Excerpt from

Revised Willamette Basin Mercury TMDL

Draft for Public Comment

July 3, 2019

Chapters 13 and 14 from the public comment draft.

For the entire draft TMDL, please visit
https://www.oregon.gov/deq/wq/tmdls/Pages/willhgtmdlac2018.aspx

13. Water Quality Management Plan

13.1. Introduction

This draft WQMP developed by DEQ provides the framework for describing management efforts that will be put into action to attain the Willamette Basin Mercury Total Maximum Daily Load. This framework builds upon existing point and nonpoint source implementation plans to outline a management approach for reducing mercury from all land uses in the basin.

Oregon Administrative Rules (OAR 340-042-0040(4)(I)(G)) require DEQ to identify persons, including Designated Management Agencies that are responsible for implementing management strategies and sector-specific or source-specific implementation plans. A DMA is "a federal, state or local governmental agency that has legal authority of a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL" (OAR 340-042-0030(2)). See a complete list of DMAs and responsible persons in Appendix E: List of designated management agencies and responsible persons.

The WQMP includes a description of activities, programs, legal authorities and other measures for which DEQ and DMAs have regulatory authority. The WQMP also includes a description of how other responsible persons are expected to implement activities and programs that will help to achieve the TMDL.

13.1.1 Implementation plans

Following the issuance of a TMDL and WQMP, DEQ requires most DMAs and responsible persons to develop implementation plans that identify specific management strategies and actions that will be implemented in order to meet water quality standards over time. For DMAs and responsible persons associated with nonpoint sources of pollutants, these implementation plans may be called different names. For example, implementation plans for the Bureau of Land Management and the U.S. Forest Service are called Water Quality Restoration Plans. The Oregon Department of Agriculture uses Agricultural Water Quality Management Area Plans to meet most requirements of an implementation plan.

Per OAR 340-042-0040(4)(l)(I) the WQMP must provide a schedule for submittal of implementation plans. DEQ typically gives DMAs and responsible persons 18 months to submit new or updated implementation plans following the issuance of a TMDL and WQMP. For this WQMP, DEQ will continue using the 18-month time frame for implementation plan submittal. Implementation plans must be posted to a publicly accessible website, unless the DMA does not have a website. DEQ reviews the plans in accordance with regulations in OAR 340-042-0080(4):

(a) Prepare an implementation plan and submit the plan to the Department for review and approval according to the schedule specified in the WQMP. The implementation plan must:

A. Identify the management strategies the DMA or other responsible person will use to achieve load allocation and reduce pollutant loading;
   a. Provide a timeline for implementing management strategies and a schedule for completing measurable milestones;

b. Provide for performance monitoring with a plan for periodic review and revision of the implementation plan;
c. To the extent required by Oregon Revised Statute 197.180 and OAR chapter 340, division 18, provide evidence of compliance with applicable statewide land use requirements, and;
d. Provide any other analyses or information specified in the WQMP.

(b) Implement and revise the plan as needed.

In addition, implementation plans must provide an estimate of the technical and financial resources needed, associated costs, and the sources and authorities that will be relied upon to implement the plan.

For point sources, wasteload allocations and/or other management strategies identified in the TMDL and WQMP will be incorporated into renewed NPDES permits as enforceable provisions.

Following the issuance of the TMDL, DEQ may make a determination that nonpoint source implementation plans are not necessary for certain DMAs and responsible persons. In those cases, DEQ will provide a written determination to the DMA or responsible person of why a plan is not necessary. This determination will be based on deminimis mercury loads associated with these DMAs or responsible persons.

13.1.2 Adaptive management

The federal Clean Water Act and associated Oregon Water Quality laws and implementing regulations require water quality standards to be met over time. In some cases, responsibility may depend on practicability, but in any event DEQ typically requires that all feasible steps be taken toward achieving the highest quality water attainable. This is a long-term goal in many watersheds, particularly where nonpoint sources of pollution are the main concern and significant landscape alterations are needed.

TMDLs are numerical allocations of pollutants that are set so that instream water quality standards are met. This TMDL includes values calculated from mathematical models and other analytical techniques designed to simulate and/or predict very complex physical, chemical and biological processes of mercury release and transport in the Willamette Basin. DEQ used models and techniques that incorporate large amounts of water quality and land use data and information specific to the Willamette Basin. However, in order to evaluate these processes on this scale, the models and techniques used simplify these complex processes and inherently contain a distribution of uncertainty concerning how streams and other waterbodies will respond to various management measures. For this reason, the TMDL is required to contain a margin of safety.

WQMPs are plans designed to reduce pollutant loads to meet TMDLs. DEQ recognizes that it will take time before management practices identified in a WQMP are fully implemented and effective in reducing and controlling pollution. In addition, DEQ recognizes that technology and practices for controlling nonpoint source pollution will continue to develop and improve over time. As implementation, technology and knowledge about these approaches progress, DEQ will use adaptive management to refine implementation. Figure 13-1 provides a conceptual representation of the adaptive management concept.

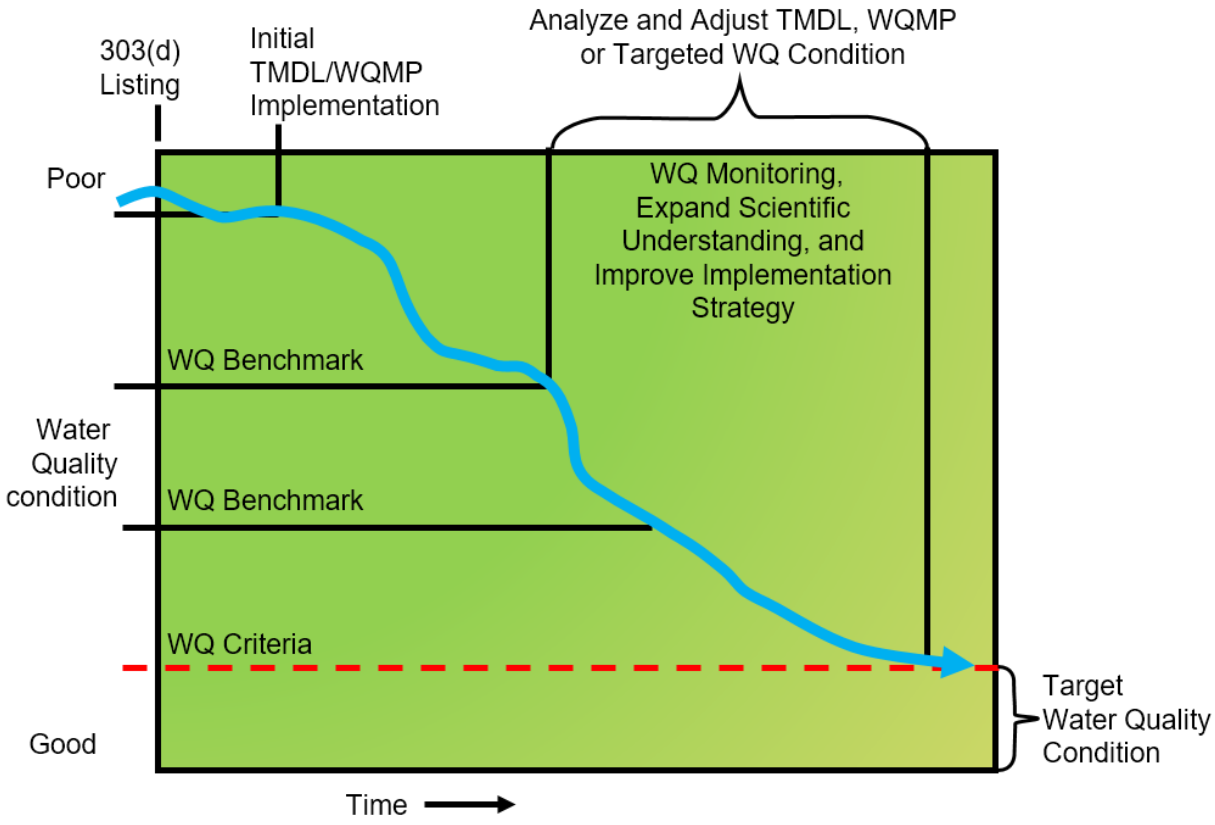

Figure 13-1. Conceptual representation of adaptive management. The estimated timeline for achieving water quality standards is multiple decades.

DEQ also recognizes that despite best efforts, natural events beyond the control of humans may interfere with or delay attainment of the TMDL. Such events include, but are not limited to, floods, fire, insect infestations, and drought.

If a source is not given an allocation, it does not necessarily mean that a source is prohibited from discharging any wastes. DEQ may permit a point source that is not covered by an allocation to discharge if the holder either can adequately demonstrate that the discharge will not impact the pollutant in question, or that the discharge is covered by reserve capacity.

