WATER QUALITY
(Taken from Appendix F of the Tualatin Soil and Water Conservation District's Long-Range Business Plan for 2011-2015)

Description of Resource Concern

Every water body in the Tualatin River Watershed is contaminated at some level. The problem spans streams, creeks, rivers, lakes, ponds, construction sites, clearing and grading areas, and areas with septic systems throughout the watershed. The Tualatin River and tributaries are used for fish and wildlife, irrigation, drinking water, supporting industries, and recreational purposes such as swimming, fishing and boating. All of these beneficial uses are affected by the water quality in the Tualatin River Watershed.

In the past, most water quality problems were traced to the most obvious cause, point source pollution. Since point source pollution is any pollution source that comes from a specific location such as a pipe discharging pollutions directly into the river, this means the problem can usually be traced back up the pipe to the source. Much progress has been made in preventing further water quality problems from point sources.

Nonpoint source pollution problems are more difficult to control because the sources are often hard to identify and difficult to measure. This type of pollution results from a variety of activities. Nonpoint source pollution can be the water that runs off crop, forest, and urban landscapes. Nonpoint sources include failing septic systems, runoff from parking lots and construction sites, and irrigation and drainage systems.

Resident salmonids in the Tualatin Watershed include cutthroat trout (*Oncorhynchus clarki*) and rainbow trout (*O. mykiss*). Anadromous salmonids in the Tualatin Watershed include fall Chinook salmon (*O. tshawytscha*), coho salmon (*O. kisutch*) and winter steelhead (*O.mykiss*). Chinook are generally found in the lowest reaches of the Tualatin River, near the Willamette River confluence, but were found in Scoggins Creek in the 1970's. However, none have been documented in recent years.

At present, salmonid fisheries in the Tualatin Watershed are depressed as compared with historic diversity and run size. The factors that limit salmonids in the watershed include:

- Low hydraulic diversity in the river and tributaries.
- Degraded water quality, including turbidity and siltation.
- Low summer flows.
- High summer water temperatures.
- Predation by warm water species.
- Limited spawning and rearing areas.
- Predation by non-native species.

In general, salmonids appear to be more abundant in the upper reaches of the watershed, where better physical habitat and water quality exist. The lower reaches are dominated by introduced warm water species, which are typically more tolerant to habitat degradation. Warm-water fish species

include largemouth and smallmouth bass, crappie, bluegill, catfish, dace, squawfish, suckers, sculpin, and threespine sticklebacks.

Some parts of the watershed are stocked with old water game species. Oregon Department of Fish and Wildlife (ODFW) released rainbow and cutthroat trout in Dairy Creek, Gales Creek, and the Tualatin main-stem but stopped such releases in 1986 to promote natural cutthroat runs. From 1975 to 1995, winter steelhead hatchery fish were released into Gales Creek. Hagg Lake and Dorman Pond are still stocked with hatchery trout. Coho salmon, a popular coldwater species, are not believed to have been present in the Tualatin watershed historically; however, construction of a fish ladder at Willamette Falls and stocking by ODF&W since 1962 may have resulted in some natural production today.

Fifteen tributaries in or near the Urban Growth Boundary in Washington County were surveyed for fish and habitat conditions. ODFW and Clean Water Services conducted the surveys in 1995. The study used a modified index of biotic integrity (IBI) to measure the quality of the fish communities. The IBI ranks streams as excellent, good, fair, poor and very poor based on the abundance of fish, the diversity of species, feeding structure of fish, pollution and habitat tolerances of species and the presence of physical anomalies. The study found only one of the 34 stream reaches sampled ranked "good." No reaches achieved excellent scores, 20 ranked poor or very poor, and thirteen ranked fair. Findings of the report include:

- 12 of 25 species collected were exotic to Oregon. Introduced species made up 6% of the total catch. Three percent (3%) of the fish were intolerant to habitat degradation and pollution.
- Intolerant species were generally confined to the upper reaches of forested, free flowing, relatively undisturbed sites.
- Sculpin made up nearly 70% of the total catch.

Fish populations outside the Urban Growth Boundary are not well studied. Upper reaches of the Tualatin River and tributaries within the Mountain eco-reach support cold water species including resident and migratory cutthroat trout, which maintain a popular fishery. IBI scores would likely be higher in the upper reaches where the substrate is dominated by boulder and cobble, the landscape is not as developed and water quality is typically better than in the lower reaches.

