

Tualatin Subbasin TMDL

Chapter 4

Water Quality Management Plan

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Quality

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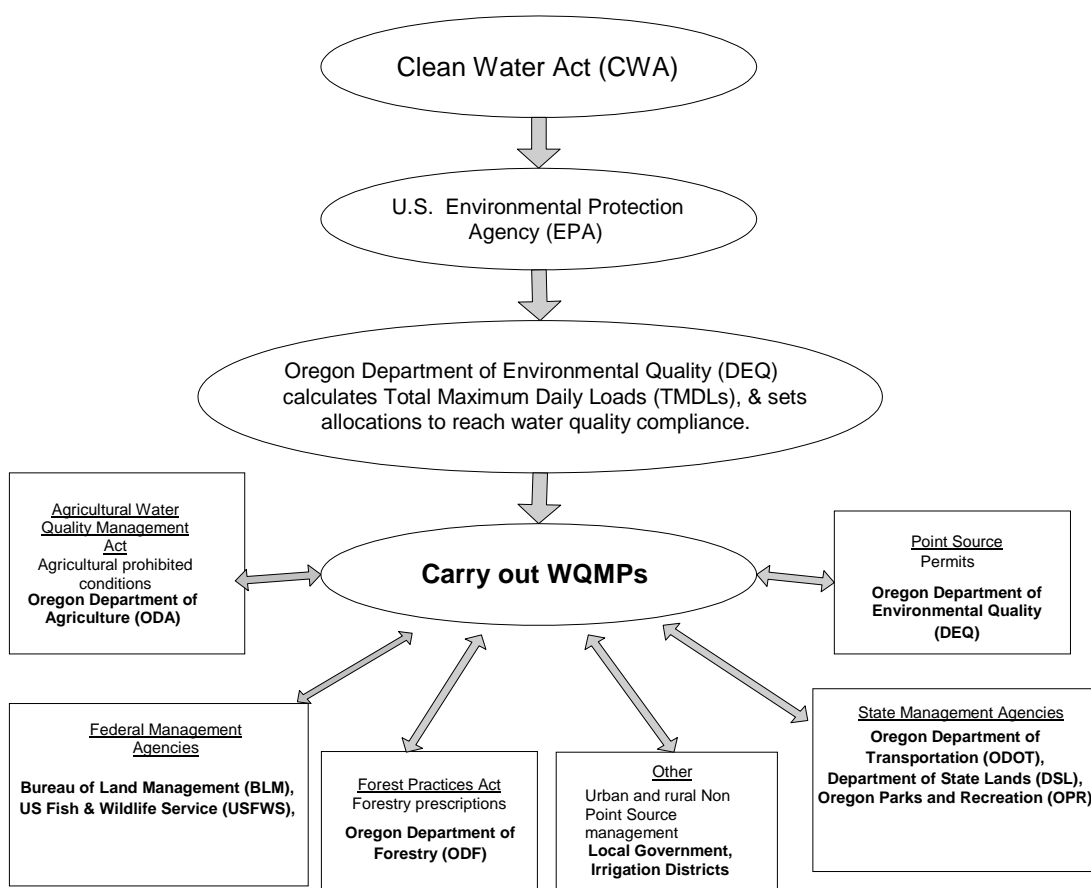
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4.1 Introduction

The Water Quality Management Plan is the section of the TMDL that describes strategies for implementing and achieving the Tualatin Basin TMDL. This document incorporates the 10 plan elements (Section 4.2) described in the 2000 Memorandum of Agreement (MOA) between the U.S. Environmental Protection Agency (EPA) and the Oregon Department of Environmental Quality (DEQ), and subsequently adopted into Oregon Administrative Rule (OAR 340-042- 0040(4)(I)). This TMDL chapter identifies the Designated Management Agencies and Responsible Parties for implementing the TMDL, and describes the activities, programs, legal authorities and other measures that may be used to achieve water quality compliance. A Designated Management Agency (DMA) is a “federal, state, or local government agency that has legal authority of a sector or source contributing pollutants, and is identified as such by the DEQ in a TMDL.” A Responsible Party (RP) has responsibility for a pollutant source identified in the TMDLs, and may be a public or private entity. This WQMP is a revision of the WQMP in the 2001 TMDL, and replaces that version.

The Water Quality Management Plan (WQMP) relies on existing programs wherever possible for meeting water quality objectives. The WQMP identifies DMAs and RPs with authority over pollutant sources that are not already addressed through a prescribed approach or permit conditions, and thus need to develop Implementation Plans. The relationship between the Clean Water Act and TMDL Implementation is described schematically in **Figure 4-1**.

Figure 4-1. Relationship between the Clean Water Act and TMDL Implementation. This demonstrates the relationship to but does not identify all of the Designated Management Agencies.



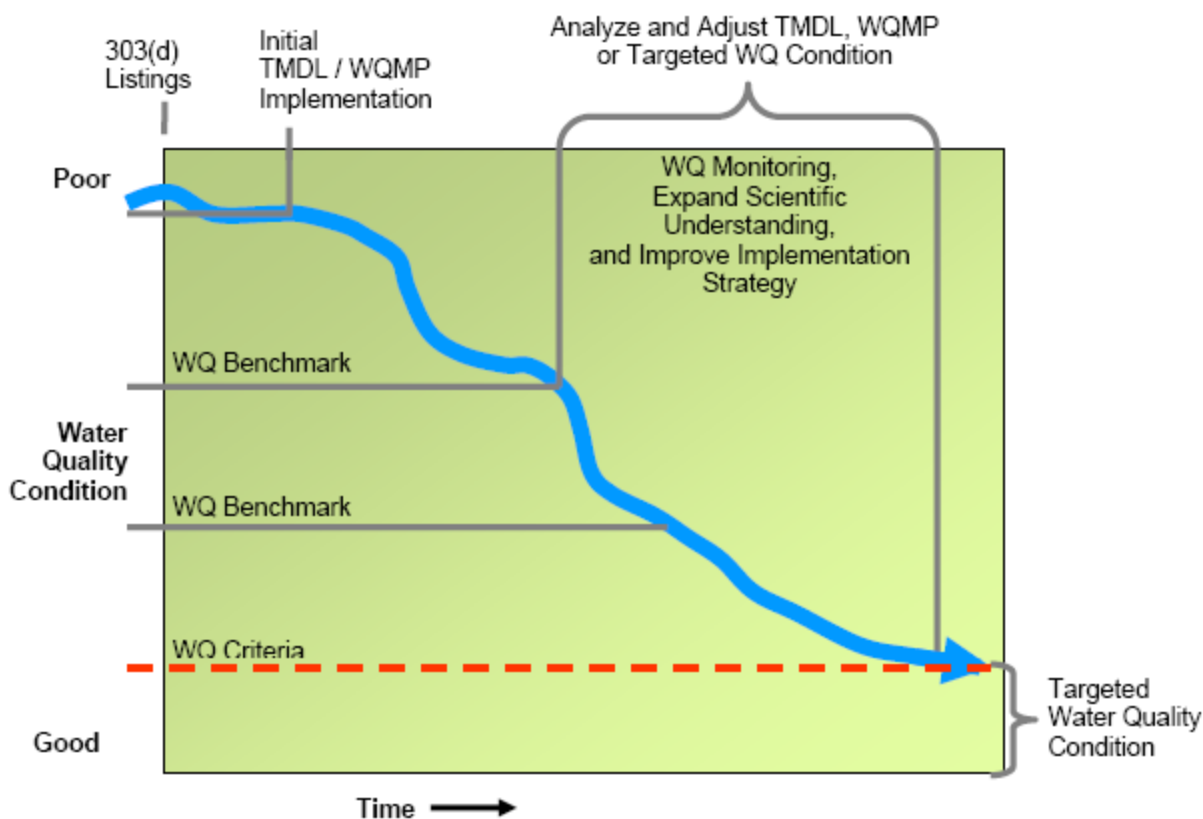
As shown in **Figure 4-1**, Oregon DEQ has received delegated authority to implement the federal Clean Water Act. One facet described in the Federal Clean Water Act, the Total Maximum Daily Load, is an approach that involves identification of the pollutant capacity of a water body (maximum daily load), and then assigns portions of that load to pollutant sources (load and waste load allocations). The allocations in this “plan” for addressing water pollution then become targets that can be legally enforced. DEQ requires Designated Management Agencies (DMAs) and Responsible Parties (RPs) to implement existing programs or if none exist, to develop implementation plans that will address the pollutant allocations. DEQ reviews and approves the implementation plans, and oversees the progress made on implementation of all allocations. DEQ encourages an adaptive management approach for TMDL implementation. This is described in detail in the next section.

4.1.1 Adaptive Management

The goal of the Clean Water Act and associated Oregon Administrative Rules (OARs) is to meet water quality standards. When this is not immediately possible, all feasible steps must be taken toward achieving the highest quality water attainable. This is a long-term goal in many watersheds, particularly where nonpoint sources are the main concern. To achieve this goal, implementation must commence as soon as possible.

TMDLs are numeric loadings that are set to limit pollutant levels such that in-stream water quality standards are met. DEQ recognizes that TMDLs are values calculated from mathematical models and other analytical techniques designed to simulate and/or predict very complex physical, chemical and biological processes. Models and techniques are simplifications of these complex processes and, as such, may not result in exact predictions of how streams and other waterbodies will respond to various management measures. It is for this reason that the TMDL has been established with a margin of safety, and that adaptive management approaches are recommended for addressing TMDL allocations.

WQMPs are plans designed to reduce pollutant loads to meet TMDLs. DEQ recognizes that it may take some period of time - from several years to several decades - of full implementation before management practices identified in a WQMP become fully effective in reducing and controlling pollution. This is true especially for activities like restoring riparian condition, where it can take several years to re-establish effective shade. In addition, DEQ recognizes that technology for controlling nonpoint source pollution is, in many cases, in the development stages and will likely take one or more iterations to develop effective techniques. It is possible that after application of all reasonable best management practices, some TMDLs or their associated surrogates cannot be achieved as originally established. If DEQ determines that all appropriate measures are being taken by the DMAs and that water quality standards will still not be met, DEQ may revise the TMDL. **Figure 4-2** is a graphical representation of this adaptive management concept.

Figure 4-2. Adaptive Management

Adaptive management is a strategy that requires learning from doing and making changes based on findings. The Tualatin TMDL experience has been a prime example of adaptive management. Implementation of the 1988 TMDLs for total phosphorus and ammonia began in the late 1980's and early 1990's. Phosphorus concentrations throughout the basin decreased as changes were made to sewage treatment, and new management practices were adopted on agricultural lands. Water quality monitoring and related studies continued through the 1990's. Results from these studies indicated that the phosphorus targets in the 1988 TMDL were lower than naturally occurring background levels of phosphorus. In this case, the TMDL was updated in 2001. Changes made in management practices of both point and non-point sources throughout the 1990's led to meeting the new TMDL targets at several sites soon after the new targets were adopted. Not all allocations have been met in the Tualatin Subbasin however, and this TMDL revision will trigger both a review of current activities, as well as submission of new implementation plans by additional stakeholders.

When a TMDL sets allocations for surrogate measures in place of the main pollutant, there are uncertainties in how the environment will respond to implementation actions and inherent nature of changing environmental conditions. Because of that, adaptive management is a desirable and appropriate strategy to use for TMDL implementation. Surrogate targets are commonly set for pollutants such as temperature, where shade is necessary to decrease non-point sources of temperature. Total phosphorus has been adopted as the target TMDL pollutant intended to improve pH and chlorophyll a concentrations in the lower Tualatin River. The lower concentrations of total phosphorus now observed in the Tualatin River correlate well with improvements in riverine pH and with decreases in chlorophyll, an indicator of algal populations. The strategy of using surrogate parameters has been shown successful in the Tualatin and other places. Adaptive management in these situations is useful, because when using surrogate measures, the uncertainty in predicting environmental improvement may be higher than using the pollutant directly. Still, the use of adopting allocations for surrogate measures can be easier to

implement and measure, and may thus have a more effective water quality benefit. Adaptive management can make these approaches even more effective.

Current examples of adaptive management include activities by both the Department of Forestry and the Department of Agriculture. ODF is in the process of reviewing and revising its Forest Practice Rules because stream temperature studies referred to as the Ripstream (Riparian Function and Stream Temperature Study; ODF, 2003) indicate that riparian protection under current rules is not sufficient to prevent stream warming for some stream reaches. The Board of Forestry directed ODF to begin rule analysis for riparian management of small and medium sized streams in response to this study. The Department of Agriculture is also reworking their approach for revising Local Area Plans, by providing plan requirement check lists and placing a different emphasis on plan revisions. ODA has also identified priority areas for assessing the impact of agricultural practices on water quality, and will use these findings statewide. Upon completion of this TMDL, DEQ will complete a Basin Assessment and Action Plan that will provide additional detail concerning water quality in the Tualatin Basin, and will identify additional actions that would improve water quality in the basin. This assessment is scheduled for completion well before implementation plans are due, and should prove useful in plan development.

The WQMP and the associated DMA/RP Implementation Plans will address how human activities will be managed to achieve the water quality targets; the purpose of the TMDL is not to bar or eliminate human access or activity in the basin or its riparian zones. DEQ also recognizes that full attainment of pollutant surrogate measures (system potential vegetation, for example) at all locations may not be feasible due to physical, legal or other regulatory constraints. To the extent possible, the Implementation Plans should identify potential constraints, and should also provide for the ability to mitigate those constraints when the opportunity arises. For instance, at this time, the existing location of a road or highway may preclude attainment of system potential shade due to safety considerations. Consideration should be given to designs that support TMDL load allocations and pollutant surrogates such as system potential vegetation whenever construction or restoration activities are considered for these river reaches.