If a nonpoint source DMA or responsible person complies with its implementation plan, DEQ will consider them in compliance with the TMDL. DEQ has the following general expectations and intentions for using an adaptive management approach for the TMDL and WQMP:

- Every five years, DEQ will review the progress of the TMDL and the WQMP. Where DEQ determines that implementation plans or effectiveness of management strategies are inadequate, DEQ will require DMAs and responsible persons to revise the components of their implementation plans to address these deficiencies.
- In conducting this review, DEQ will evaluate the progress towards achieving the TMDL and water quality standards and the success of implementing the WQMP.

- DEQ expects that each DMA and responsible person 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. This information is typically provided in an annual report and/ or five year review report. Please see section 13.4 for more information on annual reporting and the five year review.

If DEQ determines that all appropriate measures are being taken by DMAs and responsible persons and water quality standards will still not be met, DEQ may take one of several actions depending on the information available. For example, DEQ may conduct a use attainability analysis if the current designated beneficial use of a waterbody cannot be met. In addition, DEQ may also consider reopening and modifying the TMDL, subject to available resources, if new information showed that the TMDL or associated surrogates should be modified.

13.2. Elements of the Water Quality Management Plan

OAR 340-042-0040(4)(l) describes WQMP requirements. This section provides the framework of management strategies to attain and maintain water quality standards. The framework is designed to work in conjunction with detailed plans and analyses provided in sector-specific or source-specific implementation plans.

This section presents an overview of each element of the WQMP. Additional detail on each element is provided in the sections that follow.

13.2.1 Condition assessment and problem description

As noted in OAR 340-042-0040(4)(l)(A), WQMPs must contain an assessment of conditions and description of the problem the TMDL is developed to address. Fish tissue and water samples were collected from the Willamette Basin and analyzed for mercury. The data indicated several segments of the Willamette River and its tributaries are not meeting water quality standards. Based on Oregon's assessment methodology for the Integrated Report these waterbodies were identified as impaired and included on the state's 303(d) list. Oregon's 2012 Integrated Report contains the most recent listings relative to mercury for the Willamette Basin.

The Oregon Health Authority is responsible for evaluating contaminant concentrations in fish tissue, calculating the number of meals per month that can safely be consumed, and providing that information to the public by issuing a fish consumption advisory when data are available. DEQ helps to support this process by collecting and analyzing fish tissue samples and sharing these data with OHA. EPA and the National Parks Service also provide fish tissue data to OHA.

Advisories are designed to protect the public from contaminants sometimes found in fish, while also balancing the positive health benefits from eating fish. Information regarding fish consumption advisories can be accessed on OHA's website: https://www.oregon.gov/oha/pages/index.aspx.

There are multiple fish consumption advisories for the Willamette Basin advising people of the health risks associated with consuming fish containing elevated levels of mercury. Currently, fish consumption advisories in place for mercury include:

- Bass in all Oregon waters;
- All resident fish (except stocked, fin-clipped rainbow trout 12-inches or less) in the Dorena and Cottage Grove Reservoirs; and

- Resident fish in the mainstem Willamette River from its mouth on the Columbia River southward to Eugene, including the Coast Fork Willamette up to the Cottage Grove Reservoir.

These fish consumption advisories for mercury in the Willamette Basin and several 303(d) listings for mercury impaired waters support the need for additional mercury reductions in order to restore the beneficial use of “fishing”, and being able to safely eat fish. Table 4-1 contains the 303(d) listed waterbodies addressed in this TMDL.

The TMDL and accompanying WQMP demonstrate how Oregon will meet standards for total mercury in water and methylmercury in fish tissue, as well as the narrative water quality standard for toxic pollutants. The fish tissue methylmercury standard is 0.040 milligrams methylmercury/kilogram of fish tissue. Data indicate that the freshwater acute criterion for mercury of 2.4 micrograms/liter and the freshwater chronic criterion is 0.012 micrograms/liter of water are currently being attained.

13.2.2 Goals and objectives

Another required component of the WQMP is a section on goals and objectives, as described in OAR 340-042-0040(4)(l)(B). The overarching goal of this WQMP is to achieve the water quality standards for mercury in the Willamette Basin over time. Oregon has a mercury water standard to protect aquatic life, a methylmercury standard measured in fish tissue, and a narrative water quality standard for toxic chemicals (Section 13.2.1). The fish tissue standard, if not exceeded, protects those who consume up to approximately 23 eight ounce servings of fish or shellfish every month from Oregon lakes and streams. The primary objective of this WQMP is to lay out a framework that describes who is responsible for implementing the TMDL, management efforts that will be put into action in order to meet the TMDL, and how to measure progress towards attaining water quality standards for mercury.

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 DMAs and responsible persons. Many DMAs and responsible persons 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 mercury TMDL allocations.

13.2.3 Identification of designated management agencies and responsible persons

Identification of DMAs and responsible persons is required in the WQMP, as noted in OAR 340-042-0040(4)(l)(G). The purpose of this element is to identify responsible persons and Designated Management Agencies that are responsible for implementing the Willamette Basin Mercury TMDL. DMAs are federal, state and local governmental agencies that have legal authority over an activity or source contributing pollutants. DMAs are identified as such by the Department of Environmental Quality in a TMDL. A responsible person is an entity identified in a TMDL that has responsibility to meet assigned allocations and/or surrogate measures. DMAs and responsible persons are responsible for implementing management strategies and developing and revising sector-specific or source-specific implementation plans, unless otherwise indicated in the WQMP

Responsible persons may not have governmental (regulatory) authority to develop ordinances or other legal controls over activities. However, responsible persons identified in a WQMP may

cause or contribute pollutant loading and have direct control over land or water management activities affecting mercury loading to rivers and streams.

TMDL implementation responsibilities will be carried out through existing regulatory and non-regulatory programs and activities for DMAs and responsible persons.

DMAs and responsible persons are required to develop or revise TMDL implementation plans that describe the management measures they will take to achieve their load allocations (Section 13.3). See Appendix E: List of designated management agencies and responsible persons for a complete list of DMAs and responsible persons named in the Willamette Basin Mercury TMDL. is not intended to be an exhaustive list of every entity that bears responsibility for improving water quality in the Willamette Basin. All citizens that live, work and recreate in the Willamette Basin can take steps to reduce mercury and protect water quality. It will take broad participation to accelerate water quality improvements throughout the basin.

13.3. Proposed management strategies

This section of the plan describes management measures, as required in 340-042-0040(4)(l)(C), to reduce loadings of mercury to Willamette Basin waterbodies to meet TMDL load and wasteload allocations. It is organized by nonpoint and point source DMAs and responsible persons. For some of the DMAs, DEQ included a list of management measures as an implementation or “good practice” baseline. The list is not intended to be comprehensive or prescriptive and DMAs and responsible persons may propose alternative approaches or management strategies.

Following the issuance of the 2006 Willamette Basin TMDL and WQMP, DEQ required individual DMAs and responsible persons to develop implementation plans that included specific management strategies and best management practices to meet load allocations for mercury. Reporting requirements for many of these DMAs and responsible persons included an annual progress report and a comprehensive assessment of activities every five years. Summaries and reports of implementation activities since the issuance of the 2006 TMDL are summarized below (Table 13-1).

All DMAs and responsible persons named in this TMDL will be required to either update or develop mercury reduction strategies and milestones as identified in Section 13.3.1. In addition, riparian protection practices identified in the 2006 Willamette Basin **Temperature** TMDL are complementary to runoff, sediment and erosion management strategies contained in this WQMP for mercury. Together, these practices will provide a comprehensive approach to mercury pollution reduction. Existing information related to DMAs’ TMDL implementation efforts is available on DEQ’s websites below. Implementation plans and reports are also available on DMA websites**.**

Table 13-1. TMDL implementation reports and summaries

DMA	TMDL Report	Information available on DEQs website
Oregon Department of Agriculture	Biennial Agricultural Water Quality Management Area Plans	https://www.oregon.gov/deq/wq/programs/wqstatustrends

DMA	TMDL Report	Information available on DEQs website
Oregon Department of Environmental Quality	Biennial Agricultural Water Quality Status and Trends Analysis	
Oregon Department of Environmental Quality	Willamette Basin TMDL Five Year Review: DMA Implementation 2008 - 2013	https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Implementation.aspx
Oregon Department of Environmental Quality	Oregon Nonpoint Source Pollution Program Annual Report	https://www.oregon.gov/deq/wq/programs/Pages/Nonpoint.aspx
Urban and Rural DMAs	TMDL annual progress report	Some DMAs provide a copy of their annual report and five year review report on their city or county website. These reports are also available from DEQ through a public records request. Public records request information: https://www.oregon.gov/deq/Requesting-Public-Records
Urban and Rural DMAs	TMDL five year review report	

13.3.1 Management strategies for nonpoint sources and water protection programs

As required in OAR 340-042-0040(4)(l)(E), the following section describes management strategies for nonpoint sources that will protect water quality. The section is arranged to include DMAs and responsible parties by state agencies, local governments, federal agencies and special districts.