The Winter Steelhead Distribution Map (Figure 9) shows in the rural area:

- 51 miles of spawning and rearing habitat
- 58 miles of rearing and migration habitat
- 31 miles of migration habitat

In addition, there are 15 miles of habitat in the rural residential area. We have a responsibility to protect these species and to help the miles of wildlife habitat reach the best possible condition.

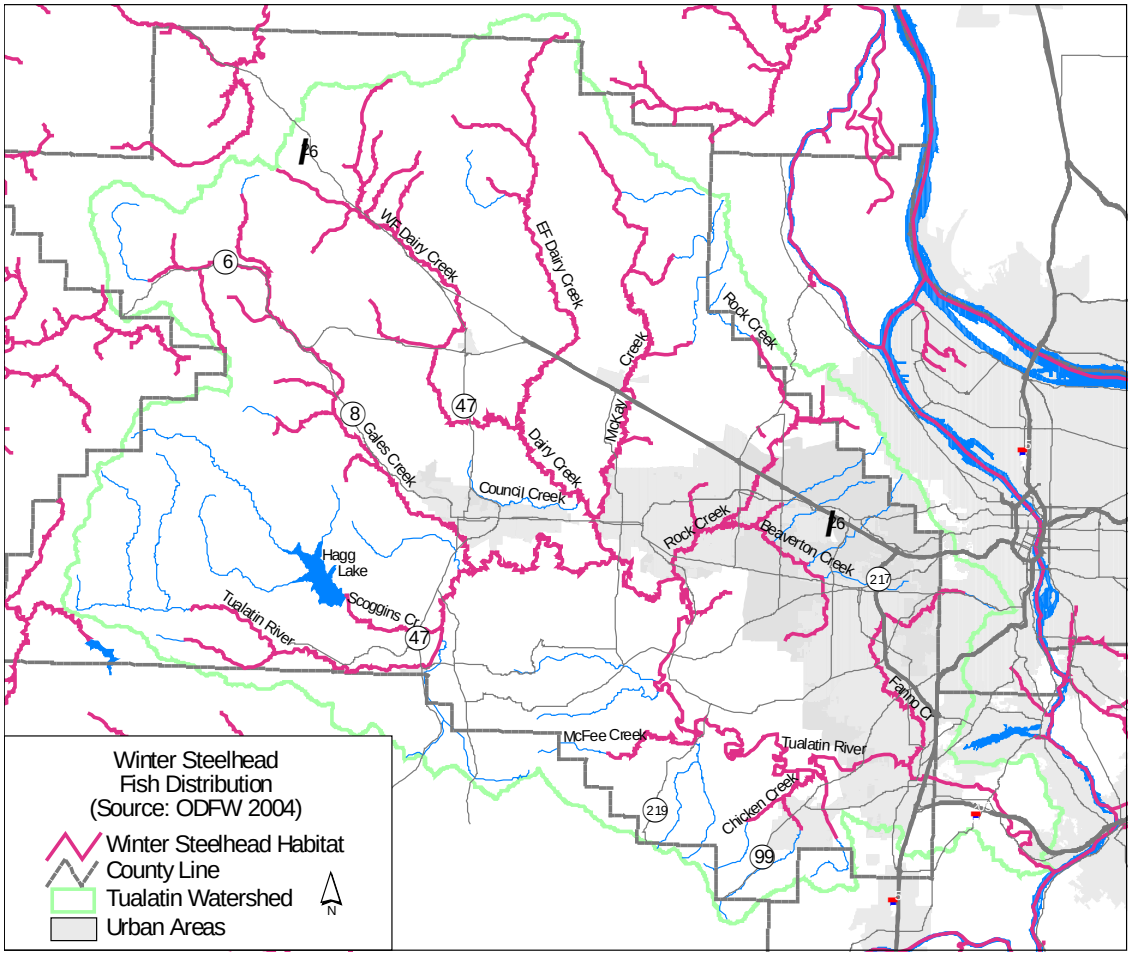

Figure 1. Winter Steelhead Distribution in the Tualatin River Watershed.

