inspections are required to be fixed immediately upon notice. TMC 13.12.020(E) addresses how any illicit connection to the MS4 will be addressed, and provides the regulatory authority to ensure it is remedied. In addition, the action specifically calls out "video inspection" which is costly and not the only viable method for determining cross connections. Please remove this specific reference, providing additional flexibility on how the City addresses this requirement.

TUM9 Response: We agree this statement limited the city's flexibility to identify and use alternative methods and removed the sentence as requested.

TUM10 Comment: (Pgs. 124-125, Table 34) - For a number of the Tumwater requirements, an implementation start date of 2015 or 2016 is unrealistic. The City operates on a 2-year budget, as well as a 6-year CIP that is updated every two years. For many of the actions identified, additional time is needed to request funding through the normal budget process. The last adopted budget covers expenses planned through the end of 2016 – the earliest any action beyond current operating practice could be implemented is 2017.

TUM10 Response: Several of the planning dates that were 2015 have been changed to 2016, and implementation start dates were updated to 2017 where the start date was earlier. We recognize the city has independent planning processes and timeline to consider when beginning implementation of the TMDL. We hope the city can begin integrating these actions into their current Community Investment Partnership (CIP) planning process so they can begin implementing as soon as possible.

TUM11 Comment: (Pg. 124, Table 34) - The action calls for compliance with the City's NPDES permit, yet requires a plan to address bacteria loading in 2016. The permit requires initial screening to be complete by the end of 2017, with additional limited monitoring thereafter. The City is currently in compliance with its permit. The timeline for actions requiring permit modification should be extended to match the modification schedule, currently post July 31, 2018.

TUM11 Response: This is an implementation action that will be rolled into the city's Phase II Stormwater permit requirements during the next permit modification in 2018. The schedule for this action was revised so that it is consistent with the next permit modification. More specific timeline information will be included in the city's permit requirements. We deleted this row from the table.

TUM12 Comment: (Pg. 124, Table 34) - This, and other actions identified on the table, are currently being implemented by the Tumwater, City of. It is unclear what is meant by a "Regional Pet Waste Control Program" or the milestones and outcomes necessary to achieve compliance with this TMDL. Are additional actions being requested?

TUM12 Response: This action is already a requirement of the Phase II Stormwater permit and was rolled into a previous action identified in the city's implementation table.

TUM13 Comment: (Pg. 124, Table 34) - This has been underway in Tumwater since at least 2001, and targeted sectors have been identified in the City's NPDES permit. Are there specific milestones or outcomes, in excess of the City's permit, that the TMDL is requiring? The word "existing" should be removed, unless there is an intention to focus efforts on a particular age of business, and not new or future businesses.

TUM13 Response: This TMDL implementation plan includes all activities that are necessary to achieve clean water even if the actions are already requirements or activities are part of a non-TMDL program. The word "existing" was removed so as not to preclude the city from examining new or future businesses.

TUM14 Comment: (Pg. 125, Table 34) - Work is currently underway by Thurston County to evaluate conditions that would be supportive of improving water quality in the Deschutes Watershed. This action is non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision.

TUM14 Response: This is a general implementation action for the city and is not part of the stormwater permit related implementation actions. This action should be incorporated into the city's relevant planning processes (for example the Shoreline Master Plan process).

TUM15 Comment: (Pg. 125, Table 34) - Please note, most of the Percival Creek channel is largely developed in private ownership, and City capacity to complete any project in these areas is extremely limited, and likely will require voluntary landowner participation. This action is also non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision.

TUM15 Response: This is a general implementation action for the city and is not part of the stormwater permit related implementation actions. The city should implement the recommended buffers on city property on the Deschutes River and Percival Creek. The city should also make sure building codes and requirements are protective of riparian areas.

TUM16 Comment: (Pg. 125, Table 34) - Please note, most of the Percival Creek channel is largely developed in private ownership, or outside City limits, and City capacity to complete any project in these areas is extremely limited, and likely will require voluntary landowner participation.

TUM16 Response: Ecology acknowledges and recognizes the city's limitations. We encourage the city to provide education and outreach to local landowners to increase their understanding of the watershed needs and benefits.

TUM17 Comment: (Pg. 125, Table 34) - The City continues to participate in regional discussions for developing a strategy to address high density septic systems; however, regional implementation may or may not be an eventual outcome. The City is committed to the protection of groundwater and will continue evaluating options toward that goal. This action is also non-stormwater related and is not appropriate to be included in the proposed NPDES permit revision. Of final note on this action, the 2015 strategy adoption and implementation is very unrealistic, as discussions continue. It is likely that a strategy may be identified within the next year; however, funding for implementation may still likely be a number of years following.

TUM17 Response: Ecology recognizes the city continues to participate in regional discussions to address high density septic systems. This is a general implementation action for the city and is not part of the stormwater permit related implementation actions. Under a new row, "On-site Sewage System (OSS) Related", the action was rewritten as follows "In coordination with regional partners, develop and implement a strategy for converting on-site septic systems (OSS) in high priority/high density neighborhoods within the urban areas to sewer". To ensure consistency, this same revision was added to the City of Olympia table.