13.3.1.1 Oregon Department of Environmental Quality Nonpoint Source

DEQ has the responsibility of overseeing and implementing Oregon's Nonpoint Source Management Program Plan. A nonpoint source of pollution is any pollution entering a waterbody that does not come directly from a discrete conveyance. Nonpoint sources are not normally covered by NPDES permits. The goal of DEQ's Nonpoint Source Management Program is to reduce water pollution from nonpoint sources, in order to meet water quality standards. The nonpoint source program is implemented by coordinating with many local, state and federal agencies and organizations throughout Oregon. The program uses a combination of federal and state programs for implementing statewide, programmatic, and geographic priorities, objectives, and strategies to achieve short- and long-term goals. Program requirements include tracking and reporting on implementation actions and water quality outcomes from these activities in Oregon's Nonpoint Source Annual Report submitted to EPA, which can be accessed on DEQs website https://www.oregon.gov/deq/wq/programs/Pages/Nonpoint.aspx.

Oregon's Nonpoint Source Management Program is an important part of the state's water pollution control programs because for many pollutants, nonpoint sources of pollution are the major sources of pollution to a waterbody. A summary of DEQ programs that have the potential to reduce nonpoint source mercury loading in the Willamette Basin is provided Table 13-2.

Table 13-2. Summary of DEQ programs that have the potential to reduce mercury loading in the Willamette Basin.

DEQ NPS Program	How it Protects/ Supports Water Quality
Nonpoint Source TMDL Implementation Program	Outlines and implements management goals, projects, and water quality monitoring for pollutant reductions that are needed in order meet Oregon's water quality standards, including mercury and methylmercury.
Onsite Program	Protects human health and the environment by establishing requirements for the construction, alteration, repair, operation and maintenance of onsite wastewater treatment systems.
Clean Up Program	Protects human health and the environment by identifying, investigating, and remediating sites contaminated with hazardous substances, including mercury.
Nonpoint Source 319 Grant Program	The 319-grant program funds cooperating entities for activities that address NPS emphasizing watershed protection and enhancement, watershed restoration, voluntary stewardship, and partnerships among watershed stakeholders, such as DEQ's Pesticide Stewardship Partnership. This includes alignment with significant match funding provided through the Oregon Watershed Enhancement Board (OWEB)'s parallel granting programs.
Clean Water State Revolving Fund	SRF loans finance a variety of nonpoint source water quality plans and projects. Eligible activities include integrated and stormwater management plans, establishing or restoring permanent riparian buffers and floodplains and daylighting streams from pipes.

13.3.1.2 DEQ Cleanup Program—Abandoned Mine Lands Sites

The Cleanup program includes a number of subprograms, including Site Assessment (for a complete list of subprograms visit https://www.oregon.gov/deq/Hazards-and-Cleanup/env-cleanup/Pages/default.aspx). Site Assessment is responsible for screening abandoned mine lands sites to determine which sites may be having significant impacts to the environment. Within the Willamette Basin there are 12 abandoned mine lands sites that were identified as significant sources of mercury, as shown in Table 9-2 of the Source Assessment Section above. These sites represent legacy mines that were in operation prior to Oregon's 1972 Oregon Mined Land Reclamation Act, and are now considered sources of "uncontrolled hazardous substances." These sites are subject to statutes and rules administered by the Cleanup program (ORS 465; OAR 340.122).

Between 2000 and 2004, the Cleanup program collaborated with EPA, the federal Bureau of Land Management and the US Forest Service to perform preliminary assessments of all abandoned mine lands sites in Oregon. Since that time, agency partners have completed site investigations, evaluations of potential cleanup levels and actions (feasibility studies), and the removal or treatment of contaminated materials. For up to date information visit DEQ's Environmental Cleanup Site Information database at https://www.deq.state.or.us/lq/ECSI/ecsiquery.asp.

13.3.1.3 DEQ Cleanup Program—Portland Harbor Superfund Source Control

Portland Harbor is a heavily industrialized stretch of the Lower Willamette River north of downtown Portland, from Sauvie Island south to the Broadway Bridge. EPA listed Portland

Harbor on the National Priorities List, known as Superfund, in December 2000 due primarily to contaminated sediment.

EPA, DEQ and other agencies, tribal governments, community groups and companies are working to investigate and clean up contamination in Portland Harbor. EPA is the lead agency responsible for investigating and cleaning up contaminated sediments in the river, while DEQ is the lead agency for investigating and cleaning up contamination on upland sites.

Although EPA and DEQ identified mercury as a contaminant of concern in this area, additional data and investigations to date show that mercury levels alone do not warrant active cleanup of particular sediment areas. However, upland remediation and planned in-water cleanup necessary for dioxins, pesticides, metals, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons will also address some areas with mercury contamination. DEQ and EPA will be monitoring for mercury and relying on natural recovery to reduce concentrations in sediment and fish tissue. EPA established a cleanup level for mercury in fish tissue at 0.031 mg/kg. Additional information about Portland Harbor cleanup activities can be accessed on DEQs website: https://www.oregon.gov/deq/Hazards-and-Cleanup/CleanupSites/Pages/Portland-Harbor.aspx

13.3.1.4 Oregon Department of Agriculture

The responsibility of Oregon Department of Agriculture for regulating agricultural activities that impact water quality qualifies ODA as a DMA under OAR 340-042-080(3). The Agricultural Water Quality Management Act (ORS 568.900 to 933), and ORS 561.191, gives ODA the responsibility to adopt and enforce rules that protect water quality on agricultural lands. The Agricultural Water Quality Management Act directs ODA to develop Agricultural Water Quality Management Area Plans as well as rules. Together, area rules and plans represent the two main pathways through which ODA implements TMDLs on non-federal agricultural lands in Oregon. DEQ will continue to work closely with ODA's Water Quality Management Program to ensure that ODA's plans and rules are protective of water quality standards, including allocations and any surrogate measures contained in TMDLs. DEQ works with ODA as described under a 2012 Memorandum of Agreement.

Voluntary implementation through Agricultural Water Quality Management Area Plans

ODA's area plans identify local watershed conditions, water quality concerns associated with agriculture, and resources and strategies to address these concerns. There are a total of 38 Area Plans in Oregon, 10 of which specifically address watersheds within the Willamette Basin. These area plans include the Lower Willamette, Lower Columbia-Sandy, Clackamas, Middle Willamette, Molalla-Pudding-French Prairie- North Santiam, Tualatin, South Santiam, Southern Willamette, Upper Willamette- Upper Siuslaw, and Yamhill. Area plans are developed in consultation with Local Advisory Committees, which are made up of local farmers, and other watershed stakeholders.

ODA reviews each area plan on a biennial basis in consultation with local Soil and Water Conservation Districts, as well as the Local Advisory Committee. DEQ consults with ODA during the biennial review process to assess the water quality status and trends in the area in relation to allocations and any surrogate measures in an applicable TMDL. As part of the consultation process, DEQ provides a Status and Trends Report for each agricultural management area. These reports provide data and analysis of water quality status and trends in relation to water quality standards and TMDL allocations. ODA uses these reports to help identify implementation

priorities at the catchment or watershed scale. Status and Trends Reports can be accessed from DEQ's website.

After the biennial review process, the Local Advisory Committee submits progress reports to the Board of Agriculture and ODA Director. These reports will continue to include statistics on landowner engagement and types of management practices being employed. These reports will continue to be available to DEQ for review in assessing implementation progress.

Soil and Water Conservation Districts also continue to be key partners in implementing area plans. During the 2013-2015 biennium all Soil and Water Conservation Districts in Oregon started working in Focus Areas. Focus Areas are geographic areas that are selected based on identified needs for agricultural water quality improvements. Soil and Water Conservation Districts contact agricultural landowners and offer voluntary assistance to improve streamside vegetation, streambank stability, and other concerns including livestock manure management and sediment reduction. These efforts are typically included in area plans and are evaluated as part the biennial review process.

Regulatory implementation through Agricultural Water Quality Management Area Rules

Implementation of the recommendations provided in area plans is voluntary, however ORS 561.191 stipulates that ODA must also adopt rules that protecting water quality in areas designated as exclusive farm use and other agricultural lands.

Between 1998 and 2014, the Agricultural Water Quality Program primarily conducted compliance investigations based on written complaints received from the public and complaint referrals from other agencies. In 2014, ODA initiated Strategic Implementation Areas, which represent a proactive approach to identifying specific agricultural activities in a specific watershed that are violating ODA rules, as well as legacy conditions that are adversely affecting water quality, and identifying conservation actions that will help achieve water quality goals.