In response to the Federal Clean Water Act (CWA) of 1972, the Oregon Department of Environmental Quality (DEQ) listed the Tualatin River and its tributaries as "water quality limited." Once a river has been designated as water quality limited, the CWA requires that Total Maximum Daily Loads (TMDLs)[1] be developed for that water body to meet the established water quality standards. In 1998, 274 out of 898 stream miles in the Tualatin Watershed were listed as water quality limited for one or more of the following parameters: bacteria, dissolved oxygen, temperature, pH, biological criteria (fish communities), chlorophyll a, and toxics (iron, arsenic, and manganese). In 2001, four TMDLs were developed addressing dissolved oxygen, temperature, bacteria, and algae/phosphorous. These four water quality parameters are extremely important in supporting the beneficial uses in the Tualatin River Watershed.

Oxygen is necessary to all forms of life, but too much or too little oxygen in the system can be fatal to organisms. Dissolved oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement), and as a byproduct of photosynthesis. As dissolved oxygen levels in water drop below 5.0 mg/L, many aquatic species are stressed. Oxygen levels that remain below 2 mg/L for a few hours can result in large fish kills. Total dissolved gas concentrations in water should also not exceed 110 percent.

[1] TMDLs are numerical loadings that are set to limit pollutant levels such that in-stream water quality standards are met.

Eighteen tributaries to the Tualatin were listed as water quality limited for dissolved oxygen until 2002, when a TMDL was approved for the Tualatin and these eighteen tributaries. According to the DEQ, the two factors that most affect dissolved oxygen concentrations in the tributaries are temperature and sediment oxygen demand[2].To address sediment oxygen demand, reductions in organic solids discharged to streams are needed from both point and nonpoint sources. Increasing stream flow is another way to counter the impact of sediment oxygen demand. More stream flow also tends to keep water cooler, which helps to keep more oxygen in the water.

During summer months, water temperature in the Tualatin is much too high for fish. Salmon and trout need cool water temperatures to rear young and survive. Salmon and trout eggs must be in water less than 55°F in order to develop. Spawning and egg incubation occurs during fall and winter months when high temperatures are not usually an issue. Fry[3] and smolt[4] need water under 64°F to migrate downstream; migration generally takes place during the spring, but small fish may rear in the Tualatin for a year before leaving. When water is too warm, salmon and trout experience many negative effects, ranging from decreased spawning success to death. In addition, warm water encourages bacteria to grow and dissolved oxygen levels to decrease.

Temperatures are too warm in at least 19 stream segments, covering 193 miles in the Tualatin Subbasin. The Tualatin River and many tributaries exceed the standard in July and August. Currently, approximately 76% of the stream network exceeds the 64 degree standard in midsummer. According to DEQ the primary causes of increased stream temperature are the lack of riparian vegetation and the discharge of warmer water from point sources (i.e. waste water treatment plants). All tributaries on the water quality-limited list for temperature (Figure 10) have approved TMDLs.

The problem of water temperature is a serious issue. Right now, the Tualatin River and most of its tributaries are too warm to meet the needs of fish and wildlife. Even more important, high water temperatures affect the Basin's human residents. Farmers must allow for natural or managed vegetation to grow along perennial streams. Businesses and cities must follow regulations on what they can discharge into waterways. For landowners and taxpayers, costs to comply with laws regarding fish and wildlife habitat will increase, as will costs for water treatment. Without adequate conservation measures, the problem may eventually cause our waterways to lose the scenic and recreational value for which they are known.

Bacterial contamination of waterways can affect the health of people, crops, fish and others who utilize the water for beneficial uses. Bacteria can enter the waterways through several different routes. The highest levels of bacteria in the Tualatin watershed generally occur during periods of storm-water runoff due to rain events. Sources of bacteria include failing septic systems, pet waste, other animal wastes, and illegal dumping.

Every resident is affected by the level of nutrients (nitrogen, phosphorus) and animal waste that enters our waterways. Farmers confront more regulations and rules for farming activities. Public water supply users must pay more to have water properly cleaned and treated to make it safe. Contamination is also harmful to wildlife. When water contains a large amount of nutrients, it is easier for algae to grow. Algae uses up the oxygen fish and other aquatic life need to survive. It makes water murky (turbid), can produce ugly algal blooms, and causes water's pH to change, damaging fish and other animals.

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[2] Sediment Oxygen Demand (SOD) is the decomposition of bottom sediments which consumes dissolved oxygen.
[3] Fry – A small fish, especially a young, recently hatched one.
[4] Smolt – A young salmon at the stage at which it migrates from fresh water to the sea.