If a source is not given a load allocation, it does not necessarily mean that the source is prohibited from discharging any wastes. A source may be permitted by DEQ to discharge if the holder can adequately demonstrate that the discharge will not have a significant impact on water quality over that achieved by a zero allocation. For instance, a permit applicant may be able to demonstrate that a proposed thermal discharge would not have a significant detrimental impact on projected stream temperatures. Alternatively, in the case where a TMDL is set based upon attainment of a specific pollutant concentration, a new source permitted to discharge at or below that concentration would be considered in compliance with the TMDL.

If a DMA/RP that is covered by the TMDLs complies with its finalized Implementation Plan it will be considered in compliance with the TMDL. In employing an adaptive management approach to the TMDLs and the WQMP, DEQ has the following expectations and intentions:

- Subject to available resources, on a five-year basis, DEQ intends to review the progress of the TMDLs and the WQMP.
- While conducting this review, DEQ will evaluate the progress towards achieving the TMDLs (and water quality standards) and the success of implementing the WQMP.
- DEQ expects that each DMA will also monitor and document its progress in implementing the provisions of its Implementation Plan. This information will be provided to DEQ for its use in reviewing the TMDL, and will take the form of a revised Implementation Plan when warranted.
- When developing Implementation Plans, DEQ expects that DMAs will develop benchmarks for attainment of TMDL surrogates, which can then be used to measure progress.

- Where implementation of the Implementation Plans or effectiveness of management techniques is found to be inadequate, DEQ expects DMAs/RPs to revise the components of their Implementation Plan to address these deficiencies.

If DEQ determines that all appropriate measures are being taken by the DMA/RP and that water quality standards will still not be met, DEQ may revise the TMDL. DEQ would also consider reopening the TMDL, subject to available resources, should new information become available indicating that the TMDL or its associated surrogates should be modified. If use attainability analysis (UAA) and/or site specific criteria show that the targeted standard or beneficial uses cannot be achieved, then revisions to the water quality standards may lead to recalculating the TMDL loading capacity and allocations.

The implementation of TMDLs and the associated plans is generally enforceable by DEQ, other state agencies or local governments. However, DEQ envisions that sufficient initiative exists to achieve water quality goals with minimal enforcement. Should the need for additional effort emerge, DEQ expects that the DMA/RP will work with land managers to overcome impediments to progress through education, technical support or enforcement. Enforcement may be necessary in instances of insufficient action towards progress. This could occur first through direct intervention from land management agencies (e.g. Oregon Department of Forestry [ODF], Oregon Department of Agriculture [ODA], Counties and Cities), and secondarily through DEQ.

4.2 TMDL Water Quality Management Plan Guidance

In February 2000, DEQ entered into a MOA with the EPA that describes the basic elements needed in a WQMP. That MOA was endorsed by the Courts in a Consent Order signed by United States District Judge Michael R. Hogan in July 2000. DEQ later adopted a rule that guides TMDL and WQMP development; WQMP elements are identified in OAR-340-042-0040(I)(A)-(O). These elements are addressed in this WQMP, for the most part in the order in which they are cited in the rule. However, for ease in reading and implementing the requirements of the WQMP, some items are combined together in a single section of the WQMP. The following list identifies the sections of the WQMP, and identifies which portion of the rule is addressed in each section.

WQMP Elements

- 4.2.1 Condition assessment and problem description (OAR 340-042-0040(4)(I)(A))
- 4.2.2 Goals and objectives (OAR 340-042-0040(4)(I)(B))
- 4.2.3 Proposed management measures (OAR 340-042-0040(4)(I)(C)) and their relation to water quality (OAR 340-042-0040(4)(I)(E))
- 4.2.4 Timeline for implementation (OAR 340-042-0040(4)(I)(D)), attaining standards (OAR 340-042-0040(4)(I)(F)), submitting source-specific plans (OAR 340-042-0040(4)(I)(I)), plan for maintaining implementation over time (OAR 340-042-0040(4)(I)(M))
- 4.2.5 Identification of responsible parties (OAR 340-042-0040(4)(I)(G)), and existing implementation plans (OAR 340-042-0040(4)(I)(H))
- 4.2.6 Reasonable assurance of implementation (OAR 340-042-0040(4)(I)(J))
- 4.2.7 Monitoring and evaluation (OAR 340-042-0040(4)(I)(K))
- 4.2.8 Public involvement (OAR 340-042-0040(4)(I)(L))
- 4.2.9 Costs and funding (OAR 340-042-0040(4)(I)(N))
- 4.2.10 Citation to legal authorities (OAR 340-042-0040(4)(I)(O))

4.2.1 Condition Assessment and Problem Description

Condition Assessment and problem description are presented in Chapter 1, and Sections 2.3, and 3.2 of this document. The condition assessment for temperature can be found in Section 4.1.4, bacteria in Section 4.2.5, and greater detail regarding dissolved oxygen can be found in Section 4.3.2 of the 2001 Tualatin Subbasin Total Maximum Daily Load (TMDL). This TMDL amends the dissolved oxygen and pH and Chlorophyll *a* (total phosphorus is the surrogate) TMDLs that were adopted in 2001 (2001 Tualatin Subbasin TMDLs), to accommodate new summertime pollutant sources. These are TMDL amendments; all of the waterbodies addressed in this TMDL have TMDLs in place, thus the status on the state's list of water quality-impaired waterbodies has already been changed to "TMDL Approved."

This WQMP encompasses both the Ammonia amendments which apply to the Tualatin Basin (HUC17090010), and the TMDL amendments for Total Phosphorus which applies to both the Tualatin and Lake Oswego subbasins (HUC 17090010 and the streams tributary to Oswego Lake located in the southern portion of the Lower Willamette HUC 17090012) presented in this document, and the TMDLs for temperature, bacteria and dissolved oxygen in the approved 2001 TMDL.

Water quality conditions in the Tualatin subbasin have improved since the adoption of the first TMDLs in 1988. The incidence of algae blooms in the lower river has decreased, as demonstrated by lower chlorophyll *a* concentrations, no pH violations, higher minimum dissolved oxygen levels, and fewer hours when dissolved oxygen is supersaturated. These improvements coincide with lower total phosphorus concentrations in the Tualatin River mainstem that now meet the 2001 TMDL phosphorus targets. This success suggests that the TMDL target for total phosphorus should remain in place to maintain water quality. A TMDL for temperature was issued in 2001; no data have been collected that demonstrate lower water temperatures, however over 35 miles of streams and creeks have been planted with shade trees; some on creeks sufficiently narrow that the stream is fully shaded after less than 10 years of growth. Additional riparian planting and continued growth of the reaches already planted are expected to improve water temperatures in the future. Flow augmentation from Henry Hagg Lake and Barney Reservoir has also lowered summertime Tualatin River water temperatures. In the future, flow augmentation may occur in some of the tributaries to the Tualatin, to both lower water temperatures, and improve dissolved oxygen concentrations in the tributaries.

4.2.2 Goals and Objectives

The overall goal of the WQMP is to implement the TMDLs to achieve compliance with water quality standards for temperature, dissolved oxygen and bacteria in the Tualatin subbasin, and total phosphorus in the Tualatin and Oswego Lake Basins. The WQMP includes a description of all DMA/RP plans that are in place or will be developed to address the load and wasteload allocations in the TMDL. In requesting revisions and updates for existing plans, this WQMP accommodates the adaptive management approach described in Section 4.1 above, for addressing pollution sources. As more information and knowledge was gained regarding the pollutants, allocations, management measures, and other related areas, changes have been made in the strategies for addressing pollutant sources.

As defined in OAR 340-042-0080(3), all DMAs and RPs will develop or revise Implementation Plans as directed in this document. DEQ has developed TMDL implementation guidance documents, a tracking matrix, and checklists for management strategies and existing plans to assist DMAs in developing and revising TMDL Implementation plans describing Implementation Plan requirements (<http://www.deq.state.or.us/wq/tmdls/implementation.htm>). These plans will serve as the tool for implementing the TMDLs and will:

- Develop strategies to achieve Load Allocations and Waste Load allocations including:
 - Both passive and active restoration of riparian vegetation and channel morphology, including floodplain area and connectivity, targeting natural conditions;
 - Nutrient source reduction, management and controls;
 - Instream flow restoration, where flow has been artificially reduced;
- Give reasonable assurance that management measures will meet load allocations, through both quantitative and qualitative analysis of management measures
 - Specific management measures in Table 4-1 are examples of what might be done;
 - IPs must identify management measures as well as demonstrate that the selected management measures will address water quality impairment
- Adhere to measurable milestones for progress
 - DMAs and RPs will submit annual progress reports to DEQ
 - DEQ will require periodic review of IPs as described in Table 4-2
- Develop a timeline for implementation, with reference to costs and funding, therefore Implementation Plans must:
 - Include a timeline to obtain information that allows DMAs to estimate quantity of management measures needed in order to meet load allocations
 - Include a description of the extent of management strategies that will need to be implemented to meet water quality standards and the TMDL load allocations;
 - Include an estimate of the time required to adopt the various management strategies identified;
 - Incorporate these factors along with associated costs and funding availability to produce a timeline for implementing the necessary management practices.
- Develop a monitoring plan to determine if:
 - BMPs are being implemented
 - Individual BMPs are effective
 - Load and wasteload allocations are being met
 - Water quality standards are being met

DEQ anticipates that DMAs, RPs and stakeholders in the Tualatin Basin will include monitoring strategies to track their own implementation progress. DEQ also encourages DMAs, RPs, and stakeholders to collaborate on efforts to monitor water quality and progress in meeting allocations. Monitoring BMP effectiveness may be accomplished with a combination of literature review, tracking the extent of BMP implementation and water quality monitoring.

4.2.3 Proposed Management Measures and their Relation to Water Quality

Restoration efforts that support TMDL implementation have been ongoing in the Tualatin Basin for decades. Landowners, special districts, state and local agencies, permittees and private trusts have all contributed to restore impaired waterbodies. Efforts have included measures that remove pollutant delivery to streams, reduce erosion across the watershed and increase riparian shade.

Specific management measures that will meet the TMDL load and wasteload allocations differ depending on the source of the pollutant. **Table 4-1** is organized by categories of pollutant sources and lists general management strategies that might be used to address each of the pollutants in the Tualatin River and Oswego Lake Basin TMDLs. The list is not intended to be comprehensive or prescriptive, but it does provide example management strategies that may be considered by DMAs and RPs as they develop Implementation Plans. Each DMA is responsible for source assessment and identification, which may result in additional management needs in more categories. DMAs and RPs are also responsible for

identifying the appropriate management strategies to address the pollution sources over which they have jurisdiction. Pollutant trading is also a management strategy that can be used to meet load and waste load allocations. Specific detail regarding DEQ’s polices for pollutant trading can be found in DEQ’s internal management directive concerning trades (DEQ 2009). A short summary of Tualatin trading is included in section 4.3.

Many of the measures have been implemented to address temperature, total phosphorus, bacteria and dissolved oxygen in Tualatin Subbasin streams. Most riparian planting has been completed since 2005, thus much of the vegetation has grown too slowly to provide significant shade. However, on a few narrow stream reaches, vegetation has already grown to a point where the stream is fully shaded. As noted in Chapter 2, TMDL targets for total phosphorus have been met in the mainstem Tualatin. This improvement resulted from changes in point source discharges as well as decreased erosion basin-wide from many of the measures listed below. Total Phosphorus concentrations in many of the tributaries still exceed the TMDL target concentrations however, so implementation of measures to reduce erosion and monitor fertilizer use should be emphasized in several drainages in the Tualatin subbasin.

Table 4-1. Pollutant sources and example management strategies to address TMDL pollutants. Pollutants addressed by each strategy are indicated with a grey box.

Pollutant	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus		
General Strategies	Increase effective shade through riparian restoration and protection; restore natural stream channel hydrology; increase stream flow.	Reduce bacteria delivered to streams by various means including source control, runoff and erosion control, stormwater control and treatment; encouraging stormwater infiltration and adopting various agriculture and irrigation practices.	Reduce volatile solids delivered to streams by various means including riparian protection, erosion control and stormwater control and treatment; low impact development; various agriculture and irrigation practices.	Reduce total phosphorus delivered to streams by various means including riparian protection, erosion control and stormwater control and treatment; low impact development; various agriculture and irrigation practices.		
Permitted Discharges			Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Permit Issuance <ul style="list-style-type: none"> • Include wasteload allocation in permit limits for new and renewed permits • Include conditions in §401 water quality certifications to ensure that allocations are met • Encourage water reuse to manage discharged wastes 						
New Construction and Development			Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Planning, Permitting, Zoning and Development Codes <ul style="list-style-type: none"> • Develop Low Impact Development Ordinance • Develop a Goal 5 ordinance (Protect natural resources & conserve scenic... and open spaces) • Protect buffers, riparian, wetland, and native vegetation areas, potentially with ordinances • Limit increase of impervious areas • Forest conversions follow measures/procedures in Memorandum of Agreement, Conversions of Forestland 						
Construction Stormwater Quantity and Quality Control Activities <ul style="list-style-type: none"> • Use existing open space/landscape areas for stormwater retention and treatment • Maintain post-development peak runoff rate and average volume at levels that are similar to pre-development levels • Incorporate porous pavement and other stormwater BMPs whenever possible • Grass swales • Reduce erosion and retain sediment on-site during and after construction 						