Strategic Implementation Area watersheds are designated by ODA after conferring with watershed partners including DEQ, and reviewing available water quality and other data. After establishing a Strategic Implementation Area, properties of concern within the Strategic Implementation Area are identified. After an initial assessment, ODA contacts landowners to offer assistance and determine compliance with local rules. For more information about Strategic Implementation Areas, visit https://www.oregon.gov/ODA.

ODA is the agency responsible for compliance investigations and enforcement of program rules, however Soil and Water Conservation Districts, Oregon Watershed Enhancement Board, US Department of Agriculture Farm Service Agency, US Department of Agriculture Natural Resources Conservation Service, watershed councils, and other partners also work to provide technical assistance and other resources to help landowners implement conservation activities.

In addition to the efforts described above, ODA also registers, administers and enforces water quality permits for Confined Animal Feeding Operations. ODA and DEQ jointly issue Water Pollution Control Facility state permits and NPDES federal permits for Confined Animal Feeding Operations. These permits do not allow discharges to waters of the state.

Measurable Objectives and WQMP Reporting Requirements

For the purpose of this TMDL, ODA has identified minimizing bare ground as the strategy most likely to have the greatest impact on sediment and erosion, especially during wet winter months.

In addition to minimizing bare ground, best management practices and conservation practices that limit livestock access to the riparian area, establish stream canopy, and help stabilize channel banks should be given the highest priority. Because stream crossings, road prism failures, and hydrologically-connected roads are known sources of sediment to waterbodies across land uses, DEQ expects to work with ODA to develop measurable objectives related to roads and a schedule for implementing these strategies following the issuance of the TMDL. Examples of such strategies include: inventorying hydrologically-connected roads and potentially unstable road prisms and at-risk stream crossings.

Management strategies that minimize the impact of agricultural activities on water quality are currently identified in area plans. Management strategies that specifically impact sediment and erosion are shown in Table 13-3.

Table 13-3. Table of management strategies included in the Agricultural Water Quality Management Area Plans that address management strategies related to sediment and erosion.

Riparian Areas and Streams			
Practice	**Resource Concerns Addressed**	**Potential Benefits of Practice to Producer**	**Potential Costs of Practice to Producer**
Rotational grazing in riparian area; timed when growth is palatable to animals and when riparian area soils are not saturated.	May help establish desirable riparian vegetation and address temperature and bacteria TMDLs.	Allows limited use of riparian area for grazing, improves wildlife habitat.	Requires intense management to insure that grazing does not prevent site capable vegetation from establishing.
Livestock exclusion from riparian area; establishing off-stream watering facilities.	Helps promote desirable riparian vegetation; promotes streambank integrity; helps filter nutrients and sediment from runoff; may help narrow channel and reduce erosion in channel and address temperature, mercury and bacteria TMDLs.	May lessen streambank erosion and loss of pastures; less time involved in managing livestock grazing in riparian area, improves wildlife habitat.	May require higher weed control costs in riparian areas than seasonal riparian grazing. May require financial investment for livestock control and off-stream watering facilities.
Planting perennial vegetation in riparian area.	Helps establish perennial riparian vegetation rapidly; promotes streambank integrity; may help narrow channel and reduce erosion in channel; provides appropriate shade necessary to moderate solar heating and address temperature, mercury and bacteria TMDLs.	May lessen streambank erosion and loss of pastures. If livestock are excluded from riparian area, area may be eligible for federal cost-share programs. Some alternative perennial agricultural products may be harvested from riparian areas.	Costs of vegetation and weed control. May require financial investment for riparian fencing and off-stream watering facilities while vegetation establishes.

Riparian Areas and Streams			
Practice	**Resource Concerns Addressed**	**Potential Benefits of Practice to Producer**	**Potential Costs of Practice to Producer**
Erosion, Sediment, and Mercury Control			
Practice	**Resource Concerns Addressed**	**Benefits to Producer**	**Costs to Producer**
Grazing management: graze pasture plants to appropriate heights, rotate animals between several pastures; provide access to water in each pasture.	Helps prevent sediment, nutrient, mercury and bacteria runoff into waters of the state. Helps protect streamside areas.	May improve pasture production; easy access to water may increase livestock production as well. May improve livestock health because of better nutrition and parasite control. May improve composition of pasture plants and help prevent weed problems.	Cost of installing fencing, watering facilities for rotational grazing system; time involved in moving animals through pastures.
Farm road construction: construct fords appropriately, install water bars or rolling dips to divert runoff to roadside ditches.	Helps prevent sediment and mercury runoff to waters of the state.	May help prevent water damage on farm roads.	Cost of installation and maintenance.
Plant appropriate vegetation along drainage ditches; seed ditches following construction.	Helps prevent sediment and mercury runoff into waters of the state.	May help prevent ditch bank erosion and slumping.	Costs of establishing vegetation.
Plant cover crops on erosion-sensitive areas.	Helps prevent sediment and mercury runoff into waters of the state; helps filter nutrients and slow runoff.	May reduce weed problems; prevents loss of applied nutrients.	Costs of establishing cover crops; cover crops may compromise primary crop.
Irrigate pasture or crops according to soil moisture and plant water needs.	Helps prevent irrigation return flow and associated nutrients, sediment, and mercury to waters of the state.	May reduce costs of irrigation; may help crop or pasture production.	Installation/ maintenance cost. Monitoring time.
Install/maintain diversions or French drains to prevent unwanted drainage into barnyards and animal heavy use areas.	Helps prevent nutrient and mercury runoff into waters of the state.	Decreases muddiness and shortens saturation period in protected areas.	Cost of installation.

In addition to continued implementation of the strategies provided in Table 13-3, ODA will work with Local Advisory Committees, in consultation with DEQ, to identify specific measurable

objectives and timelines such as percent reduction in bare ground during wet months, along with associated implementation timelines for implementing best management practices and conservation practices that address runoff, sediment and erosion. ODA will work with Local Advisory Committees to report on these metrics during the biennial review process.

DEQ is requesting that ODA and Local Advisory Committees include specific metrics for identified areas of agricultural lands that can be tracked consistently across all agricultural water quality management plan areas in the Willamette Basin. DEQ recognizes that farming practices and cropping systems vary across and within these areas; however there are relevant strategies for reducing runoff, sediment and erosion that apply universally to almost all agricultural lands, e.g. reduce bare ground. This approach does not replace developing and tracking area-specific measurable objectives.

Measurable objectives and timelines should be coordinated with biennial reviews of area plans to the extent possible, however DEQ expects measurable objectives and timelines to be incorporated into all Willamette Basin area plans within 18 months of the issuance of this TMDL. ODA will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.1.

13.3.1.5 Oregon Department of Forestry

Under OAR 340-042-080(2), the Oregon Department of Forestry is the DMA for water quality protection from nonpoint source discharges or pollutants resulting from forest operations on non-federal forestlands within the state. The Forest Practices Act sets expectations for water quality outcomes and prescribes required best management practices. The Forest Practices Act has provisions for both criminal and civil penalties if forest operators do not comply with water protection regulations. ODF rules relevant to protection of water quality and erosion control are found in the Oregon Administrative Rules referenced in Table 13-4.

Table 13-4. ODF Rules Related to Water Quality and Erosion Control

Forestry Practice	Rule Reference
Treatment of Slash	OAR-629-615-0000 through 629-615-0300
Stewardship Agreements	OAR 629-021-0100 through 629-021-1100
Forest Road Construction and Maintenance	OAR-629-625-0000 through 629-625-0700
Harvesting	OAR 629-630-0000 through 629-630-0800
Water protection rules	OAR 629-635-0000 through 629-660-0060

In addition to assuring compliance with the Forest Practices Act, ODF also employs other efforts and funding, such as landowner voluntary measures conducted as part of the Oregon Plan for Salmon and Watersheds, to help support ODF's role in implementing the TMDL. ODF also delivers technical assistance and cost share funding to family forest landowners that support goals for water quality protection. See Table 13-5 for examples of management strategies that resource managers on non-federal land implement to meet Forest Practices Act regulations to control erosion and runoff.

DEQ will work with ODF to identify specific actions necessary to reduce sedimentation from non-federal forest lands, including both voluntary and regulatory actions. For example, ODF's February 2012 guide to voluntary actions to protect threatened and endangered fish is a good resource for private forest landowners who wish to implement practices that go beyond the

current Forest Practices Act and rules. For additional information about ODF, visit: http://www.oregon.gov/ODF.

Table 13-5. Pollutant sources and example management strategies to address sediment and mercury.