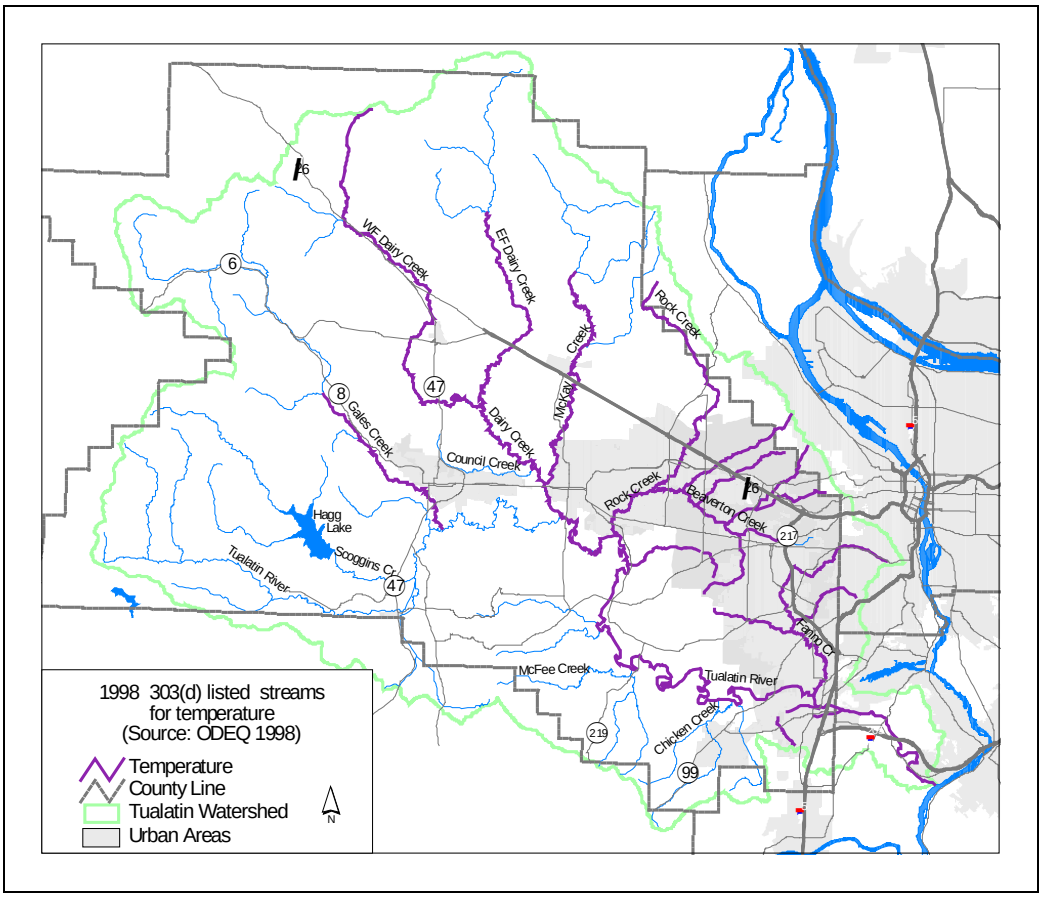

Figure 2. Streams in the Tualatin River Watershed listed as water quality limited for temperature, 1998.

Highlights of Accomplishments

Resource concerns about soil erosion, water quality, and loss of productivity were first identified in the 1955 Tualatin SWCD long-range plan. Surface water quality resource concerns and the impacts on water quality were discussed in 1988 in the *Tualatin River Watershed Agricultural Non-point Source Water Quality Plan*.

Adopted in 1996, the *Tualatin River Subbasin Agricultural Water Quality Management Area Plan* and rules have been updated every two years since 1999. The District has extensive experience in addressing water quality issues. All conservation plans written by the District include conservation practices designed to improve water quality.

Currently, the conditions of surface water quality, as impacted by nutrients and animal waste, are improving. Most dairy operation owners in the area have installed conservation systems to manage nutrients. Thanks to the efforts of many individuals, ammonium is officially no longer a major concern in the Tualatin River. Although phosphorus levels have decreased, they remain a concern. There are also ongoing problems with low dissolved oxygen and pesticides in the Tualatin River and its tributaries.