New Construction and Development	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Education/Inspection/Enforcement <ul style="list-style-type: none"> • Develop training and education programs for those involved with the design, installation, operation, inspection, and maintenance of erosion and stormwater BMPs • Develop schedule of regular and long-term inspection and maintenance • Education and outreach, enforcement of riparian ordinances 				
Existing Urban and Rural Development	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Planning, Permitting, Zoning and Development Codes <ul style="list-style-type: none"> • Implement watershed management programs to reduce runoff volumes and pollutant concentrations from existing development • Promote redevelopment over new development, by assessing previously contaminated sites 				
Stormwater Quantity and Quality Controls, Parking Lots <ul style="list-style-type: none"> • Implement BMPs to promote infiltration, filtration, retention, and detention • Perform routine maintenance of stormwater systems • Conduct regular street maintenance and sweeping 				
Sewers, Septic Systems, Animal Waste <ul style="list-style-type: none"> • Identify and eliminate illicit discharges and cross connections • Conduct onsite septic systems inspection and maintenance • Develop and implement animal waste controls 				
Education and Outreach Conduct public education and outreach on the following: <ul style="list-style-type: none"> • Stormwater • Illegal dumping • Septic system maintenance • Riparian protection and local zoning/ordinances • Landscape design and maintenance 				
Monitoring and Reporting <ul style="list-style-type: none"> • Conduct implementation monitoring and evaluation • Conduct instream and effectiveness monitoring • Provide adequate records and report results 				
Forestry	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Implement Forest Practices Act and federal resource management plans				
Protection/enhancement of riparian zone, wetlands, seeps, etc. with buffers				
Conduct pre-harvest planning				
Replace/restore roads/culverts				
Stabilize stream banks				
Onsite systems inspections/maintenance campground facilities				
Uplands management				
Inspection/enforcement				
BMP monitoring and evaluation				
Instream monitoring				
BMP implementation monitoring				
Education and outreach to operators and landowners				
Agriculture and Irrigation	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Implement SB 1010 Ag Water Quality Management Area Plans				
Manure, pasture, and nutrient management				
Riparian protection/enhancement; streambank stabilization				
CAFO program implementation				
Uplands management, plant cover crops on sloping lands or erosion-sensitive areas				

Agriculture and Irrigation	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Irrigation management to prevent soil erosion and excess nutrient loss				
Education and outreach				
BMP monitoring and evaluation				
Instream monitoring				
Flow management to reduce stream heating, erosion, sediment delivery to streams				
Piping of irrigation canals				
Transportation Roads and Bridges	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Siting and Construction <ul style="list-style-type: none"> • Prepare a stormwater management plan to ensure that pre- and post-construction stormwater runoff from roads, highways, and bridges is treated prior to discharge to a waterbody • Protect sensitive ecosystems, including wetlands, by minimizing road-building in those systems, minimizing the number of water crossings, and establishing protective measures, including setbacks, during construction 				
Stormwater, Erosion, Sediment, and Chemical Control <ul style="list-style-type: none"> • Develop an approved erosion, sediment, and chemical control plan prior to construction • Implement erosion, sediment, and chemical control plan • Construct runoff management systems to reduce pollutant concentrations in runoff from existing roads, highways, and bridges 				
Maintenance and Repair <ul style="list-style-type: none"> • Develop and implement a plan for a integrated vegetation/roadside maintenance controls • Limit generation of pollutants from maintenance operations by minimizing the use of pesticides, herbicides, fertilizers, deicing salts and other chemicals 				
Mining and Instream Work	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Implementation and enforcement of permits				
Education and outreach				
Riparian protection/enhancement; streambank erosion control				
Parks	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Riparian protection/enhancement; streambank erosion control				
Limit the increase of impervious areas				
Siting and maintenance of docks				
Use existing open space/landscape areas for stormwater retention and treatment				
Develop and implement animal waste controls				
Conduct onsite septic systems inspection and maintenance				
Dams & Reservoirs	Temperature	Bacteria	Volatile Solids & Ammonia	Phosphorus
Investigate options for changing operations to alter the temperature of release water				
Investigate structural modifications that will allow the temperature of release water to be managed ¹				
Monitor release water temperatures under various management strategies to identify solutions				
Pond by-pass during summer months				
Dam removal				

¹Initial water quality model runs for a scenario with a multiple depth of water release predicted water quality improvements for chlorophyll and pH within Hagg Lake, as well as a more natural seasonal thermal pattern of water released downstream (Sullivan and Rounds, 2006).

4.2.4 Timeline for Implementing Management Measures and Attaining Water Quality Standards

The purpose of this element of the WQMP is to describe the strategy for implementing actions that will improve water quality, and present a schedule for reviewing progress on implementation. Timelines for the development and review of implementation plans, DEQ activities, and attaining water quality standards are included in this section. TMDL Implementation is carried out by many different stakeholders, DMAs and RPs, so that the timeline for attaining water quality standards will be dependent on successful implementation of the strategies identified by each party.

4.2.4.1 TMDL Implementation Plan Development, Review and Future Revision

DMAs and RPs identified in this Water Quality Management Plan will submit TMDL Implementation Plans within 18 months of the date this TMDL is issued by DEQ. This WQMP accompanies a TMDL revision. As such, many of the DMAs were identified in the 2001 TMDL, and already have approved plans that are being implemented. DEQ will review the existing Implementation Plans and will work individually with these DMAs to identify areas of the plans that need updating. Other DMAs and RPs have been added with this revision and will need to submit Implementation Plans for the first time. DEQ will work with them, providing information and guidance on plan preparation as needed.

Each DMA/RP TMDL Implementation Plan will include timelines for the implementation of the milestones previously described in the Goals and Objectives section. Timelines should be as specific as possible and should include a schedule for BMP installation and/or evaluation, monitoring schedules, reporting dates and milestones for evaluating progress.

While previously submitted Implementation Plans will be reviewed and revised, and new plans submitted within 18 months, DEQ also intends to regularly review the progress of the Implementation Plans into the future. Individual Implementation Plans, this WQMP, and the TMDLs are part of an adaptive management process. DMAs/RPs are expected to report on implementation progress on an annual basis. DEQ may review and revise the TMDLs whenever deemed necessary which may occur approximately five years after the final approval of the TMDLs. Regardless of the status of TMDL review, DEQ will work with DMAs and RPs to review and revise the TMDL Implementation Plans on a five year schedule. **Table 4-2**, below, gives the timeline for activities related to this WQMP and associated DMA/Responsible Party Implementation Plans. The 5 year review schedule will ensure that DEQ and the DMAs/RPs use an adaptive management approach to TMDL implementation.

Table 4-2. Water Quality Management Plan and DMA/Responsible Party Specific Implementation Plan Timeline.

Activity and DMA	Year Activity is to Be Undertaken				
	2012	2013	2014	2015	2016
DEQ Review/Modification of WWTP and MS4 Permits	5 Year Cycle; 2010				
DEQ Modification of General and Minor Permits	5 Year Cycle; various				
DMA Development and Submittal of new or revised Implementation and Monitoring Plans			X		

Activity and DMA	Year Activity is to Be Undertaken				
	2012	2013	2014	2015	2016
Development of MOU or other agreement – Oregon Department of Transportation, Division of State Lands, Oregon Parks & Recreation Department*	X	X			
Revision of Tualatin Basin Agricultural Water Quality Management Area Plans	2 Year Cycle; 2012 Tualatin Basin				
DMA/Responsible Party Implementation of Plans [†]	X	X	X	X	X
DEQ/DMA/Responsible Party/Public Review of TMDL and WQMP	5 Year Cycle; 2019				
DMA Submittal of Annual Reports for Approved Plans	December 1 of Each Year				

* DMA/Responsible Party- Specific Implementation Plans must be submitted to DEQ for approval within 18 months of the issuance of the TMDL.

[†]Implementation of Plans for DMAs identified in the 2001 TMDL is already underway; others will start before or upon Plan approval

4.2.4.2 Timeline for Attainment of Water Quality Standards

The first Tualatin Basin TMDL for phosphorus and dissolved oxygen was adopted by DEQ in 1988. By 1996, total phosphorus concentrations in the lower river were dramatically lower, and the number of hours with pH violations was markedly reduced. These changes have been attributed to treatment modifications at the waste water treatment facilities, as well as changes in farming practices and manure management, and improvements in addressing erosion on forested, agricultural and urban lands. Timelines to implement these kinds of changes can span from a few months to install measures such as erosion control measures and fencing, to several years for planning and funding construction projects. However, water quality improvement was noted within 10 years, and the water quality violations for pH have not been present since 2005.

Improvements for other TMDL parameters have not been as rapid. Low levels of dissolved oxygen have been noted in the lower Tualatin River as well as Tualatin subbasin tributaries. Bacteria levels in some but not all reaches have declined, but at many sites, bacteria levels must be lowered further. Riparian plantings for shade have occurred on more than 35 miles in Tualatin subbasin streams, but most restored reaches need years of tree growth before water temperatures will be improved, and many miles of streams still need restoration of riparian planting to provide sufficient shade.

The DMA/RP TMDL Implementation Plans are designed to reduce pollutant loads from sources in order to meet TMDLs' associated loads and water quality standards. DEQ recognizes that where implementation involves significant habitat restoration or reforestation, water quality standards may not be met for decades. In addition, DEQ recognizes that technology for controlling nonpoint-source pollution is in the development stages in some cases, and will likely take one or more iterations to develop effective techniques. In addition to determining what measures to adopt to best address water quality impairment, the cost of adopting new and different management measures can affect how long it takes to meet the water quality standards throughout the basin. For this reason, DMAs and RPs are encouraged to prioritize the TMDL measures they plan to implement. DEQ plans to determine the timeline to attain water quality standards for each pollutant as DMAs and RPs estimate and report quantity of management measures needed to meet load allocations to DEQ.

4.2.5 Identification of Responsible Parties (RPs)

The purpose of this element is to identify the DMAs and RPs who have a responsibility to meet the Tualatin and Oswego Lake Basin TMDLs. DMAs and RPs are recognized by the State of Oregon as being those entities with the legal authority to ensure that the targets set forth in the TMDL are met (OAR 340-042-0030 (2)). What follows is a listing of the DMAs and RPs in the Tualatin River and Oswego Lake Basin and their responsibilities under the TMDL. The list is categorized by the land use and activity that each addresses. DMAs and RPs are responsible for implementing management strategies and developing and revising sector-specific or source-specific implementation plans. The management strategies necessary to meet the TMDL load and wasteload allocations differ based upon the source of pollution and the responsibilities and resources of the DMAs and RPs. Many DMAs and RPs are already implementing or planning to implement management strategies for improving and protecting water quality, but may need to take additional actions to meet the TMDL allocations.

This is not intended to be an exhaustive list of every participant that bears some responsibility for improving water quality in the Basin. Because this is a community-wide effort, a complete listing would have to include every business, every industry, every farm, and ultimately every citizen living or working within the basin. We are all contributors to the existing quality of the waters in the subbasin and we all must be participants in the efforts to improve water quality. Implementation Plans are not required from all parties, but the implementation of appropriate management practices necessary to meet water quality standards and TMDL allocations is a responsibility of any participant who has control over sources of water pollution.

For certain DMAs, TMDL implementation responsibilities will be carried out through existing regulatory and non-regulatory programs and activities. These DMAs, and examples of the programs and activities they will implement to achieve TMDL allocation, include those listed in Section 4.2.5.1.

The DMAs and RPs that are not covered by existing programs must develop and submit TMDL Implementation Plans for approval by DEQ, and are then required to implement the Plans. This TMDL revision is a trigger for all DMAs and RPs to submit TMDL Implementation Plans that address temperature and bacteria allocations in the 2001 Tualatin Subbasin TMDL, and that address total phosphorus and ammonia allocations from the 2001 TMDL or the current revision, whichever is applicable. Many DMAs submitted Implementation Plans in response to the 2001 TMDL; these plans should be revised and updated as needed to meet DEQ approval. Whether DMAs/RPs are submitting new or revised plans, plans will be due 18 months after the TMDL is issued by DEQ. DMAs and RPs will receive a formal notice from DEQ requiring the Implementation Plans at the time the TMDL is formally adopted by DEQ.

Several of the DMAs/RPs were designated in the previous Tualatin TMDL, and have already submitted TMDL Implementation Plans. DEQ will work with these DMAs to review implementation progress and identify what revisions need to be made to these plans. Revised plans are due within 18 months of the TMDL issuance. DMAs/RPs required to revise existing TMDL Implementation Plans are listed in Section 4.2.5.2. Other DMAs/RPs, listed in section 4.2.5.3, and not identified in the previous Tualatin TMDLs, are required to submit TMDL Implementation Plans within 18 months of this TMDL revision.

DEQ expects all implementation plans, whether new or revised to:

- Include measures that establish a trend toward load allocation attainment
- Identify how progress will be approached and assessed
- Identify priorities for monitoring, restoration and outreach
- Describe how the plan will be modified in the future to ensure the adoption of pollution prevention and control measures deemed necessary to meet the load allocations, when monitoring shows that the measures adopted fall short of achieving the load allocations.

- Identify timelines for the adoption of management strategies that target TMDL attainment

This TMDL document includes amendments to the 2001 TMDL document, and therefore does not replace all of the allocations assigned in the 2001 document. **Table 4-3** lists the DMAs and RPs that have been identified in this Water Quality Management Plan, shows the relevant TMDL parameters for each DMA/RP, and cites the relevant TMDL and allocation tables for each. Sections 4.2.5.1, 4.2.5.2 and 4.2.5.3 provide further detail regarding DEQ's expectation for each DMA/RP.

Table 4-3. Where to find Allocations for DMAs/Responsible Parties.

