



State of Oregon  
Department of  
Environmental  
Quality

# Tualatin Subbasin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WPMP)

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This report prepared by:

Oregon Department of Environmental Quality  
811 SW 6<sup>th</sup> Avenue  
Portland, OR 97204  
1-800-452-4011  
[www.oregon.gov/deq](http://www.oregon.gov/deq)

Primary Authors: Avis Newell, James Bloom

For more information contact:

Avis Newell, Basin Coordinator  
Oregon Department of Environmental Quality  
2020 SW 4<sup>th</sup> Avenue, Suite 400  
Portland, OR 97201  
503-229-6016  
[newell.avis@deq.state.or.us](mailto:newell.avis@deq.state.or.us)

Steve Mrazik, Water Quality Manager  
Oregon Department of Environmental Quality  
2020 SW 4<sup>th</sup> Avenue, Suite 400  
Portland, OR 97201  
503-229-5379  
[mrazik.steve@deq.state.or.us](mailto:mrazik.steve@deq.state.or.us)

Eugene Foster, Manager of Watershed Management Section  
Oregon Department of Environmental Quality  
811 SW 6<sup>th</sup> Avenue  
Portland, OR 97204  
(503) 229-5325  
[foster.eugene.p@deq.state.or.us](mailto:foster.eugene.p@deq.state.or.us)

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# Executive summary

## Introduction

This document contains a revision of the 2001 Tualatin Subbasin Total Maximum Daily Load, or TMDL, with two amendments, and a revised Water Quality Management Plan which describes TMDL implementation. TMDLs are pollution limits intended to bring rivers, lakes and streams into compliance with water quality standards designed to protect human health, aquatic life, and other beneficial uses of water including fishing and swimming. The federal Clean Water Act of 1972 requires TMDLs. Federal and state law authorizes the Oregon Department of Environmental Quality to develop these pollution limits.

Section 303(d) of the Clean Water Act requires EPA or a delegated state to develop a list of state surface waters that do not meet water quality standards. Each state develops these standards to protect beneficial uses and EPA must approve the standards. The resulting 303(d) list of impaired waterbodies is based on the best available data and, in most cases, must be revised every two years. DEQ must develop a TMDL for each applicable pollutant that does not meet the standard in an impaired waterbody.

A TMDL includes a geographic description, identification of pollutants, applicable standards, source assessment, description of data collected, loading capacity, allocation of loads, and margin of safety. The TMDL document and its appendices provide a thorough analysis of pollutant sources and accumulation processes in the applicable river basin. The Water Quality Management Plan designates management agencies that are responsible for implementing pollution limits.

For the Tualatin River subbasin, TMDLs for pH, chlorophyll *a*, and dissolved oxygen were originally adopted in 1988. These were revised in 2001, and TMDLs for temperature and bacteria were adopted. This document includes a revision of the 2001 TMDL for Temperature in order to comply with the temperature standard adopted in 2005. This document also amends the 2001 TMDLs for pH and chlorophyll *a*, and dissolved oxygen to accommodate new summertime discharges.

The Tualatin River subbasin is located in the northwestern portion of the Willamette Basin. The Tualatin River originates in the Coast Range of Oregon, west of the city of Portland, and flows to the Willamette River just upstream of Willamette Falls at river mile 28. The 712 square mile Tualatin River subbasin is located mainly in Washington County, Oregon, with small portions located in Multnomah, Clackamas, Yamhill, Tillamook and Columbia counties. The Tualatin Subbasin TMDLs for temperature and dissolved oxygen apply to all perennial and intermittent streams, rivers, and lakes within the Tualatin River Basin in Oregon. The Tualatin Subbasin TMDLs for pH and chlorophyll *a* that regulate total phosphorus concentrations apply to the entire Tualatin River subbasin, and to the Oswego Lake watershed which is located in the Lower Willamette River Basin but draws water from the Tualatin River.

Land use in the Tualatin River Subbasin is 39 percent forestry, 35 percent agriculture, and 26 percent urban, residential, and industrial. Ecoregions range from moderate elevation Valley Foothills to low elevation Prairie Terraces and Willamette River Gallery Forrest. The fish population includes a number of salmonid species, including winter steelhead, Coho, and resident cutthroat trout.