TUM18 Comment: Stream Team Web Resources
Clean Cars Clean Streams: http://www.streamteam.info/actions/carwashing/
Don't Drip and Drive: http://www.streamteam.info/actions/vehiclecare/
Pet Waste: http://www.streamteam.info/actions/petwaste/
Storm Drain Marking: http://www.streamteam.info/pdf/newsletter-2015-summer.pdf
Monitoring: http://www.streamteam.info/getinvolved/monitor/streambugs/
Salmon Stewards: http://www.streamteam.info/getinvolved/educate/salmon/
Naturescaping: http://www.streamteam.info/getinvolved/learn/naturescaping/
Rain Gardens: http://www.streamteam.info/actions/raingardens/
Lawn Care: http://www.streamteam.info/actions/lawncare/
Stormwater Stewards: http://www.streamteam.info/getinvolved/educate/stormwater/
ST Newsletter: http://www.streamteam.info/about/newsletter/
Habitat Enhancement: http://www.streamteam.info/getinvolved/plant/

TUM18 Response: Thank you for providing these additional resources. Revised table.

TUM19 Comment: Tumwater, City of Web Resources
Go Green Natural Lawn Care*: http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/natural-lawn-care-973
LID http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/low-impact-development
Stormdrains/Spill Reporting: http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/storm-drains
Stormwater Ed Info: http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/stormwater-faqs
Stormwater Facilities: http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/stormwater-program-npdes-updates/private-system-maintenance
Barnes Lake Mnmt Dist: http://www.ci.tumwater.wa.us/departments/public-works/utilities/stormwater/barnes-lake-management-district
*w/Oly & TC
Public Outreach Events Earth Day, Juvenile Chinook, 4th of July, Tum Com Day, Return of the Chinook, Tum Library/Schools (by request)

TUM19 Response: Thank you for providing these additional resources. Revised table.

Washington State Department of Agriculture (WSDA)

WSDA1 Comment: (Pg. 103) - WSDA's logo should be updated, which I've attached.

WSDA1 Response: Thank you for the new logo graphic. It is included in the final report.

WSDA2 Comment: (Pg. 125, Table 37) - Washington State Department of Agriculture (WSDA): Not sure where the third action fits (Starts with "Reduce anthropogenic sources of heat."), but it is not related to WSDA so should be removed from Table 37.

WSDA2 Response: Thank you for pointing out this oversight. We deleted the row from the table.

WSDA3 Comment: (Pg. 126, Table 37) - Washington State Department of Agriculture (WSDA): Please add the following comment next to action 1: Routine dairy inspections are conducted every 18 to 22 months to ensure compliance with the Dairy Nutrient Management Act and to provide regulatory technical assistance.

WSDA3 Response: Thank you. Revised table as requested.

WSDA4 Comment: (Pg. 126, Table 37) - Washington State Department of Agriculture (WSDA): Please add the following comment next to action 2: WSDA addresses and tracks complaints through Ecology's Environmental Response Tracking System. Compliance responses may include regulatory technical assistance, informal enforcement, or formal enforcement.

WSDA4 Response: Thank you. Revised table as requested. *Note: Ecology's database is called the Environmental **Report** Tracking System (ERTS).*

Washington State Department of Transportation (WSDOT)

WSDOT1 Comment: (Pg. 51) - "No offsite transport via runoff of any materials to a surface water body within the TMDL boundary is allowed." Comment: Suggest removing this sentence as it is not consistent with the requirements described in the rest of the paragraph or the NPDES Construction Stormwater General Permit.

WSDOT1 Response: Ecology recognizes there may be infrequent stormwater events when the stormwater best management practices (BMPs) and water treatment technology might fail, resulting in fine sediments being transported offsite and into the receiving surface water body. Ecology expects BMPs to be maintained properly to meet their intended purposes, and BMP failures should be corrected as soon as possible. For consistency, we revised text throughout the document where stormwater wasteload allocations (WLAs) for fine sediment are referenced.

WSDOT2 Comment: (Pg. 178, Table C-5) - Table C-5 is inconsistent with the body of the document. Therefore, we suggest Ecology:
• Remove the bulleted actions, "Apply fecal coliform programmatic…" and "Reduce anthropogenic sources of heat…," and ensure WSDOT's actions are consistent with those listed in Table 42.

• Revise the table so it is consistent with the language on page 57. Specifically, the critical periods for the Waste Load Allocations (WLAs) are listed as year round on page 57, while Table C-5 lists the critical period as June – September. In addition, the description of the WLA for Bacteria is slightly different on page 57 than it is in Table C-5.
• Revise "current permit limits" to reflect WSDOT's current permit's effective date of April 5, 2014.