WQMP Section	DMA or RP	Temperature	Bacteria	Volatile Solids & Ammonia (dissolved oxygen)	Total Phosphorus (pH & Chlorophyll)	Plan on file	Revision Cycle
DMAs with Implementation Through Existing Programs							
4.2.5.1	Department of Environmental Quality	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17, 18, 19, 20, 21, & 22	2001 TMDL , Tables 35, 36, & 37; 2012 TMDL , Table 3-3	2001 TMDL , Table 46, 47, 48, 49, 54 2012 TMDL Table 2-13	No	Implementation through Water Quality Program; NPDES Permits renewal 5 year cycle
	Oregon Department of Agriculture	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17, 18, 21, 22	2001 TMDL , Table 37	2001 TMDL , Table 46 & 48	No	Implementation through Local Agricultural Management Plan (2 year review cycle); & ODA basin rules (OAR 603-095 & 603-1000)
	Oregon Department of Forestry	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 21, & 22	2001 TMDL , Table 37	2001 TMDL , Table 46 & 48	No	Implementation through Oregon Forest Practices Act (OAR 635)
DMAs with Implementation Plans on File							
4.2.5.2	Washington County	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17, 18, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Tables 46, 47 & 48	Yes	Revise for 2012 TMDL, then update every 5 years
	Multnomah County	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17, 18, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Tables 46, 47 & 48	Yes	Revise for 2012 TMDL, then update every 5 years

WQMP Section	DMA or RP	Temperature	Bacteria	Volatile Solids & Ammonia (dissolved oxygen)	Total Phosphorus (pH & Chlorophyll)	Plan on file	Revision Cycle
4.2.5.2	Clackamas County	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17,18, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Tables 46, 47 & 48	Yes	Revise for 2012 TMDL, then update every 5 years
	City of Rivergrove	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17, 18, 20, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then update every 5 years.
	Surface Water Management Agency of Clackamas County	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17, 18, 20, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then update every 5 years.
	City of Portland	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17,18	2001 TMDL , Table 37	2001 TMDL , Tables 46 & 47	Yes	Revise for 2012 TMDL, then update every 5 years
	City of West Linn	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17,18	2001 TMDL , Table 37	2001 TMDL , Tables 46 & 47	Yes	Revise for 2012 TMDL, then update every 5 years
	City of Lake Oswego	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL Tables 17,18	2001 TMDL , Table 37	2001 TMDL , Table 46, 47 & 54	Yes	Revise for 2012 TMDL, then update every 5 years
	Clean Water Services	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17 & 18	2001 TMDL , Tables 35, 36, & 37; 2012 TMDL , Table 4-3	2001 TMDL , Tables 46, & 47 2012 TMDL , Table 3-13	No	Watershed Permit & Temperature Management Plan on file will be updated with permit renewal

WQMP Section	DMA or RP	Temperature	Bacteria	Volatile Solids & Ammonia (dissolved oxygen)	Total Phosphorus (pH & Chlorophyll)	Plan on file	Revision Cycle
DMAs Required to Submit Plans							
4.2.5.3	Oregon Department of Transportation	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17 & 18	2001 TMDL , Table 37		No	Submit for 2012 TMDL; then modify every 5 years. Statewide plans may follow slightly different revision schedule
	Oregon Department of State Lands	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then modify every 5 years. Statewide plans may follow slightly different revision schedule
	Oregon Department of State Parks & Recreation	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then modify every 5 years. Statewide plans may follow slightly different revision schedule

WQMP Section	DMA or RP	Temperature	Bacteria	Volatile Solids & Ammonia (dissolved oxygen)	Total Phosphorus (pH & Chlorophyll)	Plan on file	Revision Cycle
4.2.5.3	Metro	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 17, 18, 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then modify every 5 years. Metro may work with DEQ to combine Willamette and Tualatin Basin Implementation Plans; revision schedule would then follow one TMDL or the other
	Tualatin Valley Irrigation District	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29		2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then update every 5 years.
	Federal Bureau of Land Management	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit Water Quality Restoration Plan for 2012 TMDL; update on 5 year cycle
	U.S. Fish & Wildlife Service	2001 TMDL Table 10, System Potential Shade as depicted in Figures 26, 27, 28 & 29	2001 TMDL , Tables 21 & 22	2001 TMDL , Table 37	2001 TMDL , Table 46, 48	No	Submit for 2012 TMDL; then update every 5 years.

4.2.5.1 Designated Management Agencies with Implementation through Existing Programs

TMDL requirements for these DMAs are implemented through existing programs such as permit issuance, administrative rules and local resource plans.

Land Use: Various Permitted Discharges

DMA: Oregon Department of Environmental Quality (DEQ)

The following permits are issued and activities are conducted by DEQ.

- National Pollution Discharge Elimination System (NPDES) Permitting and Enforcement
- Water Pollution Control Facility (WPCF) Permitting and Enforcement
- Municipal Separate Storm Sewer System (MS4) Discharge Permit
- 401 Hydroelectric Certifications
- 401 Dredge and Fill Certifications
- On-Site Septic System Permitting and Enforcement (except where delegated to specific county)
- Nonpoint Source TMDL Implementation Program
- Technical Assistance
- Financial Assistance
- Sewer and septic systems related to human habitation

DEQ Expectations: DEQ has begun adjusting the permit renewal schedule for NPDES permits such that NPDES permits within a basin will expire and renewal will be due in the same year. This approach will allow permits to be evaluated at the same time, so that cumulative impacts can be identified. In addition to adjusting this schedule, DEQ should meet permit renewal timelines, ensuring that permit conditions comply with new TMDL allocations as early as possible. DEQ also expects that all DEQ programs will evaluate the water impacts of proposed projects, and ensure that TMDL allocations are met. DEQ's Basin and Action Plan will include a review of DEQ programs in relation to the Tualatin TMDL requirements. The Action Plan will identify areas where DEQ programs can be modified to further address water quality issues in the Tualatin Subbasin, and will act as a review of DEQ's TMDL implementation program.

DEQ also expects to provide assistance to all DMAs/RPs in the development and revision of TMDL Implementation Plans. For DMAs who already have Implementation Plans, DEQ will review the plans and identify what areas or sections of the plan, if any require revision. DEQ will assist new DMAs/RPs in developing Implementation Plans. DEQ will also participate with ODA and Local Advisory Committees in biennial reviews, rule revisions, and priority setting activities. DEQ will continue coordinating with ODF on sufficiency analyses and rule revision.

Land Use: Agriculture

DMA: Oregon Department of Agriculture (ODA)

Agricultural land uses are addressed for the Tualatin Subbasin in the *Tualatin River Basin Agricultural Water Quality Management Area Plan (revised 2010)* and for the Oswego Lake Subbasin in the *Lower Willamette Agricultural Water Quality Management Area Plan (revised 2009)*. The activities and programs falling under this category include:

- Agricultural or farm-related activities, both commercial and noncommercial including livestock stable and pastures, both inside and outside of municipal boundaries
- Agricultural Water Quality Management Plan Development, Implementation, Enforcement and Revision
- Confined Animal Feeding Operations Permitting and Enforcement
- Container nursery operations
- Technical Assistance
- Rules under the AGRICULTURAL WATER QUALITY MANAGEMENT ACT (SB 1010) to clearly address TMDL and Load Allocations as necessary (Tualatin Basin Oregon Administrative Rules 603-095-0100—0180; Lower Willamette Basin OAR 604-095-3700-3760)

- Riparian area management

The Tualatin Soil and Water Conservation District is the primary Local Management Agency (LMA) designated by ODA for the Tualatin plan area, while the West Multnomah Soil and Water Conservation District covers the Oswego Lake Subbasin in the Lower Willamette Basin. Bi-annual Progress Reports are completed along with the Area Plan reviews, and allow DEQ to track implementation coordinated by the local Soil and Water Conservation Districts. The SWCDs are funded to conduct outreach and education, develop individual farm plans for operations in the planning area, work with landowners to implement management practices, and help landowners secure funding to cost-share water quality improvement practices.

Initial work by the Local Area Advisory Committees led to the adoption of rules governing allowable agricultural practices and prohibited conditions in the respective basins. Here is a short list of practices identified in the Tualatin – and Lower Willamette (includes Oswego Lake Subbasin) Basins:

OAR 603-095-0100 (Tualatin Basin, 2005)

- (1) Sheet and Rill Erosion
- (2) Active Channel Erosion
- (3) Near Stream Management Area
- (4) Stream Temperature
- (5) Irrigation Water Discharges
- (6) Waste Discharges

OAR 603-095-3700 (Lower Willamette Basin, 2003)

- (2) Waste Management
- (3) Nutrient Management
- (4) Erosion Management
- (5) Riparian Management

DEQ Expectations. The Department of Agriculture has been developing requirement surveys for Local Area Plans, and continues to work with Local Area Committees (LACs) in the development of those plans. ODA has also identified priority areas for assessing the impact of agricultural practices on water quality, and will use these findings statewide. DEQ therefore expects that the next biennial revisions for the Tualatin and Lower Willamette basin Ag Water Quality Management Area Plans will address the TMDLs and include “pollution prevention and control measures deemed necessary by the department to achieve the goal, a schedule for implementation of the necessary measures that is adequate to meet applicable dates established by law, guidelines for public participation, and a strategy for ensuring that the necessary measures are implemented.” (OAR 603-090-030). Load allocations have been set for temperature, phosphorus, bacteria and settleable solids load allocations and surrogate measures throughout the subbasins; the Ag plan revision should identify how progress will be approached and assessed, as well as set priorities for monitoring, restoration, outreach, and if appropriate, rule compliance for each biennium. The basin rule in conjunction with the local area plan should allow agricultural practices to be in compliance with water quality standards and TMDL non-point source or agricultural load allocations. In addition to the identification of management measures, DEQ expects the Local Area Plans to include an assessment of the percent of land area in agricultural management that is in compliance with the basin rule and the local area plan, and the percentage of agricultural area that is implementing the Local Area Plan. The Plan must also include a timeline for achieving compliance with the basin rule and implementing the area plan, and it must identify interim milestones for gauging progress along that timeline. In order to track this achievement DEQ expects ODA to report the percent of compliance with the rule as well as reporting the percent implementation with the Plan.

Land Use: Forestry on Private Lands

DMA: Oregon Department of Forestry (ODF)

Private land forestry uses are addressed in the rules adopted subsequent to the Forest Practices Act. Oregon Department of Forestry rules that protect water quality are largely included in Division 635. The

forest management activities covered under the Forest Practices Act are included in the following general categories:

- Harvesting or Salvaging Trees
- Site Preparation and Reforestation
- Chemical Application
- Clearing Forest Land for Non-forest Uses
- Road Construction and Improvements
- Riparian area management
- Pre-commercial Thinning/Slash Disposal

Examples of forestland water protection best management practices include:

- Roads should not be located in riparian management areas, flood plains, or wetlands;
- Stream crossing structures designed for 50 year flows;
- Maintain riparian vegetation with a 20-foot no harvest zone of trees and a 10-foot zone of no disturbance of all understory vegetation that is near the high water level of the stream or river on fish-bearing and domestic use streams;
- And minimize disturbance to beds and banks of streams, lakes, and all wetlands more than ¼ acre in size; and
- Minimize slash that may enter waters of the state during felling, bucking, limbing or yarding.

If additional actions are needed to meet the TMDL, ODF may revise statewide FPA rules and/or adopt subbasin specific rules as necessary.

DEQ Expectations: Coordination between ODF and DEQ is guided by a Memorandum of Understanding (MOU) signed in April of 1998. This MOU was designed to improve the coordination between the ODF and the DEQ, and is in the process of being updated. In addition, work to evaluate the efficacy of various forest practices is currently underway (the Riparian Function and Stream Temperature (RipStream) study). The the study design can be found in an ODF document (ODF, 2003). Published reports from this study indicate that the Protecting Cold Water criterion of the Temperature Standard is not being met during harvest activities along small and medium fish-bearing streams (see Groom et al 2011a, b). In addition, this indicates that TMDL load allocations in existing temperature TMDLs are also not being met. As a result, ODF has recently been directed by the Bureau of Forestry to begin a rule analysis for riparian management of small and medium sized streams. ODF anticipates that it will take up to 18 months to revise the FPA rules. DEQ expects that anytime forest practices rules are revised ODF will provide outreach and education with foresters to ensure that new practices are adopted quickly.

4.2.5.2 Designated Management Agencies/Responsible Parties Required to Revise Existing Implementation Plans

The Tualatin TMDL was originally adopted in 1988, and previously revised in 2001. Several of the DMAs and RPs submitted Implementation Plans in response to the previously issued TMDLs. For parties who are currently implementing approved Implementation Plans, this TMDL revision shall trigger a review and update of existing plans. DEQ expects that all implementation plans will include elements described in Section 4.2.5.

Land Use: Rural/Urban Nonpoint Source Land Uses in the Tualatin River and Oswego Lake Subbasins

**DMA: Counties: Washington, Multnomah and Clackamas
Cities: Portland, West Linn, Lake Oswego, City of Rivergrove
Special Districts: Clean Water Services, Surface Water Management Agency of Clackamas County.**

Oregon Cities and Counties have the authority to regulate land use activities through local comprehensive plans and related development regulations. This authority begins with a broad charge given to them by the Oregon constitution and the Oregon legislature to protect the public's health, safety, and general welfare. The Oregon land use planning system, administered through the Oregon Department of Land Conservation and Development, provides a unique opportunity for local jurisdictions to address water quality protection and enhancement. Every city and county is required to have a comprehensive plan and accompanying development ordinance to be in compliance with state land use planning goals. While the comprehensive plan must serve to implement the statewide planning goals mandated by state law, cities and counties have a wide degree of local control over how resource protection is addressed in their community.

Many of the goals have a direct connection to water quality, particularly Goal 5 (Natural Resources, scenic, and historic areas and open spaces, OAR 660-015-0000(5)), Goal 6 (Air, water, and land resources quality, 660-015-0000(6)), and Goal 7 (Areas subject to natural hazards). We expect that the efforts of local jurisdictions to address Goal 5, 6, and 7 requirements, when incorporated into a TMDL Implementation Plan, will help a DMA to meet the allocations in this TMDL.