## Temperature

Chapter 2 of this document provides a revision of the waste load and load allocations for temperature that were adopted in the 2001 TMDL. These changes were made to align the allocations with Oregon's revised temperature standard that was adopted in 2005. The temperature standard protects salmon and trout throughout their life histories: spawning, rearing and migration. Changes to the temperature standard included the adoption of different temperature criteria depending on which fish species and fish-related uses such as spawning or rearing, occur in the waterbody. The new language also clearly

specifies where and when cold, cool and warm water fish occur and when and where they spawn, rear and migrate. All of the streams in the Tualatin River subbasin are designated as salmon and trout rearing and migration habitat. In addition, spawning areas and dates have been determined for specific streams in the basin. Another change to the temperature standard allows for a determination of natural stream temperatures which may supersede a numeric criterion.

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

The natural temperature profile for the Tualatin River and its major tributaries was developed through analyzing extensive amounts of local data and the development of mathematical water quality models. The natural conditions temperatures were used to develop pollution limits for the waste water treatment facilities that discharge to the mainstem Tualatin. DEQ used tributary and discharge flow and temperature to calculate waste load allocations for sources that discharge to Tualatin Basin tributaries. The shade target for streams throughout the basin remains the same as the 2001 TMDL: providing 'system potential' shade in riparian areas. However, the shade curves used to measure system potential shade were revised slightly to align the target with the new temperature standard and TMDLs for neighboring basins.

This TMDL revision also acknowledges and supports the temperature trading program that has been implemented in the Tualatin Basin since 2005. Instead of installing large-scale chillers to cool effluent, Clean Water Services established a temperature trading program that included supplementing summer river flow with stored water and establishing shade along tributaries. This TMDL revision identifies a waste load allocation for Clean Water Services that will accommodate future growth in the basin, and allows the trading program to be used to meet that allocation as well.

## Total phosphorus TMDL amendment

In 1988, DEQ adopted a TMDL that provided load and waste load allocations for total phosphorus. The TMDL set controls on phosphorus, an important plant nutrient, to target water quality violations that were attributed to dense algae growth that in turn caused violations of the water quality standards for pH, a measure of the level of acidity, and chlorophyll *a*, a measure of the density of algae. The algae blooms and water quality violations were common summertime occurrences in the lower Tualatin River between the mouth and river mile 9. This TMDL led to large changes in treatment at the waste water treatment facilities, as well as numerous efforts to control phosphorus pollution in runoff from forest, agricultural and urban areas.

The management changes made in response to this TMDL were ultimately effective and improved water quality in the lower Tualatin River. However, based on additional data and water quality modeling in the 1990s, the 1988 TMDL phosphorus targets were deemed to be lower than naturally occurring conditions, so the TMDL targets were revised upward. These targets were adopted in the 2001 TMDL. By this time, efforts to lower total phosphorus met the new TMDL targets concentrations for phosphorus, and violations of the water quality standard for pH were very uncommon.

The pollution controls set in 2001 TMDL for pH and chlorophyll must be continued to maintain water quality in the Tualatin River. However, to accommodate population growth occurring in the region, Clean Water Services proposes to increase its waste water treatment capacity at two smaller plants. These two plants currently route waste water to the downstream Rock Creek Plant for treatment and discharge during the summer months and do not have waste load allocations from the 2001 TMDL. This TMDL amendment provides waste load allocations for those sources and will allow Clean Water Services to make changes at these plants to allow for discharges during the summer.

The 2001 TMDL allocations targeted instream concentrations of total phosphorus to control water quality in the Tualatin River downstream of river mile 9. This TMDL amendment maintains the same total phosphorus TMDL targets in the lower river, but allows summertime discharge at the two upstream locations. DEQ does not expect the resulting higher phosphorus concentration that will occur upstream of Clean Water Services Rock Creek Waste Water Treatment Facility at river mile 37.7 to affect water quality in the fast moving upper river.

This TMDL amendment is also designed to accommodate some phosphorus “trading” between Clean Water Services’ two small upstream plants and their large Rock Creek waste water treatment plant. The TMDL sets a “bubble” waste load allocation for all three plants that ensures the TMDL target for phosphorus will be met in the lower Tualatin River. It also provides flexibility to the waste water treatment facilities, allowing waste to be directed to more than one of the treatment plants, depending on treatment capacity at each plant.

Finally, this TMDL total phosphorus amendment clarifies that the load allocation set in the 2001 TMDL also applies to the Wapato Drainage as well. The 2001 TMDL did not specify a unique load allocation for Wapato Creek, but instead included it by reference with all tributaries to the Tualatin River upstream of Dairy Creek. This amendment further identifies additional parties responsible for management at Wapato Lake in Chapter 5, the Water Quality Management Plan. The amendment was necessary to address problems in the drainage system. For example, in 2007, the dike surrounding Wapato Lake breached and allowed the lake bed of drained and farmed area to flood. Due to the dike breach, the Wapato Improvement District was unable to drain the lakebed until the summer of 2008. Delivering the nutrient- and algae-rich water to the Tualatin contributed to a bloom of nuisance algae in the lower river and caused the drinking water providers to provide additional and expensive treatment to water withdrawn from the Tualatin for more than three weeks during the summer of 2008.