Forestry Practice	Description
Implement Forest Practices Act	• Prescriptive rules for forest operations • Notification system (FERNS) • Forest operation inspections conducted by Stewardship Foresters • Compliance monitoring • Education and outreach on FPA topics
Protection/enhancement of riparian zone, wetlands, seeps, etc. with buffers	• Stream and water body classification • Prescriptive rules on vegetation retention, ground equipment, road building restrictions in riparian management areas • Promote implementation and reporting of Oregon Plan voluntary measures • Deliver incentive programs to restore/enhance aquatic/riparian habitat (CREP, etc.)
Conduct pre-harvest planning	• Stewardship Forester notification review, pre-operation inspections, and recommendations for any additional BMPs • Delivery of incentive programs to promote stewardship and planning
Replace/restore roads/culverts	• Prescriptive rules for road construction, maintenance and decommissioning • Identification and replacement/repair of culverts, ditches and other drainage elements of active and inactive roads that are not functioning properly or at risk of failure. • Promote implementation and reporting of Oregon Plan voluntary measures
Stabilize stream banks	• Prescriptive rules for vegetation retention in riparian management areas • Rules to minimize, avoid, restore or prohibit ground equipment, road building in or near channels or channel modification
Uplands management	• Prescriptive rules for reforestation and harvesting • Rules to minimize soil disturbance and erosion and maintain productivity • Delivery of incentive programs to encourage forest health, minimize fire risk
Inspection/enforcement	• Civil Penalties • Forest operation inspections conducted by Stewardship Foresters
BMP monitoring and evaluation	• Adaptive management: effectiveness monitoring informs Board of Forestry who can revise prescriptive rules • Monitoring Strategy to prioritize and direct monitoring work
Instream monitoring	• Member of Water Quality Pesticide Management Team, Pesticide Stewardship Partnerships • Project-level instream water quality monitoring efforts to assess FPA effectiveness
BMP implementation monitoring	• Compliance audit study and reports

Forestry Practice	Description
Education and outreach to operators and landowners	• Delivery of technical assistance and cost share programs to family forest landowners • Agreement with Associated Oregon Loggers • Regional Forest Practices Committee • Committee for Family Forestlands • Partnership for Forest Education • Logging Conference session(s) • Annual Tree School events • Stewardship Forester delivery of individual landowner, operator technical assistance • Ad hoc training events: Operator breakfasts, Society of American Forester meetings, Watershed Council meetings, new rule training, etc.

The Memorandum of Understanding between ODF and DEQ describes a process to evaluate the sufficiency of current Forest Practices Act best management practices in meeting water quality standards and TMDLs on state and privately owned forestlands. Forest operators conducting operations in accordance with the Forest Practices Act are generally considered to be in compliance with water quality standards. Where it is shown that existing Forest Practice Act rules and voluntary measures are not sufficient to meet water quality standards, including TMDL load allocations, DEQ will request that ODF implement additional voluntary programs, revise statewide Forest Practices Act rules and/or adopt subbasin specific rules as necessary.

Measurable objectives, milestones, and WQMP reporting requirements

In addition to continued implementation of the strategies provided in Table 13-5, and other voluntary efforts, DEQ and ODF will identify specific measurable objectives with milestones and associated implementation timelines that address runoff and erosion. Because stream crossings, road prism failures, and hydrologically-connected roads are known sources of sediment to waterbodies across land uses, DEQ expects to work with ODF to develop measurable objectives related to roads and a schedule for implementing these strategies following the issuance of the TMDL. Examples of such strategies include: inventorying hydrologically-connected roads and potentially unstable road prisms and at-risk stream crossings. Measurable objectives may also include an evaluation of hillslope erosion potential during tethered logging operations.

The measurable objectives and the metrics used for tracking measurable objectives will be submitted to DEQ in an implementation plan within 18 months of TMDL issuance.

Status of management strategies related to the Forest Practices Act erosion and runoff control requirements, progress on meeting milestones, and other ODF reporting, such as Forest Practices Compliance Audits will be included in subsequent Willamette Basin five year reviews. For more information about five year reviews, see Section 13.4. Reports or other documents used for ODF TMDL reporting should be made available on a publically accessible website.

13.3.1.6 Oregon Department of State Lands

Oregon Department of State Lands is named as a Designated Management Agency because DSL manages significant tracts of land and issues permits for earthwork below ordinary high

water of waterways and in wetlands in the Willamette Basin. DSL's authorities are noted in OAR 340-042-080(4).

DSL has both a regulatory and a proprietary role with regard to the land within the Willamette Basin. DSL issues two types of permits and authorizations related to its regulatory and proprietary roles: removal-fill permits for removal or fill activity in waterways and wetlands, and proprietary waterway authorizations for use of state-owned waterways.

In its regulatory role, DSL is responsible for administering Oregon's Removal-Fill Law which was enacted in 1967 and includes the following responsibilities:

- Protect, conserve and make best use of water resources
- Protect public navigation, fishery and recreational areas
- Ensure that activities of one landowner don't adversely affect another landowner
- Minimize flooding, improve water quality, and provide fish and wildlife habitat.

For many removal-fill permits, applicants also must obtain a corresponding permit from the U.S. Army Corps of Engineers under section 404 of the federal Clean Water Act. For these permits, DEQ issues water quality certifications under section 401 of the CWA.

In its proprietary role, DSL owns certain state-owned parcels within the Willamette Basin, including:

- Approximately 2,900 acres of land which includes both the surface and underlying mineral rights
- Approximately 12,100 acres of mineral rights which occur on land on which the surface is owned by another entity (commonly termed "split estates")
- Submerged and submersible land underlying:
    - The Willamette River from its confluence with the Columbia River at River Mile (RM) 0.0 to RM 187 at the confluence of the Coast and Middle Forks of the waterway;
    - The McKenzie River from its confluence with the Willamette River at RM 0.0 to RM 37 at Dutch Henry Rock; and
    - Tidally-influenced waters.

As the manager of both upland parcels and mineral rights within the Willamette Basin, as well as submerged and submersible land underlying the Willamette River, DSL is responsible for authorizing uses placed on these holdings. Mercury may occur, or is likely or known to occur on the following types of state-owned land in the following ways:

- Upland parcels: primarily derived from local and distant sources by atmospheric deposition, and associated with possible underlying mineralization.
- Submerged and submersible land: via atmospheric deposition and from runoff from upland and industrial discharges, and prior mining operations.
- Mineral Rights: as an accessory constituent of, or used to process some mineral deposits.

Measurable Objectives, Milestones, and Water Quality Management Plan Reporting Requirements

DSL will continue to implement the management strategies identified in Table 13-6 in order to ensure that all persons applying for, and holding authorizations to use, state-owned land are implementing best management practices that reduce runoff, sediment and erosion.

In addition to the strategies identified in Table 13-6, DEQ encourages DSL to work with ODA and other watershed partners to conduct focused outreach and education that includes the water conveyance systems that are identified as responsible persons in this WQMP.

DSL is required to develop a TMDL implementation plan for the Willamette Basin for review and approval by DEQ within 18 months of the issuance of this TMDL. This plan must include specific measurable objective(s) and timelines for implementation and may include specific conditions that DSL and/or DEQ (through section 401conditions) utilize to avoid soil erosion and sedimentation. DSL will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

Table 13-6. Management Strategies that Department of State Lands implements that reduce mercury loading to the Willamette Basin.

Management Strategies
Maintain all structures, waste disposal and septic systems, and storm water runoff collection systems in good working condition.
Condition or do not allow uses of submerged and submersible land that result in streambank erosion
Encourage persons authorized to use state-owned land for grazing to prevent their animals from walking in or drinking directly from streams on state-owned property.
Not authorize any use of either upland or submerged and submersible land managed by the agency that involves the use of mercury or compounds containing mercury in amounts determined to be unacceptable based on comments received from the public review process of the application
Not allow any use to occur on, or be made of state-owned submerged and submersible land that is determined to cause the release of an unacceptable amount of mercury from the sediments to the environment based on comments received from the public review process of the application
Not allow any state-owned mineral deposit managed by DSL to be mined for mercury, or mercury to be used on state-owned land to process minerals
Wherever possible, condition authorizations to limit or prevent stormwater runoff from, and resultant erosion of soil on state-owned land
Clean up solid waste and other materials dumped illegally on state-owned land that may contain mercury, and attempt to identify the person(s) responsible for such activities for possible citation
Employ interagency cross checks to confirm that a proposed use will not negatively impact a restoration site

13.3.1.7 Oregon Parks and Recreation Department

Under OAR 340-042-080(4), Oregon Parks and Recreation Department qualifies as a DMA due to responsibilities for managing several categories of lands owned by the state. Many of these areas remain undeveloped and while primarily managed for recreational uses, they also include lands managed for forestry and agriculture, such as livestock grazing. OPRD manages and operates over 130 individual parks, waysides and greenway properties, and more than 90 sites

are leased to other entities for management. State Parks, State Natural Areas as well as upland areas are also managed by OPRD.