Rural and urban land uses are under the authority of the designated County/City. The Counties and Cities are responsible for their governmental operations, as well as zoning and permitting, urban runoff and drainage systems, streets and roads, and riparian protection. The land uses include:

- All non-agricultural, non-forestry-related land uses including transportation uses (road, bridge, and ditch maintenance and construction practices)
- Sewer and septic systems as related to human habitation, On-Site Septic System Permitting and Enforcement (where delegated to specific county)
- Design and placement of housing/home, commercial, and industrial sites in urban and rural areas
- Golf courses and parks
- Land use planning/permitting
- Maintenance, construction and operation of parks and other county/city-owned facilities and infrastructure
- Construction, operation and maintenance of county/city roads and county storm sewer system
- Riparian area management
- Other land uses as applicable to the TMDL

Stormwater runoff is a significant nonpoint source in urban areas. In the Tualatin and Oswego Lake subbasins, stormwater in urban areas is regulated by a Municipal Separate Storm Sewer System (MS4) National Pollution Discharge Elimination System (NPDES) permit. Urban areas in the Tualatin Basin are subject to MS4 permits held by Clean Water Services or Clackamas County. Bacteria, phosphorus and ammonia and settleable volatile solids are addressed through the MS4 permits; because stormwater is not a significant source of heat to subbasin streams during the TMDL period, temperature impacts are not addressed by the MS4 permit. Oswego Lake is addressed in the MS4 permit for Clackamas County; this permit was recently renewed, and the MS4 permit for Clean Water Services is scheduled for renewal in early 2012. These permits include (or will include) a requirement to assess whether waste load allocations have been met, and if not, to assess what management practices are needed, and what the cost of implementing those practices will be. This information will be used to assign benchmark targets in the in the next MS4 permit cycle.

DEQ Expectations: In addition to coverage under the MS4 permits, all of these cities and counties have TMDL Implementation Plans on file from the two previous Tualatin TMDL orders. The plans shall be updated to include changes in ordinances, describe changes in approach that have been made to adaptively manage water quality and make progress toward the TMDL allocations. This review should also examine the progress made toward meeting water quality standards. The TMDL Implementation Plans shall then be revised to include new programs and actions adopted that will be implemented to continue making progress in meeting water quality standards.

Land Use: Management of Wapato Improvement District Dike and Pumphouse to control water level and irrigation in and around Wapato Lake Basin**RP: Wapato Improvement District (WID)**

Until recently, Wapato Improvement District had the authority to manage the Wapato Lake area, controlling the timing of water releases from the lakebed. Water releases from this farmed area have been shown to contribute high phosphorus loads to the Tualatin River, and have been associated with downstream nuisance algal blooms. The WID was not identified as a Responsible Party in the 2001 TMDL, but did submit a management plan for the lake area to DEQ in 2009, after the area was shown to be a source of nutrients and algae under some management practices. The US Fish and Wildlife Service now owns and operates the dikes and pumphouse that control Wapato lakebed water levels as part of the Tualatin Wildlife Refuge. The U.S. Fish and Wildlife Service is now the DMA for this land area. DEQ's expectations for this agency are included in Section 4.2.5.3.

DEQ Expectation:The Wapato Improvement District is currently in the process of being dissolved, and thus will not become a designated management agency under this TMDL.

4.2.5.3 Designated Management Agencies/Responsible Parties Required to Submit TMDL Implementation Plans

DMA's and RPs that were not identified by previous TMDLs are required to submit TMDL Implementation plans for the first time. These DMA's are listed below. DMA's and RPs are required to develop TMDL implementation plans that describe the management measures they will take to achieve their load allocations. The required elements of these plans, and the process for monitoring progress under these plans and revising them as necessary, are described in DEQ's TMDL Implementation Plan Guidance. DEQ encourages the development of statewide implementation plans by other state agencies. DEQ also encourages DMA's and RPs to integrate the TMDL Implementation Plan with requirements for other plans, as well as using existing plans and local regulations as the basis for TMDL Implementation Plans wherever feasible.

State Agencies

Land Use: Roads, Highways and Bridges**DMA: Oregon Department of Transportation (ODOT)**

State road issues are largely addressed through ODOT's Municipal Separate Storm System Permit (MS4). A review and renewal of ODOT's MS4 permit is anticipated in 2012. As noted in the 2001 Temperature TMDL, stormwater is not a significant heat source, thus the MS4 permit is not expected to address ODOT's thermal impact on streams.

DEQ Expectations: DEQ anticipates that work on the MS4 permit renewal will begin in 2012. Under a Memorandum of Agreement with DEQ, ODOT will initiate work on a statewide Water Quality Implementation Plan in 2012. The Water Quality Implementation Plan will address the pollutant parameters that are not sufficiently covered by the MS4 permit. Although the MS4 permit and the Implementation Plan will apply statewide, they will include management strategies that address the TMDL pollutants in the Tualatin Basin, including measures that ODOT will take to protect water quality from runoff and construction activities, and monitoring plans that include both implementation and water quality benefits.

Land Use: Publicly Owned Lands and Removal-Fill Activities**DMA: Oregon Department of State Land (DSL)**

DSL holds state-owned lands in trust and manages these lands in the public's best interests. DSL administers the state's removal-fill permits and is responsible for leasing range and agricultural land and waterways for a variety of business activities, both of which may have impacts on water quality in general,

and affect the TMDL parameters in the Tualatin Basin in particular. DSL may choose to submit a state-wide water quality implementation plan instead of a local basin plan, as long as the statewide plan addresses all of the Tualatin Basin TMDL parameters.

DEQ Expectations: DEQ expects the TMDL Implementation Plan to describe how DSL programs are implemented in order to protect water quality, and to describe a monitoring program that tracks both practice implementation and water quality benefits.

Land Use: State Park Lands

DMA: Oregon Parks and Recreation Department (OPRD)

OPRD is responsible for land stewardship, overseeing Oregon's scenic waterways, several permit programs, and park plants and animals. OPRD owns and operates three parks in the Tualatin Basin: Stewart Stubb State Park, the Vernonia-Banks Trail, and the Willamette Stone State Heritage Site. OPRD also owns and operates several parks in the Willamette Basin, and will prepare TMDL Implementation Plans in response to the Willamette Basin TMDL. The Tualatin TMDL Implementation Plans has been largely separate from the Willamette Basin TMDL Implementation Plans due to differences in the issuance dates for the TMDLs. OPRD is welcome to address the Tualatin TMDL in the larger Willamette Basin Implementation Plan, as long as the submitted plan addresses all the physical areas and TMDL pollutants addressed in the multiple TMDLs.

DEQ Expectations: DEQ expects the TMDL Implementation Plan to include both OPRD management practices that are used to protect water quality, and a monitoring program that quantifies management practice implementation and associated water quality benefits.

Special Districts:

Land Use: Land ownership throughout basin with potential water quality impact

DMA: Metro

Metro is an elected regional government whose activities include region-wide planning, adopting related ordinances, setting urban growth boundaries, and owning and managing several area parks and greenspaces. Metro has acquired several land parcels throughout the Tualatin Basin, including riparian corridors and wetlands.

DEQ Expectations: Metro already has an approved TMDL Implementation Plan for the Willamette Basin. Metro and DEQ will work together to identify any Tualatin-specific issues, programs or strategies that should be added in order for the Willamette Basin Plan to be approved for the Tualatin Subbasin. Tualatin TMDL parameters differ somewhat from the Willamette Basin TMDLs, and include temperature, total phosphorus, bacteria and settleable volatile solids. In addition, local ordinances required by Metro differ from other Willamette Basin jurisdictions, so Metro will submit any necessary additional material that describes how regional ordinances protect water quality in the Tualatin subbasin and outlines how their management activities on lands in the subbasin will comply with the Tualatin TMDLs.

Land Use: Irrigation water transport and delivery

DMA: Tualatin Valley Irrigation District (TVID)

Irrigation districts and distribution systems are considered nonpoint sources of pollution that influence the quantity and timing of heat and phosphorus delivery to downstream river reaches. While irrigation district operations themselves may not contribute pollutants, the laterals and canals that are used to convey water can play a major role in transporting contamination across the landscape and into surface waters. Irrigation districts are responsible for maintaining water quality within their water conveyance structures. Irrigation districts are required to develop implementation plans that include management strategies to address TMDL parameters.

TVID controls operations related to irrigation water transport and delivery in the Tualatin River Basin, through its water delivery from the Bureau of Reclamation's Henry Hagg Lake to irrigators in the Tualatin Basin. A significant portion of the delivery system consists of buried pipe, which is not subject to the same level of pollutant loading as open ditches. In addition, runoff from irrigation in the Tualatin Basin is

subject to Oregon Department of Agriculture rules (OAR 603-095-0140(5)) that generally preclude irrigation runoff to waters of the state during the TMDL season (May 1-October 31). To reduce the potential of polluted return flows, TVID may contact users directly or in conjunction with ODA and the Tualatin Soil and Water Conservation Districts to inform irrigation users of effective irrigation practices, manure management and other practices to keep fecal organisms, phosphorus, sediment and heat from being delivered to surface waters by the irrigations system.

DEQ Expectations: TVID shall develop a TMDL Implementation Plan that describes the potential for irrigation system contamination including the extent of covered and open transmission lines, and identifies best management practices, measures, and/or control technologies that the district will use to reduce its impact. Relevant TMDL parameters that shall be addressed for the Tualatin are heat, total phosphorus, settleable volatile solids, and bacteria. The Implementation Plan should identify and address pollutant sources that occur within the irrigation distribution system, and are under control of the TVID.

Federal Agencies:

Land Use: Land Ownership in Basin, mainly in forest use

DMA: Federal Bureau of Land Management (BLM)

The Bureau of Land Management owns several small parcels of land in the Tualatin Basin, mainly located in the Dairy-McKay Creek watersheds of the Tualatin subbasin. The primary use on these lands is forestry. However, as public lands, forestry activity is subject to the Northwest Forest Plan implemented by the federal government, not the statewide Oregon Forest Practices Act. The BLM has worked with Oregon in other basins and, in keeping with a Memorandum of Agreement, will complete a Water Quality Restoration Plan (WQRP) that will be implemented on its' land holdings in the Tualatin Basin. The Tualatin subbasin WQRP will outline management practices and the monitoring program that will be implemented on BLM land in the Tualatin Subbasin.

DEQ Expectations: As agreed to in the Memorandum of Understanding between the BLM and DEQ. DEQ expects BLM to submit a WQRP for the Tualatin subbasin that includes the Implementation Plan elements identified at the beginning of section 4.2.5.

Land Use: Land ownership of Tualatin River National Wildlife Refuge

DMA: US. Fish and Wildlife Service

The US Fish and Wildlife Service owns and manages the Tualatin River National Wildlife Refuge, including the newly acquired Wapato unit, much of which is managed wetland maintained by seasonal flooding from the Tualatin River. Future management goals for all Tualatin Wildlife Refuge units are currently under review.

DEQ Expectations: The USFWS TMDL Implementation Plan shall identify near-term management strategies for these resources, and shall include a process to revise the plan as needed when long-term management strategies for the Wildlife Refuge are identified.

4.2.6 Reasonable Assurance of Implementation

This section of the WQMP is intended to provide reasonable assurance that the WQMP (along with the associated DMA-specific Implementation Plans) will be implemented and that the TMDL and associated allocations will be met.

The Tualatin Subbasin has been subject to TMDLs since adoption of the first TMDL in 1988. In response to both the 1988 TMDL and the new and revised TMDLs adopted in 2001, many efforts have been made to address water quality in the basin. The many stakeholders in the Tualatin Subbasin have made water quality a priority, and have learned to partner with other stakeholders to improve it. Tangible results from these efforts are reflected in actual water quality improvements, as well as the adoption of innovative

programs to protect water quality, such as Clean Water Services Trading Program, the creation of a Tualatin-specific program under Metro's Nature in Neighborhoods Ordinance, and adoption of agricultural rules unique to the Tualatin Basin including no irrigation discharge during the TMDL season. DMAs identified in the 2001 TMDL revision have a good track record of submitting and implementing TMDL Implementation Plans.

Programs are already in place, or will be put in place, to ensure that the Tualatin River Basin TMDL will be met. Some are traditional regulatory programs, such as specific requirements under NPDES discharge permits. Other programs address nonpoint sources under the auspices of state law (for forested and agricultural lands), previously submitted TMDL Implementation Plans, or as voluntary efforts. The key authorities and programs that ensure this TMDL revision will be carried out are described below. The section addresses point and non-point sources of pollution, which in-turn is further organized by land use. Information about specific DMAs/RPs requirements is contained above in Section 4.2.5. The intent of this section is to highlight factors that provide additional assurance that the TMDL program will be implemented. These factors include whether programs are voluntary of regulatory, and what additional agreements exist that obligate DMAs to implement the TMDL.

4.2.6.1 Point Sources

Direct Discharge to water:

DMA: Oregon Department of Environmental Quality (DEQ)
Jurisdiction: Regulation of discharges to waters of the state

DEQ has regulatory authority to disallow or to allow and limit discharges to water of the state. Regulation occurs through the issuance or revision of the National Pollution Discharge Elimination System (NPDES) permits (which include stormwater runoff) and Water Pollution Control Facilities (WPCF) permits. Reasonable assurance that point-source wasteload allocations will be met is addressed through provisions to incorporate the appropriate wasteload allocations (WLAs) into NPDES permits when permits are renewed by DEQ. Point sources are allowed reasonable time and a schedule to upgrade their facilities if necessary to meet new permit limits. Adherence to permit conditions is required by State and Federal Law, and DEQ has the responsibility to ensure compliance through its enforcement program which may include issuing fines or an order to cease discharge.

4.6.2.2 Nonpoint Sources

Agricultural Uses:

DMA: Oregon Department of Agriculture(ODA)
Jurisdiction: All agricultural operations

The Oregon Department of Agriculture is the DMA responsible for regulating agricultural activities that affect water quality through the Agricultural Water Quality Management Act (Oregon Revised Statute 568.900-568.933). The Agricultural Water Quality Management Act directs ODA to work with local communities, including farmers, ranchers, and environmental representatives, to develop Agricultural Water Quality Management Area Plans (AWQMAP) and rules statewide. ORS561.191 stipulates that ODA "*shall develop and implement any program or rules that directly regulate farming practices that are for the purpose of protecting water quality and that are applicable to areas of the state designated as exclusive farm use zones or other agricultural lands.*" Further, ODA policy states that plans and rules will be "*reviewed on a biennial basis and ODA in consultation with ODEQ will assess whether the plan and rules are sufficient to meet and address water quality concerns established under the 303(d) or TMDL process or other triggering mechanisms*".