## Ammonia TMDL amendment

As for phosphorus, the 1988 Tualatin Basin TMDL assigned waste load allocations for ammonia to improve dissolved oxygen concentrations in the lower Tualatin River. The waste load allocations for ammonia were updated in the 2001 TMDL and allocations for settleable volatile solids assigned. Similar to the phosphorus amendment in this document, this TMDL amendment for ammonia will provide allocations for summertime discharges at Clean Water Services’ two waste water treatment plants furthest upstream..

Point sources in the Tualatin Basin met their wasteload allocations for ammonia, but unlike the TMDL for phosphorus, lower ammonia loads from point sources have not translated directly to improved dissolved oxygen in the lower Tualatin. Dissolved oxygen in the lower river showed some improvement in the late 1990’s but violations of the dissolved oxygen criteria still occur. Water quality modeling presented in the 2001 TMDL indicated that sediment oxygen demand comprised the largest use of oxygen in the lower river, and Chapter 4 of this document summarizes information that shows a significant decrease in ammonia loading from waste water treatment plants has occurred in the Tualatin River since the early 1990’s. The lack of response of in-river dissolved oxygen levels as ammonia discharges from point sources declined, supports the water quality model results which suggest that ammonia has a small impact on dissolved oxygen in the lower Tualatin River.

The TMDL amendment for ammonia does not provide alternate allowable ammonia loads for point sources in the Tualatin River. It does however allow that some of the allowable ammonia load be discharged at new locations - specifically at the two upstream waste water treatment facilities at Forest Grove and Hillsboro. These modifications will enable discharge during the May-October TMDL season, but are designed to maintain the same limit on ammonia discharges to the Tualatin River as was adopted in the 2001 TMDL.

The ammonia TMDL amendment also recognizes the existing ability to trade oxygen demanding pollutants between Clean Water Services two larger waste water treatment facilities. The 2005 Watershed NPDES Permit provided a “bubble” allocation that incorporated the 2001 TMDL ammonia and oxygen-demanding pollutant limits, which allows trading of these pollutant parameters to occur between the two plants. This trade option has not yet been utilized for Clean Water Services operations, because individual performance at each WWTF has remained well below the TMDL and permit limits for ammonia. However, as for total phosphorus, to provide treatment flexibility as Clean Water Services accommodates future growth, this TMDL amendment also describes how the bubble allocation can be modified to include the two new upstream summer discharges at Forest Grove and Hillsboro.

## Water Quality Management Plan

The TMDLs include a Water Quality Management Plan designed to identify strategies and approaches for implementing the TMDLs. The plan identifies the designated management agencies -local, state and federal government agencies and other entities responsible for addressing pollution problems in their control. The plan includes example management strategies that could be implemented to meet the allocations. The plan identifies currently available TMDL implementation plans, guidance for designated management agencies required to submit new implementation plans, and the schedule for submitting those plans. The revised plan is included in Chapter 5 of this document.

Several of the designated management agencies were designated in the 2001 TMDL, and have previously submitted TMDL Implementation Plans. Each designated management agency or responsible party has 18 months from the time this TMDL becomes an executive order to develop new or revise existing implementation plans and submit them to DEQ.

The Tualatin River Basin designated management agencies include:

- Urban: Washington, Multnomah and Clackamas Counties; the Cities of Portland, Lake Oswego and West Linn; and special districts Metro and Clean Water Services.
- Irrigation-related issues: Tualatin Valley Irrigation District and Wapato Improvement District.
- Oregon state agencies: Department of Environmental Quality(responsible for regulated waste water discharges); Oregon Department of Agriculture (responsible for agriculture on private lands); Oregon Department of Forestry (responsible for forestry on private lands); Oregon Department of Geology and Mineral Industries (responsible for mining operations); Oregon Department of State Lands (responsible for wetland jurisdiction, fill and removal permits, and permits for in-water structures); Oregon Department of Transportation (impacts from roadways); Oregon Parks and Recreation Department (landholders).
- Federal agencies: U.S. Bureau of Reclamation (Henry Hagg Lake operation); U.S. Bureau of Land Management (landowner); U.S. Fish and Wildlife Service (landowner).