In 2017, OPRD released a 10-year Strategic Action Plan for restoration and stewardship of OPRD-managed sites in the Willamette Basin. The strategic plan, as well as a number of other programs and policies, integrate water quality implementation goals and objectives into existing management strategies, including:

- Agricultural Use of Park Lands
- Comprehensive Park Planning
- Forest Management
- Intergovernment Natural Resource Communications
- Invasive Species Management on State Park Lands
- Land Acquisition and Exchange
- Maintenance and Operation of Water and Sewerage Systems
- Natural Resource and Environmental Management Policy
- Oregon Plan
- Sewer and Water System Failures

OPRD also administers a grant program and the State Scenic Waterways program, which support activities that are protective of water quality.

Measurable objectives, milestones, and WQMP reporting requirements

OPRD's TMDL implementation plan was recently updated in 2018 and includes multiple management strategies and actions that address mercury load reductions, including but not limited to those provided in Table 13-7. OPRD will continue to implement these and other management strategies in order to ensure that OPRD as well as all persons applying for, and holding authorizations to use state-owned land managed by OPRD are implementing best management practices that reduce runoff, sediment and erosion.

In addition, OPRD will update their TMDL implementation plan to include specific measurable objectives, milestones and timelines for management strategies that address runoff and soil erosion within 18 months of the issuance of this TMDL.

OPRD will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

Table 13-7. Management Strategies that Oregon Parks and Recreation Department implements that reduce mercury loading to the Willamette Basin.

Management Strategies
Continually monitor trail systems; repair or re-route trails to reduce runoff and erosion
Continue to require permittees with Agricultural Leases to apply best management practices to prevent and reduce runoff and erosion, including retaining 50 foot no-till buffers along fish-bearing streams, and maintaining ground cover during wet, winter months
Reduce number of drain tile systems in former agriculture fields to promote infiltration of stormwater
Continue to meet or exceed all Forest Practices Act rules during forestry operations.

Implement riparian restoration projects, which help to filter and reduce sediment delivery to streams
Use on-site stormwater retention in new park designs to infiltrate stormwater
Continue to provide education and outreach activities including promoting biking and walking to reduce air emissions

13.3.1.8 Oregon Department of Geology and Mineral Industries

Under OAR 340-042-080(4), responsibility for regulation of aggregate mines, many of which are located in the flood plain of rivers, qualifies Department of Geology and Mineral Industries as a DMA. As with other state agencies that have been identified as DMAs, DOGAMI is required to submit an implementation plan specific to mercury reduction in the Willamette Basin, however, because DOGAMI conducts these activities throughout the state, DOGAMI may work with DEQ to develop a state-wide implementation plan to address other TMDL implementation responsibilities. Many of the elements required in an implementation plan will be met through DOGAMI's oversite, as DEQ's Agent of implementation of the NPDES 1200A general industrial stormwater permit. The 1200A permit covers aggregate and asphalt operations. Other elements required in an implementation plan are included in DOGAMI's Best Management Practices for Reclaiming Surface Mines, which can be accessed on DOGAMI's website: https://www.oregongeology.org/mlrr/overview.htm.

13.3.1.9 Oregon Department of Fish and Wildlife

Per OAR 340-042-080(4), DEQ named Oregon Department of Fish and Wildlife DMA. ODFW manages three wildlife areas in the Willamette Basin, including EE Wilson Wildlife Area near Monmouth, Fern Ridge Wildlife Area near Eugene, and Sauvie Island Wildlife Area/ North Willamette Watershed Wildlife District near Portland. In addition to providing for wildlife habitat, these areas are also managed for recreational activities such as hunting, fishing, hiking, boating, wildlife observation, trapshooting and archery.

Measurable objectives, milestones, and WQMP reporting requirements

ODFW will develop an implementation plan that will include management strategies and actions that address mercury load reductions, including but not limited to those provided in Table 13-8. ODFW will implement these and other management strategies in order to ensure that ODFW, as well as all persons applying for, and holding authorizations to use, ODFW owned land are implementing best management practices that reduce runoff, sediment and erosion.

In addition, ODFW's implementation plan will include specific measurable objectives, milestones and timelines for management strategies that address runoff and soil erosion within 18 months of the issuance of this TMDL.

ODFW will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

Table 13-8. Management Strategies that Oregon Department of Fish and Wildlife implements that reduce mercury loading to the Willamette Basin.

Management Strategies

Continually monitor trail systems; repair or re-route trails to reduce runoff and erosion
Continue to require permittees with Agricultural Leases to apply best management practices to prevent and reduce runoff and erosion, including retaining 50 foot no-till buffers along fish-bearing streams, and maintaining ground cover during wet, winter months
Reduce number of drain tile systems in former agriculture fields to promote infiltration of stormwater
Continue to meet or exceed all Forest Practices Act rules during forestry operations. Implement riparian restoration projects, which help to filter and reduce sediment delivery to streams
Use on-site stormwater retention in new park designs to infiltrate stormwater

13.3.1.10 Oregon State Marine Board

Using authorities described in OAR 340-042-080(4), the Oregon State Marine Board administers boating safety educational programs, enforces marine law and maintains and improves boating facilities. OSMB establishes state-wide boating regulations and contracts with county sheriffs and the Oregon State Police to enforce marine laws. The board provides technical training to marine patrol officers and supplies their equipment. OSMB also provides grants and engineering services to local governments such as cities, counties, park districts and port districts, to develop and maintain accessible boating facilities and protect water quality. OSMB actively promotes safe and sustainable boating through several programs.

DEQ will coordinate with OSMB regarding implementation of the TMDL as it relates to boating practices. Boating activities potentially important to the implementation of the mercury TMDL include but are not limited to signage and education, establishment of boating regulations, practices for the removal of derelict structures that qualify under the Abandoned Vessel Program rules, and boating campaigns that encourage boaters to adopt clean and safe boating practices.

Measurable objectives, milestones, and WQMP reporting requirements

OSMB will develop an implementation plan that will include management strategies and actions that address mercury load reductions. These management strategies will likely focus on boating practices.

In addition, the OSMB implementation plan will include specific measurable objectives, milestones and timelines for management strategies that address runoff and soil erosion related to boating practices within 18 months of the issuance of this TMDL.

OSMB will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

13.3.1.11 Local Government: Cities and Counties

Oregon cities and counties have the authority to regulate land use activities through local comprehensive plans and related development regulations. The Oregon land use planning system, which is administered by local governments with oversight 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 state-wide 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 land use planning goals in OAR 660-015-0000 have a direct connection to water quality, particularly Goal 5 (Natural Resources, scenic, and historic areas and open spaces, Goal 6 (Air, water, and land resources quality), and Goal 7 (Areas subject to natural hazards). DEQ expects that the efforts of local jurisdictions to address Goals 5, 6, and 7 requirements, when incorporated into a TMDL implementation plan, will help a DMA meet the TMDL allocations. In addition, existing city and county efforts to protect and enhance riparian vegetation along streams will help to provide natural filtering of runoff containing sediment.

Mercury in Urban Stormwater

TMDL modelling shows that in urban areas, the majority of mercury reaches waterbodies through atmospheric deposition and through runoff of mercury from soils and hard surfaces. Therefore, DEQ anticipates that city and county DMAs will largely focus on activities and strategies to reduce runoff and erosion into urban streams and into stormwater conveyance systems.

During the first implementation phase of the 2006 Willamette Basin Mercury TMDL, DEQ required some MS4 Phase I communities to collect mercury stormwater data. DEQ analyzed total mercury data from seven of these MS4 Phase I communities (see Table 13-9).

The TMDL water column target to meet a fish tissue methylmercury criterion of 0.040 mg/kg is 0.14 ng/L. The median value of total mercury in stormwater from the MS4 Phase I communities was 4.62 ng/L. Based on the analyzed data, DEQ concluded that urban stormwater has environmentally significant concentrations of mercury contributing to mercury loads in portions of the Willamette Basin, even though the sector's overall load to the basin is small. Therefore, to reduce mercury from urban runoff, DEQ developed point source wasteload allocations for NPDES MS4 permit holders, and nonpoint source load allocations for non-permitted urban DMAs.