The Area Plans stress voluntary cooperation, but ODA has the ability to assess civil penalties when local operators do not follow their local Agricultural Water Quality Management Area rules. ODA adopted rules for both the Tualatin Basin (2003) and the Lower Willamette Basin (2005; applicable in the Oswego Lake

watershed). ODA also maintains a program that provides outreach offering education on pollution prevention as well as an inspection program that has the ability to issue fines for non-compliance with the basin rules.

DMA: Wapato Improvement District (WID)
Jurisdiction: Manager of irrigation and drainage within the Wapato Lakebed

The Wapato Improvement District was not named as a responsible party in the 2001 TMDL and, in fact, had not been identified as a potential source of phosphorus, or as a potential contributor to algal blooms. However, with the dike breach in 2007, and high water levels in the spring of 2008, Wapato Lake water was identified as a major contributor to an algal bloom that travelled downstream in July of 2008, and developed into a nuisance bloom of bluegreen algae between river miles 5 and 16. After this event, and the discovery of the Wapato contribution, the Wapato Improvement District worked with DEQ to develop the Wapato Lake Water Quality Management Plan. The management plan identifies when and at what rate water may be released from the lakebed, as well as outlining maintenance activities, and a communication plan with local stakeholders. Since the Wapato Management Plan was adopted, the WID has followed the requirements set out in the plan. In addition, the WID has cooperated with local stakeholders, and worked closely with the US Fish and Wildlife Service (USFWS) collaborating on management activities and equipment upgrades.

At the time this WQMP is being written, the USFWS is a majority landowner of the Wapato lakebed, and now owns and operates the dikes and pumphouse. The willingness of the USFWS to continue implementation of the Wapato Management Plan, and to include water quality concerns in long-term planning are factors that contribute assurance that the pollution from the Wapato Lakebed will be minimized in the future.

DMA: Tualatin Valley Irrigation District (TVID)
Jurisdiction: Irrigation Water Transport and Delivery

The quality of water entering the TVID irrigation system is the responsibility of upstream DMAs/RPs, and the quality of water in irrigation return water falls under the Department of Agriculture's basin plans. However, any changes to water quality that occur in the irrigation delivery system are under the jurisdiction of TVID. TVID has not been identified as a DMA under previous Tualatin TMDLs; as for all DMAs, DEQ is available to provide assistance as needed with the TMDL Implementation Plan.

Forestry & Managed Lands

DMA: Oregon Department of Forestry (ODF)
Jurisdiction: All private commercial timber operations

Through the Forest Practices Act, the Department of Forestry regulates practices that protect water quality from nonpoint source discharges or pollutants resulting from forest operations on non-federal forestlands statewide, and thus also in the Tualatin River Basin. Water protection rules are applied per OAR 629-635-0000 through 629-660-0060. As provided in ORS 527.770, forest operations conducted in good faith compliance using best management practices and control measures established under the Forest Practices Act are generally deemed not to cause violations of water quality standards. Forest operations are subject to load allocations the extent needed to implement the federal Clean Water Act. ODF has the authority to enforce the Forest Practices Act to assess penalties when local operators fail to follow the practices required in the Forest Practices Act. Recent studies (Ripstream, ODF, 2003) have shown that some forest practices do not sufficiently protect water temperature. ODF is currently revising its rules to require practices that will protect the currently impaired small and medium streams.

DEQ and ODF entered into an agreement in 1998 concerning forest practices and water quality protection. This Memorandum of Agreement is currently being revised. ODF also entered into an MOA with DEQ and other state agencies to clarify the roles and responsibilities of each state agency during the conversion of forestland to other non-forest uses on publicly or privately owned lands, to ensure that state

water quality and other resources are protected throughout the process, and to ensure a smooth transition of jurisdiction between the agencies. For additional information about the Oregon Department of Forestry link to <http://www.oregon.gov/ODF/>.

DMA: Bureau of Land Management (BLM)
Jurisdiction: Manger of federally owned land within the Tualatin River Basin

DEQ and the Bureau of Land Management (BLM) have experienced a longstanding Memorandum of Agreement (MOA) that outlines how BLM will comply with the federal Clean Water Act and TMDLs on BLM land in Oregon. This MOA was recently updated, and adopted in March of 2011 (<http://www.deq.state.or.us/wq/nonpoint/docs/DEQBLLMOU20110401.pdf>). The MOA specifies that BLM will complete Water Quality Resource Plans (WQRP) to cover BLM activities in Oregon's TMDL basins. The BLM has not been identified as a Designated Management Agency in previous Tualatin Basin TMDLs, so there is no Tualatin Basin WQRP on file, however the BLM has a successful track record of submitting WQRPs for other basins.

DMA: Oregon Parks and Recreation Department (OPRD)
Jurisdiction: Manager of State Park Land in the Tualatin Basin

OPRD has been identified as a DMA in the Willamette Basin TMDL, and is currently working with DEQ to complete a TMDL Implementation Plan. Many of the elements required in an implementation plan can be addressed through the implementation of existing regulatory programs and activities already adopted at state parks throughout the Willamette Basin. DEQ is working with OPRD to explore the possibility of having the Willamette Basin Implementation Plan address all Tualatin subbasin issues as well. Because OPRD is already working on the implementation plan, and the plan reflects many activities that are already being taken at state parks located throughout the Willamette Basin, DEQ is reasonably assured that OPRD will fulfill their TMDL obligation.

DMA: Metro
Jurisdiction: Regional government & Manager of land owned in the basin

Metro is a regionally elected government that manages the metropolitan area's urban growth boundary, guides the region's transportation and land-use planning, and manages the region's solid waste. Metro provides planning tools to help protect the region's air and water quality, and has the authority to adopt regional ordinances. Metro also owns and manages several natural areas both within and outside of their jurisdictional boundary.

Metro was identified as a DMA in the Willamette Basin TMDL, and already has a DEQ-approved Willamette TMDL Implementation Plan. This TMDL implementation will be reviewed jointly by DEQ and Metro to determine whether any additional information should be added before approving this plan for the Tualatin TMDL. Based on the fact that Metro already has and is implementing an approved TMDL Implementation Plan for a basin with similar TMDL parameters, DEQ is reasonably assured that Metro will meet the TMDL implementation requirements for the Tualatin subbasin.

4.2.6.3 Urban Areas

DMA: Washington County, Clackamas County, Multnomah County, Cities of Portland, Lake Oswego, West Linn, Special District Clean Water Services, Metro
Jurisdiction: All urban and rural residential land uses within the Tualatin River Subbasin and Oswego Lake watershed

The cities and counties identified as DMAs under this TMDL were identified as DMAs in the previously issued Tualatin Basin TMDLs. Each of these DMAs has submitted TMDL Implementation Plans and progress reports in the past, so there is a high assurance that they will revise and update the existing plans in response to this TMDL revision.

DEQ encourages DMAs to work cooperatively with each other to address these requirements when it is advantageous to do so. That approach has been ongoing in the Tualatin Basin, as evidenced by the Tualatin Basin Public Awareness Committee, collaborative efforts on water quality monitoring, and other projects. DEQ believes that collaboration will enable local jurisdictions to accomplish more TMDL implementation at a lower cost than what communities would accomplish without collaboration.

DMA: Oregon Department of Transportation (ODOT)
Jurisdiction: Responsible for construction and maintenance of state roads, highways and bridges

As identified in Section 4.2.3.2, Oregon Department of Transportation (ODOT) holds an MS4 stormwater permit under DEQ that addresses most of the Tualatin Basin TMDL pollutants. This permit will be reviewed in 2012. In addition, ODOT is working closely with DEQ to develop a statewide TMDL Implementation Plan. This plan will address any pollutants that are not covered under the MS4 permit. These two programs combined will focus on managing TMDL pollutants associated with the operation, construction, and maintenance of ODOT roads, highways, and bridges. A Memorandum of Understanding (MOU) between ODOT and DEQ was signed in 2011, and ensures a proactive, collaborative, and adaptive manner whereby the TMDL management goals and requirements as defined in Oregon Administrative Rules (OAR, Division 42) will be met.

4.2.6.4 Resource Use

DMA: Oregon Department of Geology and Mineral Industries (DOGAMI)
Land Use: Aggregate mining activities
Plan Title: No Implementation Plan at this time
Status: Plan needs to be developed

DOGAMI's regulation of aggregate mines, many located in the flood plains of rivers, qualifies DOGAMI as a DMA. As with other state agencies that have been identified as DMAs, DOGAMI is required to submit an implementation plan but may work with DEQ to develop a statewide implementation plan. Many of the elements required in an implementation plan will likely be met through DOGAMI's implementation of the 1200A General Permit (for stormwater runoff), DOGAMI's Permitting Program and their Best Management Practices Manual. DOGAMI is already working on TMDL Implementation Plans for the Mollala-Pudding and Rogue Basins. These plans may be amended to address mining issues in additional basins or to address issues statewide. DOGAMI is already consulting existing TMDLs as they consider new permit applications. Based on these DOGAMI activities, DEQ is reasonably assured that DOGAMI will meet its' TMDL requirements for the Tualatin Basin.

DMA: Oregon Department of State Lands (DSL)
Jurisdiction: Public land and waterway management, removal-fill activities, wetland management, land leasing and mining activities

DSL administers the state's removal-fill permits and is responsible for leasing range and agricultural land and waterways for a variety of business activities. Many of the elements required in an implementation plan will likely be addressed through the implementation of existing regulatory programs and activities. As with other state agencies that have been identified as DMAs, DSL is required to submit an implementation plan but may work with DEQ to develop a statewide implementation plan.

4.2.6.5 Voluntary Measures

There are many volunteer opportunities through several organizations to improve environmental conditions and help restore water quality in the Tualatin Basin. The list below is not intended to be exhaustive, but does include many of the organizations that have and continue to conduct surveys to identify problem areas and solutions, solicit both grant funds and volunteer help to implement restoration projects, and provide educational resources for the public.

Organization: Tualatin River Watershed Council

Contact Information: <http://www.trwc.org/> Tualatin River Watershed Council, P.O. Box 338, Hillsboro, OR 97123-0338 Phone: (503) 846-4810 Email: trwc@easystreet.net

Program: The Tualatin River Watershed Council links land, water and people. They bring together all interests in the basin to promote and improve watershed health, and work together through cooperation, collaboration and communication.

Plan Titles: Watershed Analyses for: Upper Tualatin River and Scoggins Creek, 2000; Gales Creek, 1998; Dairy-McKay, 1999; Middle Tualatin-Rock Creek, 2001, Lower Tualatin 2001. Enhancement Plans: Lower Gales Creek Enhancement Planning: Geomorphic Assessment, 2006; Lower Gales Creek Habitat Enhancement Plan; Lower Gales Creek Enhancement Plan: Knotweed and Ivy Mapping and Report, 2006

Council Projects: Murtaugh Creek, Gales Creek, Moonshadow Park, Upper West Fork Dairy Creek

Organization: Clean Water Services

Contact Information: <http://www.cleanwaterservices.org/Residents/GetInvolved/default.aspx> Clean Water Services Administration Building Complex, 2550 Southwest Hillsboro Highway, Hillsboro, Oregon 97123, Phone: (503) 681-3600

Program: In addition to its' agency duties, Clean Water Services sponsors several volunteer efforts under its' 'Be a Clean Water Hero' citizen volunteer program by providing information and voluntary programs for several practices including tree planting, naturescaping, canines for clean water, and volunteering in the community.

Organization: Tualatin Riverkeepers

Contact Information: <http://www.tualatinriverkeepers.org/> Tualatin Riverkeepers, 11675 SW Hazelbrook Road, Tualatin, OR 97062, Phone: (503)218-2580, Email: info@tualatinriverkeepers.org

Program: Volunteer opportunities for restoration, educational information including sponsorship of a science and policy forum

Organization: Tualatin Hills Park and Recreation & Friends of Tualatin Hills Nature Park

Contact Information: <http://www.thprd.org/> Tualatin Hills Park & Recreation District, 15707 SW Walker Rd, Beaverton, OR 97006, Phone: (503)645-6433)

Program: Environmental Volunteering, Stewardship training, Links to local community groups Wildlife Preserve, Interpretive Center, Educational Opportunities

Organization: Fans of Fanno Creek

Contact Information: <http://www.fansoffannocreek.org/> Fans of Fanno Creek, P.O. Box 25835 Portland, Oregon 97225-0835 Email: info@fansoffannocreek.org

Program: Volunteers dedicated to the protection, restoration and enhancement of Fanno Creek and its tributaries

Organization: Friends of Trees

Contact Information: <http://www.friendsoftrees.org/> 3117 NE Martin Luther King Boulevard, Portland OR 97212, Phone: (503)282-8846

Program: Neighborhood Tree planting program and Greenspace Initiative, serves the Portland metropolitan area, including portions of the Tualatin sub-basin.

Organization: Rock Creek Watershed Partners

Contact Information: <http://www.cedarmill.org/RCWP/>, Amanda Wilson, Community Stewardship Coordinator, Americorps, PO Box 2152, Beaverton OR 97075 Email: awilson@rcwp.org, Phone: 503-629-6305 x2953

Program: The Rock Creek Watershed Partners is a coalition of the following Friends Groups: Friends of Beaverton Creek, Friends of Beaverton's Johnson Creek, Friends of Rock, Bronson & Willow Creeks, Cedar Mill Creek Watershed Watch, and the Skyline Ridge Neighbors Natural Resources Committee. Their mission is to preserve, protect, and restore streams in the Tualatin River basin by building the organizational capacity and providing support to stream friends, in order to build stewardship through individual, corporate, and community-based involvement in education, restoration, and monitoring.