A vibrant partnership unique to the Tualatin River Watershed is the Enhanced Conservation Reserve Enhancement Program (ECREP). This program, a collaboration of Farm Services Agency,

the District, NRCS and Clean Water Services, has helped 32 landowners establish 385,449 native trees and shrubs on 327 acres bordering 20.5 miles of streams in the watershed (progress is through 2009). These riparian forest buffers will reduce stream temperatures, filter runoff and provide habitat for fish and wildlife.

Figure 3. ECREP project on Chicken Creek, planted 2007. Left: before planting, 2007. Right: 2010.

NRCS, the District, and Metro Regional Government have partnered on nine wetland restoration projects totaling 606 acres and funded in part by the Wetland Reserve Program (WRP). Three other WRP projects, totaling 403 acres were implemented without Metro's involvement. These projects have restored riparian forest, oak savannah, wet prairie and vernal pool plant communities. Two of the projects are currently supporting populations of the threatened Nelson's checker-mallow (*Sidalcea nelsoniana*).

The US Fish and Wildlife Service has restored wetlands on the Tualatin River National Wildlife Refuge, located along the lower Tualatin River near Sherwood and is now beginning to develop its Wapato Lake Unit of the refuge on the upper Tualatin River near Gaston.

Desired Conditions

- Tualatin Watershed waters meet all federal and state water quality standards.
- TMDLs are reduced or eliminated.
- All runoff is either prevented or eliminated before reaching streams.
- Clean water is available for all beneficial uses.
- All streams have riparian buffers.
- County residents are aware of how their personal action affect water quality.

Goals

By the end of 2015, the District will:

- Demonstrate an increase in stream miles meeting state water quality standards.
- Plant 25% of high priority stream reaches in Upper Tualatin and Gales Creek watersheds to riparian forest buffers.
- Increase the number of stream miles changed from high priority to medium or low priority.

Strategies and Actions

Table 1. Timeline of Desired Conditions and Actions for Water Quality.

Benchmark	Timeline	Strategies/Actions
Baseline data collection	December 2011	▪ Collect current baseline data for water quality standards, stream miles of riparian restoration, and stream reach priority ranking. ▪ Partner with DEQ, CWS, and TRWC Restoration Committee.
Identification of priority areas and practices	December 2011	▪ Work with TRWC Restoration Committee to update basin priorities and Stream Matrix[5]. ▪ Work with NRCS to identify conservation practices that best address these priorities. ▪ Practices to be emphasized may include critical area planting, channel vegetation, stream channel stabilization, stream bank and shoreline protection, filter strips, tree and shrub establishment, riparian forest buffers, fences, and use exclusion[6]. ▪ Target outreach to landowners along high priority stream reaches (as defined by Stream Matrix).
2 miles of riparian area with improved condition[7] 5 miles of stream with improved condition 10 miles of stream with improved condition	December 2013 December 2014 December 2015	▪ Enroll landowners in ECREP, VEGBACC, AWEP, WRP, and OWEB grants projects. ▪ Increase habitat restoration efforts along high priority stream reaches (as defined by Stream Matrix).
Educate landowners about the importance of water quality	Ongoing	▪ Strongly advise and encourage streamside landowners to plant and maintain native trees and shrubs near streams to provide multiple benefits to water quality and wildlife habitat.

[5] The Stream Matrix is a system designed to prioritize stream reaches in the Tualatin River Watershed for restoration projects.

[6] Use Exclusion – Excluding animals, people, or vehicles from an area.

[7] Improved condition is defined as the riparian areas are being restored back to native vegetation and are able to function to provide suitable aquatic habitat and shade for beneficial uses.

Monitoring	Ongoing	▪ Monitor indicators for stream temperature such as suitable aquatic habitat, shade/canopy, and riparian function.
Support ecosystem market developments	Ongoing	▪ Advocate for ecosystem markets. ▪ Work with local partners.

Key partners to be involved in achieving the desired conditions include:

- Private landowners
- Clean Water Services
- Tualatin River Watershed Council
- Oregon Department of Environmental Quality
- Natural Resources Conservation Service
- Oregon Department of Agriculture
- Farm Services Agency
- Oregon Watershed Enhancement Board
- Willamette Partnership
- The Freshwater Trust
- US Fish and Wildlife Service
- Oregon Department of Fish and Wildlife

Measurements

- Total number of stream feet planted to native vegetation.
- Percent of high priority stream reaches planted to riparian buffers in the Upper Tualatin and Gales Creek watersheds.
- Miles of stream reaches improved in the Stream Matrix.
- Number of stream miles meeting state water quality standards.