Table 13-9. Stormwater Summary Statistics (Tetra Tech, 2019)

Analyte	Sample Size	Range (ng/L)	Median (ng/L)	25th % (ng/L)	75th % (ng/L)
Total Hg	655	0.25 - 120	4.62	2.94	8.31

Six Minimum Measures for Stormwater

EPA established six stormwater control measures as part of its final EPA MS4 Phase II stormwater regulations (January 9, 1998 63 FR 1536 -1643). It provides a consistent set of minimum components for a regulated small MS4 operator's stormwater management program to reduce pollution from urban runoff. The six EPA control measures generally mirror requirements in DEQ's MS4 Phase II permit that became effective in March 2019. For this TMDL, DEQ will also defer to these six stormwater control measures to control urban runoff. DEQ is requiring actions associated with these stormwater measures to achieve needed nonpoint source reductions in mercury and sediment. DEQ recognizes that implementing these requirements will also have benefits in reducing other pollutants associated with stormwater.

The six stormwater control measures described below in **Error! Reference source not found.** are generally less prescriptive than the requirements contained in the Phase II general permit. Application of these measures to urban areas not previously regulated by a permit or TMDL requirements fills a gap to ensure mercury and sediment in stormwater discharges are comprehensively controlled throughout the Willamette Basin.

Table 13-10. Minimum requirements for implementing the six stormwater measures. In addition to requirements in section 13.3.2.2, these requirements apply to MS4 permittees (outside of the MS4 permit coverage area), and non-permitted urban DMAs with a population of 5,000 or greater.

Stormwater Measure	Requirements
1. Pollution Prevention and Good Housekeeping for Municipal Operations	DMAs must properly operate and maintain its facilities, using prudent pollution prevention and good housekeeping to reduce the discharge of mercury-related pollutants through the stormwater conveyance system to waters of the state. DMAs must ensure that DMA-owned or operated facilities with industrial activity identified in DEQ's 1200-Z Industrial Stormwater General Permit have coverage under this permit. The DMA must also conduct its municipal operation and maintenance activities in a manner that reduces the discharge of pollutants to protect water quality. DMAs must maintain records for activities to meet the requirements of the Pollution Prevention and Good Housekeeping for Municipal Operations program requirements and include a descriptive summary of their activities in the TMDL Annual Report.
2. Public Education and Outreach	DMAs must conduct an ongoing education and outreach program to inform the public about the impacts of stormwater discharges on waterbodies and the steps that they can take to reduce mercury-related pollutants in stormwater runoff. The education and outreach program must be designed to address stormwater issues of significance within the DMA's community. DMAs must track implementation of the public education and outreach requirements. In each corresponding TMDL Annual Report, the DMA must assess their progress toward implementation of the program, including the evaluation of at least one education and outreach activity corresponding to the reporting timeframe for the associated TMDL Annual Report. The assessment should be used to inform future stormwater education and outreach efforts to most effectively convey the educational material to the target audiences.
3. Public Involvement and Participation	DMAs must implement a public involvement and participation program that provides opportunities for the public to effectively participate in the development of stormwater control measures. The DMA must comply with their public notice requirements when implementing a public involvement participation process, including maintaining and promoting at least one publicly accessible website with information on the city's stormwater control implementation, contact information and educational materials.
4. Illicit Discharge Detection and Elimination	DMAs must implement and enforce a program to detect and eliminate illicit discharges into the stormwater conveyance system. An illicit discharge is any discharge to a stormwater conveyance system that is not composed entirely of stormwater. The DMA must develop and maintain a current map of their stormwater conveyance system. The stormwater conveyance system map and digital inventory must include the location of outfalls and an outfall inventory, conveyance system and stormwater control locations. The DMA

Stormwater Measure	Requirements
	must make maps and inventories available to DEQ upon request. When in digital format, the DMA must fully describe mapping standards in the TMDL Implementation plan or other city planning document. The IDDE program must prohibit non-stormwater discharges into the stormwater conveyance system through enforcement of an ordinance or other legal mechanism, including appropriate enforcement procedures and actions to ensure compliance. The ordinance or other regulatory mechanism must also define the range of illicit discharges it covers, including those discharges that are conditionally allowed, such as groundwater and lawn watering discharges. The IDDE program must also maintain a procedure or system to document all complaints or reports of illicit discharges into and from the stormwater conveyance system. The DMA must track implementation of the IDDE program requirements. In each TMDL Annual Report, the DMA must assess their progress towards implementation of the program.
5. Construction Site Runoff Control	For construction projects that disturb one or more acres (or that disturb less than one acre, if it is part of a "common plan of development or sale" disturbing one or more acres), the DMA must refer project sites to DEQ, or the appropriate DEQ agent, to obtain NPDES 1200-C Construction Stormwater Permit coverage. To further control erosion related to construction sites, the DMA must require construction site operators to complete and implement an Erosion and Sediment Control Plan for construction project sites in its jurisdictional area that result in a minimum land disturbance of 21,780 square feet (one half of an acre) or more, and are not already covered by a 1200-C permit. Through ordinance or other regulatory mechanism, to the extent allowable under state law, the DMA must require erosion controls, sediment controls, and waste materials management controls to be used and maintained at all qualifying construction projects (as described above) from initial clearing through final stabilization to reduce pollutants in stormwater discharges to the stormwater conveyance system from construction sites. The DMA must develop, implement and maintain a written escalating enforcement and response procedure for all qualifying construction sites. The procedure must address repeat violations through progressively stricter response, as needed, to achieve compliance. The DMA must track implementation of the construction site runoff program's required activities. In each TMDL Annual Report, the DMA must assess their progress toward implementing the construction site runoff program's control measures.
6. Post-Construction Site Runoff for New Development and Redevelopment	DMAs must develop, implement, and enforce a program to reduce discharges of pollutants and control post-construction stormwater runoff from new development and redevelopment project sites in its jurisdictional area. Example of such programs and program elements are provided in Appendix F: Stormwater references and resources. Through ordinance or other regulatory mechanism, the DMA must require the following for project sites discharging stormwater to the storm water

Stormwater Measure	Requirements
	conveyance system that create or replace 10,890 square feet (one quarter of an acre) or more of new impervious surface area: (A) The use of stormwater controls at all qualifying sites. (B) A site-specific stormwater management approach that targets natural surface or predevelopment hydrological function through the installation and long-term operation and maintenance of stormwater controls. (C) Long-term operation and maintenance of stormwater controls at project sites that are under the ownership of a private entity. The DMA must target natural surface or predevelopment hydrologic function to retain rainfall on-site and minimize the offsite discharge of precipitation utilizing stormwater controls that infiltrate and evapotranspirate stormwater. For projects that are unable to fully retain rainfall/runoff from impervious surfaces on-site, the remainder of the rainfall/runoff from impervious surfaces must be treated prior to discharge with structural stormwater controls. These stormwater structural controls should be designed to remove, at a minimum, 80 percent of the total suspended solids. The DMA must maintain records for activities to meet the requirements of the post-construction site runoff program requirements and include a descriptive summary of their activities in the TMDL Annual Report.

13.3.1.11.1 Nonpoint source stormwater management requirements for MS4 Permit holders

Cities and other local governments that have Phase I or Phase II MS4 stormwater permits for stormwater discharges within the Willamette Basin are listed in Table 9-5 and already have specific requirements for meeting and reporting on associated wasteload allocations for total mercury that are applicable within the urbanized areas of their permit. For those requirements, see section 13.3.2.2.

As DMAs for nonpoint sources of mercury, MS4 permit holders must also implement the six stormwater control measures, as described in **Error! Reference source not found.**, in their j urisdictional areas outside of the urbanized area covered by their permit. If these city and county jurisdictional boundaries include land uses under the authority of other DMAs, such as ODA, ODF, BLM, or USFS, then those DMAs are responsible for control of any stormwater discharge from these areas. Likely areas for counties to apply the six minimum measures include areas zoned for commercial, industrial, rural residential, county parks and county road systems.

While the **Error! Reference source not found.** six minimum stormwater measures are less r igorous than the section 13.3.2.2 MS4 permit requirements, for ease of implementation, MS4 permit holders may choose to implement permit requirements outside the urbanized area. This approach would meet the requirements in **Error! Reference source not found.**.

MS4 permit holders must also develop and submit a TMDL implementation plan that demonstrates how nonpoint source load allocations will be met. This plan must include management strategies to reduce runoff and erosion that discharge directly to waterbodies.

MS4 permits will be the mechanism by which point source wasteload allocation requirements are met. Reporting on point source and nonpoint source implementation may be streamlined into a single submission, which will be reviewed by both DEQ stormwater and TMDL program staff. See *Measurable Objectives, Milestones, and WQMP Reporting Requirements* section following Table 13-11 for more information about updating TMDL implementation plans for mercury and DEQ reporting.

13.3.1.11.2 Stormwater management requirements for non-permitted urban DMAs

The requirements for portions of cities and counties that have stormwater discharges within the Willamette Basin and are not required to have MS4 permit coverage are discussed below. If a community subject to the requirements below is later identified by DEQ as needing coverage under an MS4 permit, the MS4 permit requirements would supersede the requirements below within the permit coverage area.