Organization: SOLV

Contact Information: <http://www.solv.org/> SOLV, 5193 NE Elam Young Parkway, Suite B Hillsboro, OR 97124, Phone: 503-844-9571, Email: info@solv.org

Program: Oregonians volunteering to improve the environment and build a legacy of stewardship. Lots of volunteer opportunities for environmental and restoration projects in the Portland metro area, as well as education resources for project leaders and schools.

4.2.7 Monitoring and Evaluation

Monitoring and evaluation has two basic components: 1) monitoring the implementation activities of specific TMDL Implementation Plans identified in this document and 2) monitoring the physical, chemical and biological parameters for water quality. This monitoring information will provide a check on progress being made toward achieving the TMDL allocations and meeting water quality standards, and will be used as part of the adaptive management process described earlier in the document.

The objectives of these monitoring efforts are to demonstrate long-term recovery, to better understand natural variability, to track implementation of projects and BMPs, and to track overall effectiveness of TMDL implementation. This monitoring and feedback mechanism is a major component of the “reasonable assurance for success” for the Tualatin Basin WQMP.

DMA/RP Implementation Plans will be tracked by accounting for the numbers, types, and locations of projects, BMPs, educational activities, or other actions taken to improve or protect water quality. The mechanism for reporting DMA/RP implementation efforts will be through annual reports to be submitted to DEQ. DEQ will then track progress of TMDL implementation efforts across the basin.

The information generated by each of the DMAs/RPs gathering data in the Tualatin River Basin will be pooled and used to determine whether management actions are having the desired effects, or if changes in management actions and/or TMDLs are needed. This detailed evaluation will typically occur on a 5-year cycle. If progress is not occurring, then the appropriate DMA or RP will be contacted with a request for action, or if implementation is occurring but water quality goals are not being met, DEQ will work with the DMAs and RPs to review the anticipated water quality benefits, the implementation measures and the TMDL to determine whether and where adjustments to implementation should be made.

Tracking both water quality and DMA/RP activities has occurred in the Tualatin Basin since the first TMDL was adopted. Water quality monitoring has been a requirement under the MS4 and watershed NPDES permits issued since the 1988 Tualatin TMDLs were adopted. In addition, DMAs have reported annually on their activities. However monitoring in general has evolved over the years, fluctuating with available funding, such that detailed implementation information is not available for all tributaries and sectors in the Tualatin subbasin. DEQ plans to encourage better tracking in the future to improve the opportunities for adaptive management, allowing DMAs and RPs to more effectively utilize limited implementation funds.

4.2.8 Public Involvement

DEQ believes that public involvement is essential to any successful water quality improvement process. This can be accomplished in several ways. Permit renewals provide formal opportunities for public comment, as do procedures for adopting new rules at both the state and local level. The processes for rulemaking and developing local ordinances also include volunteer committees comprised of both technical and citizen advisory groups.

DMA's will determine how best to provide for public involvement based on their local needs and requirements, and must include public participation activities in their TMDL Implementation Plans. DEQ will also continue to promote public involvement through direct association and contact with existing groups that have an interest in the Tualatin River Basin TMDL, such as watershed councils, Agricultural Water Quality Management Act Local Advisory Committees, federal, state and local agencies, and others. As noted above in Section 4.2.3, TMDL implementation is a community-wide effort. Because we are all contributors to water quality problems, we each have some responsibility to participate in the efforts to improve water quality. TMDL implementation to-date has been largely successful in the Tualatin Basin, and this history has demonstrated that the Tualatin Basin community is actively engaged and committed to improving water quality in the Basin. That said, not all TMDL implementation projects have been completed basin-wide, so implementation will continue into the future.

4.2.9 Costs and Funding

The purpose of this element is to describe estimated costs and demonstrate there is sufficient funding available to begin implementation to address TMDL allocations and improve water quality. DMA's and RPs will be expected to provide a fiscal analysis of the resources needed to develop, execute and maintain the programs described in their TMDL Implementation Plans. Another purpose is to identify potential future funding sources for project implementation.

DEQ plans to estimate costs to attain water quality standards for each pollutant or strategy as DMA's and RPs estimate and report quantity of management measures needed to meet load allocations to DEQ.

There are currently several sources of local, state, and federal funds. The following is a partial list of assistance programs available to aid in water quality protection in the Tualatin River Basin.

<u>Program</u>	<u>Agency/Source</u>
Oregon Plan for Salmon and Watersheds	OWEB
Environmental Quality Incentives Program	USDA-NRCS
Wetland Reserve Program	USDA-NRCS
Conservation Reserve Enhancement Program (Enhanced)	USDA-NRCS
Stewardship Incentive Program	ODF
Access and Habitat Program	ODFW
Partners for Wildlife Program	USDI-FSA
Conservation Innovation Grants	ODA
Water Projects	WRD
Nonpoint-Source Water Quality Control (EPA §319)	DEQ-EPA
Bonneville Environmental Foundation	BPA

Grant funds are available for improvement projects on a competitive basis. Field agency personnel assist landowners in identifying, designing, and submitting eligible projects for these grant funds. For private landowners, the recipient and administrator of these grants may be a local organization such as the Soil and Water Conservation District or Watershed Council.

4.2.10 Citation of Legal Authorities

The implementation of TMDL waste load and load allocations and the associated implementation plans are generally enforceable by DEQ, other state and federal agencies, or local governments. It is envisioned that sufficient initiative exists to achieve water quality goals with minimal enforcement. Should the need for additional effort emerge, it is expected that the responsible agency will work with land managers to overcome impediments to progress through education, technical support or enforcement. Enforcement may be necessary in instances of insufficient action towards progress. This could occur first through direct intervention from land management agencies (e.g. ODF, ODA, Counties and Cities), and secondarily through DEQ. Enforcement by DEQ may be based on departmental orders to implement management strategies leading to attainment of water quality standards. Other legal authorities are listed below.

4.2.10.1 Clean Water Act Section 303(d)

Section 303(d) of the 1972 Federal Clean Water Act as amended requires states to develop a list of rivers, streams and lakes that do not meet water quality standards. Waters that need this additional help are referred to as “water quality limited” (WQL). WQL waterbodies must be identified by the EPA or by a state agency which has been delegated this responsibility by EPA. In Oregon, this responsibility rests with DEQ. DEQ updates the list of water quality limited waters every two years. The list is referred to as the 303(d) list. Section 303 of the Clean Water Act further requires that TMDLs be developed for all waters on the 303(d) list. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. The State of Oregon OARs require development of a WQMP to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL, which is designed to restore the water quality and result in compliance with the water quality standards. In this way, the designated beneficial uses of the water will be protected for all citizens.

DEQ is authorized by law to prevent and abate water pollution within the State of Oregon pursuant to the following statute:

ORS 468B.020 Prevention of pollution

- (1) Pollution of any of the waters of the state is declared to be not a reasonable or natural use of such waters and to be contrary to the public policy of the State or Oregon, as set forth in ORS 468B.015.
- (2) In order to carry out the public policy set forth in ORS 468B.015, the Department [DEQ] shall take such action as is necessary for the prevention of new pollution and the abatement of existing pollution by:
 - (a) Fostering and encouraging the cooperation of the people, industry, cities and counties, in order to prevent, control and reduce pollution of the waters of the state; and
 - (b) Requiring the use of all available and reasonable methods necessary to achieve the purposes of ORS 468B.015 and to conform to the standards of water quality and purity established under ORS 468B.048.

4.2.10.2 NPDES and WPCF Permit Programs

DEQ administers two different types of wastewater permits in implementing Oregon Revised Statute (ORS) 468B.050. These are: the NPDES permits for waste discharge into waters of the United States; and Water Pollution Control Facilities (WPCF) permits for waste disposal on land. The NPDES permit is also a federal permit and is required under the Clean Water Act. The WPCF permit is a state program. As permits are renewed, they will be revised to ensure that all 303(d) related issues are addressed in the permit.

4.2.10.3 401 Water Quality Certification

Section 401 of the CWA requires that any applicant for a federal license or permit to conduct any activity that may result in a discharge to waters of the state must provide the licensing or permitting agency a

certificate from DEQ that the activity complies with water quality requirements and standards. These include certifications for hydroelectric projects and for in-water 'dredge and fill' projects. The legal citations are: 33 U.S.C. 1341; ORS 468B.035 – 468B.047; and OAR 340-048-0005 – 340-048-0040.

4.2.10.4 Endangered Species Act, Section 6

Western steelhead are present in the Tualatin subbasin, and are listed as threatened under the federal endangered species act. Thus some activities in some locations of the basin may be regulated by the endangered species act. Section 6 of the 1973 federal Endangered Species Act (ESA) as amended encourages States to develop and maintain conservation programs for federally listed threatened and endangered species. In addition, Section 4(d) of the ESA requires that National Marine Fisheries Service (NMFS) list the activities that could result in a "take" or impairment to a species that is classified as threatened or endangered. NMFS has also described certain precautions that, if followed, would preclude prosecution for take even if a listed species were harmed inadvertently. Such a provision is called a *limit on the take prohibition*. The intent is to provide local governments and other entities greater certainty regarding their liability for take.

NMFS published their rule in response to Section 4(d) in July of 2000 (see 65 FR 42421, July 10, 2000). The NMFS 4(d) rule lists 12 criteria that will be used to determine whether a local program incorporates sufficient precautionary measures to adequately conserve fish. The rule provides for local jurisdictions to submit development ordinances for review by NMFS under one, several or all of the criteria. The criteria for the Municipal, Residential, Commercial and Industrial Development and Redevelopment (MRCI) limit are listed below:

1. Avoid inappropriate areas such as unstable slopes, wetlands, and areas of high habitat value;
2. Prevent stormwater discharge impacts on water quality;
3. Protect riparian areas;
4. Avoid stream crossings – whether by roads, utilities, or other linear development;
5. Protect historic stream meander patterns;
6. Protect wetlands, wetland buffers, and wetland function;
7. Preserve the ability of permanent and intermittent streams to pass peak flows (hydrologic capacity);
8. Stress landscaping with native vegetation;
9. Prevent erosion and sediment run-off during and after construction;
10. Ensure water supply demand can be met without affecting salmon needs;
11. Provide mechanisms for monitoring, enforcing, funding and implementing; and
12. Comply with all other state and federal environmental laws and permits.

4.2.10.5 Oregon Forest Practices Act

The Oregon Department of Forestry is the designated management agency for regulating land management actions on non-federal forestry lands that impact water quality. The Board of Forestry has adopted water protection rules, including but not limited to OAR Chapter 629, Divisions 635-660, which describes BMPs for forest operations. The Environmental Quality Commission, Board of Forestry, DEQ, and ODF have agreed in the MOA that these pollution control measures will be relied upon to result in achievement of state water quality standards.

ODF and DEQ statutes and rules also include provisions for adaptive management that provide for revisions to FPA practices where necessary to meet water quality standards. These provisions are described in ORS 527.710, ORS 527.765, ORS 183.310, OAR 340-041-0026, OAR 629-635-110, and OAR 340-041-0120.

4.2.10.6 Agricultural Water Quality Management Act

The Oregon Department of Agriculture has primary responsibility for control of pollution from agricultural sources. This is accomplished through the Agriculture Water Quality Management (AWQM) program authorities granted ODA under Agricultural Water Quality Management Act adopted by the Oregon State

Legislature in 1993 (Oregon Revised Statute 568.900-568.933). The Agricultural Water Quality Management Act directs the ODA to work with local communities to develop water quality management plans for specific watersheds that have been identified as violating water quality standards and have agriculture pollution contributions. The agriculture water quality management plans are expected to identify problems in the watershed that need to be addressed and outline ways to correct the problems. ODA and DEQ updated and signed a Memorandum of Agreement in May, 2012. This agreement states that area rules and plans be developed to achieve water quality standards and meet TMDL load allocations.

4.2.10.7 Local Ordinances

Local governments are expected to describe in their Implementation Plans their specific legal authorities to carry out the management strategies chosen to meet the TMDL allocations. Legal authority to enforce the provisions of a City's NPDES permit would be a specific example of legal authority to carry out management strategies.

4.3 Prioritizing Implementation Approaches

Nonpoint sources commonly contribute significant pollutant loads to Oregon's waterbodies. For example, over 35% of stream heating in the Tualatin tributaries is attributed to loss of shade in riparian zones. Phosphorus loads from erosion are also significant; and little of the bacteria pollution in the Tualatin Subbasin is attributed to discharges from point sources, the remainder is attributed to nonpoint sources. With multiple pollutant sources spread across the subbasin, it can be difficult to determine where to place pollution abatement efforts in order to see the greatest improvements in water quality. The long history of TMDLs and related efforts to improve water quality in the Tualatin make additional implementation more challenging, as the larger, easier projects may already have been implemented, leaving smaller pollutant sources that are more widespread across the basin.

In addition to considerations about where to implement projects, considerable thought should be made regarding what actions should be taken to address pollutant sources. Some actions may improve water quality in one aspect, while detracting from water quality in another. For example, land applying discharges can remove a source of warm water from a stream and thereby lower nearby water temperature. However, this action will also decrease stream volume; stream volume contributes habitat as well as increasing stream mass. With less instream water, downstream solar heating may be more effective resulting in higher stream temperatures. Thus removing a warm discharge could end up increasing temperatures downstream above that caused by the discharge. Similarly, changing operations to store cold water in reservoirs throughout the summer for later fall discharge could impact summertime water quality. For example, currently flow augmentation cools summer water temperatures, and provides dilution for phosphorus and ammonia. If storing water longer makes less water available during summer, water quality could suffer between July and September.