> **WSDOT2 Response**: We removed the bulleted action "Apply fecal coliform programmatic…" since it is basically the same thing as the following bulleted action "If stormwater discharges that transport bacteria…" which remains in the implementation table and Table C-5. We removed the action "Reduce anthropogenic sources of heat..." to be consistent with the way we addressed that implementation action item in the Phase I Stormwater permits. WSDOT is expected to restore or preserve riparian areas for any riparian lands they own or manage. The critical period in table C-5 was corrected to year round. The current permit's effective date in Table C-5 was updated to the current permit date. To ensure consistency, we revised text in the implementation Table 42 and Table C-5.

WSDOT3 Comment: WSDOT's permit number is inconsistent. Comment: Ensure all references to WSDOT's permit number are the correct number: #WAR043000A.

> **WSDOT3 Response**: The letter "A" is not included with the permit number because it is appended to track permit versions. The actual permit number consists of a two or three alphabetical characters prefix followed by the six or seven digit number.

Zena Hartung (ZH)

ZH1 Comment: As a resident of Olympia semi-consistently for over 30 years, I'd like to congratulate Dept of Ecology on the TMDL drafted for the Deschutes River and related water bodies. I am grateful for the opportunity to comment.

I am presently the President of the Carnegie Group of Thurston County: a local good-government all volunteer non-profit organization. I do not speak for the board in my comments, but the board includes some strong environmental advocates who have been encouraged to make their own comments. Indeed we pooled our funds and provided Thurston County with an all-day forum on water issues just last month.

> **ZH1 Response**: Thank you for your comments and participation.

ZH2 Comment: First, the indications that stormwater is providing scouring and noxious chemical stews to Deschutes River needs to be addressed, with more and better raingardens, stormwater ponds and preferentially, to less impervious pavement. Slowing and cleaning stormwater before it joins the streams needs to be a priority. Some losses due to urban development mean this won't be possible. Look at the paving over of Schneider Creek's estuary. For the gain of a bit of parking a whole ecosystem suffers daily. This impacts the whole community, not just the fish. Another local estuary loss is Moxlie Creek. Though that decision was made generations ago, Moxlie Creek, the waters and the habitat suffer everyday from the loss.

So in this regard I was pleased to read the following in this draft: “There is no reserve for growth to contribute to nonpoint sources of pollution. In addition, municipal, construction and industrial stormwater permit requirements are expected to protect the impaired water bodies from further degradation due to future growth. All new development within the urban growth areas of the cities of Olympia, Tumwater and Lacey and Thurston County must implement low impact development (LID) practices as a requirement of their Western Washington Phase II Municipal Stormwater Permit. New development outside the UGA's should implement LID principles...to ensures (sic) that NPS of pollution are reduced to a negligible amount.”

So my question is, will it stick? Will the Department of Ecology require these permitting agencies to stick by LID practices?

> **ZH2 Response**: We agree managing stormwater is key to protecting these ecosystems. Many of the actions in the TMDL address stormwater. We encourage the site-specific solutions you mentioned such as rain gardens, stormwater ponds, and less impervious surfaces. More information on municipal stormwater permits issued by Ecology is available at http://www.ecy.wa.gov/programs/wq/stormwater/municipal/index.html.

ZH3 Comment: May I also suggest that the Department look closely at the temperature issues. Salmon are negatively impacted with waters as warm as are recorded in this document. The likelihood of a long hot summer ahead, and more to come, mean the Deschutes will be witness to dead fish soon and in the future, if any survive. Riparian plantings take 30 years to mature, and some of the large woody debris the Squaxin Tribe has hoped to place have been refused by local residents. Please include funding for education for owners of riparian zones. These folks need to understand they are stewards of a precious resource we all share and they need to be prepared to treat it according to the best available science. Once they understand the importance of not denuding or lawn planting the shore and not resisting the debris in the river, they will, we hope, come to appreciate the clean, cool water that is the result.

> **ZH3 Response**: We agree temperature is important to salmon and other aquatic life in the Deschutes River watershed, and this TMDL does address temperature. Grant funding is available from Ecology, and we support local governments, tribes, and non-profit organizations in their efforts. More information about Ecology's funding program is available at http://www.ecy.wa.gov/programs/wq/funding/funding.html.

ZH4 Comment: There is good science now that confirms that surface and groundwater are strongly connected systems. The history of permitting of exempt wells threatens the instream flow of waters of Deschutes River. If only a few conditions may be addressed as the result of this study, please recognize the critical role this bad piece of law has played in reducing the viability of this river and rivers and streams throughout the State.

ZH4 Response: Flow is an important factor in improving water quality in the Deschutes River. Many of the implementation actions in the TMDL are centered on flow, groundwater, and/or water conservation. Ecology provided further explanation of how this TMDL is addressing this issue in SIT Responses 2 and 3. Ecology's Water Resources Program has a website dedicated to this issue. The site, *State Water Use Laws: The Groundwater Permit Exemption RCW 90.44.050*, is available at http://www.ecy.wa.gov/programs/wr/comp_enforce/gwpe.html.