A good example of balancing impacts and benefits in the Tualatin basin is Clean Water Services Trading program. Instead of constructing large scale chillers to cool CWS discharge, CWS entered into a trading program, establishing 35 or more miles of riparian shade along the Tualatin River and its' tributaries upstream of the waste water treatment plants, and providing summertime augmentation flows to the Tualatin River. This program has addressed river heating with efforts to cool water throughout the basin, in place of constructing and operating a refrigeration system that would use significant energy resources to lower discharges of waste water that affect a limited riverine reach. This history of careful consideration and creative alternatives should continue to serve the Tualatin basin in the future.

TMDL allocations are written to address pollutants individually, but the environment reacts in a holistic way. DEQ encourages DMAs/RPs to consider all impacts and factors as they develop TMDL implementation plans. DEQ understands that some impacts may be addressed only with major construction projects, and will require both time and financing for implementation. In cases where large scale projects are the only option, DEQ expects DMAs/RPs to consider all impacts, and to develop implementation plans that adopt the best interim actions possible while planning for the long-term solutions.

Much work has already been done in the Tualatin subbasin to address water pollution. However, not all of the streams in the basin meet the TMDL targets for temperature, total phosphorus and bacteria, and many opportunities remain to address sources of these pollutants. DEQ encourages DMAs, RPs, and those undertaking voluntary efforts to improve water quality to prioritize both the actions and the timelines for taking action. At a minimum, the following factors should be considered in developing a prioritization scheme for these efforts:

- Benefits to water quality
- Economic costs of efforts
- Length of time project may take to produce benefits
- Balance potential water quality benefits with potential detriments caused by the action
- Where to focus efforts
- Community Involvement and support
- Environmental Justice
- Regulatory requirements

Benefits to WQ:

DEQ supports efforts to prioritize implementation strategies and actions based on achieving WQ standards for TMDL parameters. However, there are often many ways to achieve the water quality targets. DEQ encourages stakeholders to look at and compare multiple strategies, and to consider implementing strategies that are comparatively easy, but still offer improvements. These should also be evaluated based on additional prioritization factors below. Here are some questions to consider while examining water quality benefits:

- Is the strategy or approach effective at addressing a TMDL parameter?
- Does the approach address more than one TMDL parameter?
- What are the estimated extent, magnitude, and duration of the implementation impact?
- Is the restoration impact seasonal?
- Are there benefits to other water quality parameters, aquatic habitat or terrestrial habitat?
- Can the approach be detrimental to other WQ parameters?
- Can the approach be detrimental to the environment?

Economics:

Economics are not a reason for avoiding implementation, but project costs should be an important factor in deciding what actions to take, and how to stage actions that will benefit water quality. In order to optimize water quality benefits it makes sense to select approaches that have high cost benefit ratios. It is also important to characterize and evaluate both the costs and the efficacy of projects as well as comparing the implementation of widespread less expensive approaches to one or a few large sources. Here are some considerations:

- What financial costs are involved?
- What are the economic benefits of restored ecosystem services?
- What is the cost/benefit ratio? Some expensive approaches may have a much greater benefit, or benefits that are longer lasting, justifying the cost
- Among approaches that will meet WQ standards, or provide the most WQ improvement, consider all environmental benefits, not just improvements to the TMDL parameter.

Length of time to achieve benefit:

For pollutants such as temperature, it may take a long time for implementation strategies to address the source of heat. Planting shade trees in the riparian zone is a common practice to address stream heating, and it can take years for shade to establish. For other actions, planning and funding may take more time than actual implementation.

- How long will it take for the approach to be implemented?
- How long will it take to see water quality improvement?
- How long will it take to meet the water quality standard or TMDL allocation?
- How does the approach compare to other alternatives (i.e. establishing shade versus adding water instream)?
- How long will the benefit last?

Where to focus efforts and select approaches:

Basins are large and impairments are widespread. DMAs, RPs and voluntary groups will need to prioritize areas that should be addressed and actions that should be implemented. In addition to assessing the benefits to water quality, costs and timing before water quality improvement is noted, implementation planning should include an assessment of the following:

- Where in the watershed to prioritize restoration (For example, vegetation restoration in tributaries and headwaters may have a larger impact on temperature than downstream projects, but downstream locations might restore critical fish habitat, and impact a larger proportion of the fish population)?
- Should the projects be based on level of impairment? Consider that severely degraded areas may have higher priority for restoration; but these efforts may compete for resources with efforts to expand quality habitat, or other projects prioritized using different criteria.
- Should priorities be selected based on protecting and expanding quality areas?
- Priorities should balance potential benefits and detriments.
- How should the benefits of restoring adjacent parcels for continuity be prioritized?
- Are there additional benefits of creating wildlife corridors between patches?

These questions are offered to assist in full consideration of project options. There are no right or wrong answers to the above considerations; the approaches will differ in each case.

Community Involvement and Support:

Community support for TMDL implementation activities can be key factors in supporting and maintaining projects. Community support for actions that are publicly funded may influence which actions are successfully implemented. Local support within the community for actions on privately owned land can become a key factor in convincing others to adopt implementation activities on their own land. Some things to consider:

- Is there greater community support for some approaches than others?
- Is there greater community support for some project locations more than others?
- Could the demonstration of some pilot projects assist in nurturing local support?
- Can the project costs be modified, staged over time, or better explained to increase community support?
- Can some projects be modified to offer additional benefits and thus obtain greater support?

Environmental Justice:

Environmental justice has been defined by the U.S. Environmental Protection agency as "... the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work." TMDL implementation projects may be one way to improve on factors that contribute to environmental injustice. Some factors to consider while determining whether environmental justice can be improved by TMDL implementation projects are:

- Are there minority populations in the basin who experience a greater impact from water quality impairment than other populations in the basin?

- Are there TMDL Implementation projects that can directly improve water quality, especially with respect (but not limited) to TMDL parameters, in these areas of the basin?
- Are there particular aquatic resources, such as fish species, fishing or swimming locations, etc., that can be targeted by TMDL implementation projects, and thus improve both water quality and environmental justice?

Regulatory Requirements:

TMDLs are in fact regulatory requirements to improve water quality. Thus, while this section has discussed several factors to consider in prioritizing TMDL implementation actions, actions must be taken to remain in compliance with the federal Clean Water Act as well as state law. However, other regulatory considerations should also be made in prioritizing TMDL implementation actions. TMDL implementation actions that involve construction, or in-water restoration or other work may trigger the need for permits from local, state, or federal agencies. Some questions to consider in project planning and prioritization include:

- What permits are needed (local, county, special district, state, or federal)?
- Are other permissions needed from any sources (i.e. landowners, rights of way for access, etc)?
- What will permit costs be?
- How long will it take to acquire necessary permits?
- What information is needed to apply for permits? Is it available, or will it take more time and resources to obtain the additional information?
- Will permit requirements place conditions on how the project is implemented, or its' design features?

DEQ hopes that the above “checklist” of topics to consider will assist DMAs and RPs in planning implementation projects. The checklist is also intended to help planners identify areas for collaboration, as well as areas of potential conflict. DEQ hopes that by identifying potential social or environmental conflicts during the planning phase will assist DMAs/RPs and any others endeavoring to implement projects to work through the conflicts, and identify solutions that work for all.

4.4 Trading

4.4.1 Trading as a Management Strategy

Water quality trading is one approach that may be used to achieve water quality goals more efficiently. Trading programs allow regulated parties to meet their obligations by purchasing environmentally equivalent or greater pollution protection from a different point or nonpoint source. Trading can be a cost-effective alternative to conventional approaches to achieving compliance with water quality objectives. Trading may also allow a subbasin to achieve water quality improvements more quickly than what is possible with conventional approaches. Trading allows DEQ and stakeholders to look at a watershed holistically. This is important, since the best opportunities for improving water quality and watershed health are not always located at point source outfalls. There may also be ancillary benefits to trading such as the restoration of riparian areas and wildlife habitat.

DEQ encourages and supports trading where it will result in a greater benefit to the environment than might be achieved via a conventional regulatory approach. DEQ currently has an Internal Management Directive (IMD) on Water Quality Trading (DEQ 2009). The purpose of the IMD is to provide a consistent framework within which trading opportunities can be pursued and implemented and to identify key features of acceptable trades. DEQ's IMD was based in part on the 2003 Water Quality Trading Policy developed by EPA (EPA 2003) and DEQ's experiences to date with trading in Oregon, in particular the authorized temperature and dissolved oxygen trading program in the Tualatin River Subbasin. The IMD provides direction to staff on acceptable water quality trades between and among point sources and nonpoint sources, but does not contain requirements of rule or statute.

The 2005 Watershed Permit for Clean Water Services included trades for temperature and oxygen-demanding pollutants. The temperature trade was accomplished using two management strategies. Clean Water Services released augmentation flows of water stored under their water rights from Henry Hagg Lake and Barney Reservoir, primarily from July through September. Average summer augmentation flow rates were 45 cfs. Clean Water Services also arranged for riparian habitat enhancement in the form of increased shade along 35 creek miles within the Tualatin Basin. Clean Water Services hired crews to restore riparian zones in urban areas, and provided supplemental funding to the Tualatin Soil and Water Conservation District so they in turn could provide incentives to farmers who replaced crop land with riparian habitat. These activities were outlined in the permit's Temperature Management Plan, and progress was tracked in annual reports. The Temperature Management Plan and annual reports were submitted to DEQ for approval on a time frame set out in the 2005 NPDES Watershed Permit. Thus all trading activities were closely tracked, and were enforceable conditions of the Permit.

The Watershed Permit also allowed summertime trading of oxygen-demanding pollutants (Ammonia and CBOD₅, the five-day chemical and biological oxygen demand) between the two Clean Water Services discharge locations. This kind of trade fits well with a bubble allocation; an allocation that identifies a total wasteload limit for a waterbody, but allows the individual discharge loads from sources to vary as long as the sum of the loads is equal to or less than the total wasteload allocation. The oxygen-demanding parameter trade was never implemented; each Advanced Waste Water Treatment Facility was able to remain within its own discharge limits so trading between them was never necessary. However, with the future addition of summertime discharges at upstream sources and anticipated growth, trading for oxygen-demanding pollutants remains an option described in the TMDL, and will likely be included in future Watershed Permit versions.

DEQ anticipates continued trading to enable Tualatin Basin sources to meet their wasteload allocations for temperature, total phosphorus and ammonia. As noted above and in DEQ's Water Quality Trading in NPDES Permits Internal Management Directive, DEQ encourages trades for several reasons, mainly centered around increased environmental benefit at lower treatment cost. Clean Water Services has already established and implemented a temperature trading program that they plan to continue in the future. Other sources may choose to establish their own trading program, or to participate in Clean Water Services Trading Program as a way to meet their wasteload allocations.

Nutrient trading programs have been established in other states, but to date have not been implemented in Oregon. The Phosphorus TMDL amendment accommodates trading between waste water treatment facilities discharging to the Tualatin River, by providing a bubble allocation for the three upstream facilities. The loads of all three discharges must not exceed the bubble load. In addition, the concentration-based limits set out in the 2001 phosphorus TMDL still apply to the more downstream Rock Creek Facility ensuring protection of water quality in the lower Tualatin River.

The Ammonia TMDL amendment includes the option for inter-plant trading of ammonia and oxygen-demanding pollutants that was allowed in the 2005 Watershed Permit. Here too, a bubble allocation is presented to include future upstream discharges at Forest Grove and Hillsboro. As with the total phosphorus TMDL, the 2001 wasteload allocation must be met in the lower river reach which is the most sensitive to algal blooms and dissolved oxygen sags.

While pollutant trading to date in the Tualatin Basin has been implemented only by Clean Water Services, pollutant trading is an option for any Tualatin source, both point and non-point, to meet their wasteload and load allocations. Trades must be approved by DEQ, and must meet certain requirements. DEQ's Water Quality Trading in NPDES Permits Internal Management Directive outlines many of DEQ trading policies, and DEQ will consider most proposed trades. However, DEQ will not consider trades for bacterial pollution. In addition, basic minimum requirements must be met, and cannot be considered part of a trade. These requirements include things such as the federal wastewater treatment requirements, and nonpoint source requirements such as riparian zone protections set out in the Oregon Forest Practices Act and the Department of Agriculture Rules. Trading to meet thermal allocations using riparian shade must occur in the Tualatin Subbasin watershed where anadromous salmonid use occurs, and will

follow a prioritization scheme approved by DEQ. Trades that include flow augmentation must also occur within the Tualatin Subbasin watershed, but are not restricted to the mainstem Tualatin River. Details regarding trading credit for augmented tributary flow will be determined in a DEQ-approved Temperature Management Plan.

4.5 References

DEQ, 2009. Water Quality Trading in NPDES Permits Internal Management Directive. <http://www.deq.state.or.us/wq/pubs/imds/wqtrading.pdf>

EPA, 2003. Final Water Quality Trading Policy. <http://www.epa.gov/owow/watershed/trading/tradingpolicy.html>

Groom, J.D., L. Dent, L.J. Madsen. 2011(a). *Stream temperature change detection for state and private forests in the Oregon Coast Range*. **Water Resources Research**, **47**:W01501, 12 pp.

Groom, J.D., L. Dent, L.J. Madsen, J. Fleuret. 2011(b). *Response of western Oregon (USA) stream temperatures to contemporary forest management*. **Forest Ecology and Management**, **262**:1618-1629.

ODF, 2003. Riparian Function and Stream Temperature: Effectiveness of Oregon Department of Forestry's Protection Rules and Strategies. ODF Forest Practices and State Forests Study Approach Version 2.2: February 2003. <http://egov.oregon.gov/ODF/privateforests/docs/RipStreamProposal.pdf>

Sullivan, A.B. and Rounds, S.A. 2006. Modeling Water Quality effects of structural and operational changes to Scoggins Dam and Henry Hagg Lake, Oregon. U.S. Geological Survey Scientific Investigations Report 2006-5060. 36pp.

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