The analyses that are the foundation for the draft TMDL estimate that mercury loads from all combined, non-permitted urban area stormwater discharges is approximately one percent of the overall load in the Willamette Basin. The TMDL requires a 75 percent reduction of mercury loads across this sector.

DEQ does not have direct stormwater mercury data from the stormwater discharges occurring in cities and counties that are not regulated by a MS4 Phase I permit. In the absence of data, DEQ cannot quantitatively determine the amount of mercury in stormwater discharges from these smaller cities and counties. However, analyses show that mercury contained in stormwater is primarily a function of runoff and erosion from impervious areas, rather than from specific sources in large urban areas, and could contribute to a water quality impairment. This is the reason that DEQ is requiring smaller communities to meet similar requirements for stormwater control and treatment. The percent of impervious cover in the Willamette Basin communities continues to increase in almost all jurisdictions, as seen from multiple data sources including municipal building permits, and active DEQ 1200-C permits.

Note that the 2006 Willamette Basin TMDL required cities with populations greater than 10,000 people to implement the six stormwater control measures to reduce mercury and bacteria loads from urban areas.

The stormwater requirements described in **Error! Reference source not found.** will apply w ithin the city or county boundary if not under the jurisdiction of another federal or state agency such as ODOT, Oregon Department of Agriculture, Oregon Department of Forestry, Bureau of Land Management, and U.S. Forest Service. Additional details about implementing the six stormwater control measures based on population status are provided below.

Cities and counties with populations 5,000 people or greater (and no MS4 permit)

The following cities and counties meet a population criterion of 5,000 people or greater (according to Portland State University July 1, 2018 certified dataset):

- **Greater than 10,000**: (1) Canby, (2) Columbia County, (3) Cottage Grove, (4) Dallas, (5) Lebanon, (6) McMinnville, (7) Newberg, (8) St. Helens, (9) Woodburn, (10) Sandy, (11) Silverton, and (12) Yamhill County
- **5,000 – 10,000**: (1) Creswell, (2) Independence, (3) Junction City, (4) Molalla, (5) Monmouth, (6) Scappoose, (7) Sheridan, (8) Stayton and (9) Sweet Home.

These communities will need to either develop a new TMDL implementation plan, or update their existing TMDL implementation plan to fully incorporate the stormwater measures for mercury and sediment reduction described in **Error! Reference source not found.**. Cities and c ounties named above must implement the six stormwater control measures according to the schedule in Table 13-11.

Cities and counties with populations less than 5,000 people (and no MS4 permit)

City and county DMAs with a population less than 5,000 people and who are not required to have coverage under an MS4 permit must evaluate the six minimum stormwater control measures listed in **Error! Reference source not found.** and identify the strategies and actions t hat they can implement to reduce mercury and sediment, including sources of runoff, sediment and erosion. The timelines in Table 13-11 do not apply to non-MS4 city and county DMAs with populations less than 5,000 people.

Under certain circumstances, such as when population growth exceeds 5,000 people or DEQ determines it is necessary to meet load allocations for mercury, DEQ may require urban DMAs with a population less than 5,000 people to implement all or a subset of the six stormwater control measures.

These communities will need to either develop a new TMDL implementation plan, or update their existing TMDL implementation plan to include strategies that address stormwater runoff and erosion.

Implementation Schedule for stormwater control measures for non-permitted urban DMAs

Since 2006, some city and county DMAs have been implementing mercury minimization plans to help reduce mercury inputs to the watershed, including, but not limited to:

- Conducting outreach and education about best management practices for the management of dental wastes and recycling of fluorescent lighting
- Requiring sediment and erosion control plans of new and re-development projects
- Requiring or encouraging the use of low impact development to reduce the volume and rate of stormwater discharged to streams
- Reducing emissions by purchasing more fuel-efficient vehicles for municipal fleets
- Enforcing and/or encouraging conservation and enhancement of riparian buffers, which trap sediment and prevent stream bank erosion
- Performing regular street sweeping and catch basin cleaning

DEQ recognizes the financial challenges that cities and counties face in implementing the Willamette Basin TMDLs. For this reason, DEQ is proposing to allow communities the following periods before they must adopt updated implementation plans, and then fully implement the stormwater control measures in those plans:

Deadlines for Submittal of New or Updated Implementation Plans

- DEQ expects DMAs with populations greater than 5,000 to either update their current TMDL implementation plan, or develop a new implementation plan, to include the six stormwater management measures, within 18 months following issuance of the TMDL.
- DEQ expects DMAs with populations less than 5,000 people and who are not MS4 permit holders to update their current TMDL implementation plan or develop a new

implement plan, to include strategies and actions that address stormwater runoff, sediment and erosion within, 18 months following issuance of the TMDL. DEQ may approve an alternate deadline, such as the due date associated with a DMA's TMDL Annual Report.

DMA implementation plans must include measurable objectives for implementing the six stormwater control measures. Measurable objectives must include milestones and timelines. Timelines must reflect the deadlines in Table 13-11.

Deadlines for Fully Implementing Stormwater Control Measures

- Communities with a population of more than 10,000 people - by the end of their first five-year report.
- Communities that have 5,000 - 10,000 people - by the end of their second five-year report.
- Communities with a population under 5,000 people - no deadline unless specifically required.

Table 13-11. Stormwater Control Measures Implementation Schedule for non-permitted urban DMAs with populations of 5,000 or greater.

Stormwater Control Measures	Implementation Deadlines from TMDL Issuance Date	
	City Population	
	5,000 to 10,000	Greater than 10,000
1. Pollution Prevention and Good Housekeeping for Municipal Operations	3 years	18 months
2. Public Education and Outreach	3 years	18 months
3. Public Involvement and Participation	3 years	18 months
4. Illicit Discharge Detection and Elimination	4.5 years	3 years
5. Construction Site Runoff Control	9.5 years	4.5 years
6. Post-Construction Site Runoff for New Development and Redevelopment	9.5 years	4.5 years

Appendix F: Stormwater references and resources contains a list of stormwater management resources to help DMAs develop TMDL implementation plans to address stormwater measures, including resources to assist DMAs in funding and developing post-construction stormwater ordinances and manuals. In addition, a number of cities and counties in the Willamette Basin have had similar stormwater management requirements based on their status as a MS4 permit holder and could be resources for communities when developing an Implementation plan.

Measurable objectives, milestones, and WQMP reporting requirements

Cities and counties identified in Appendix E: List of designated management agencies and responsible persons as DMAs under this TMDL are responsible for either developing a new mercury TMDL implementation plan, or revising their existing mercury TMDL implementation plan to meet new load reductions required under this TMDL. These plans will describe the management strategies DMAs will take to control mercury, including developing and reporting on applicable measurable objectives and milestones. Cities and counties that have a publically

accessible website must post their implementation plan to that website. Cities and counties that do not have a publically accessible website must work with DEQ to make their plans publically accessible.

Cities and counties will also take part in the Willamette Basin five-year review. For more information about five year reviews, see section 13.4.

13.3.1.12 Bureau of Land Management

The federal Bureau of Land Management is responsible for management and regulation of lands certain forest and range lands owned by the federal government. In western Oregon these are primarily forestlands. As a DMA in this TMDL, the BLM is required to develop and implement TMDL strategies and actions that address erosion and runoff.

The DEQ and BLM have a Memorandum of Understanding signed in 2017, which ensures water quality standards, TMDLs, and drinking water rules and regulations are met. The MOU also specifies that the BLM will implement site-specific best management practices as specified in management objectives, management direction, design features, and mitigation developed in Resource Management Plans and amendments, project-level plans, and Water Quality Restoration Plans to meet applicable water quality standards. Water Quality Restoration Plans are the BLM's implementation plan to meet TMDL requirements. Water Quality Restoration Plans exist for the following areas: Clackamas, Lower Willamette, Mid-Coast, Middle Willamette, Molalla, North, Santiam, Sandy, South Santiam, Tualatin, Upper Willamette, and Yamhill.

The MOU requires monitoring to ensure that practices are properly designed and applied, to determine the effectiveness of practices in meeting water quality standards, and to provide for adjustment of best management practices when it is found that water quality standards are not being protected.

Activities on BLM lands that contribute to sediment include transportation system management, recreation and forest management. Table 13-12 contains several examples of sediment, erosion and runoff control best management practices that address activities that occur on BLM lands. The BLM incorporates water quality management as part of project design. Additionally, BLM employs best management practices that are relevant to the action in order to meet water quality standards and TMDL load allocations. Best management practices are monitored for effectiveness following implementation. Appendix J of BLM's Resource Management Plan provides a list of typical best management practices that the BLM uses to manage water quality. The BLM also designs site-specific best management practices to address specific issues and conditions that have the potential to affect water quality. The BLM will evaluate the effects of their management at the scale of the Willamette Basin.

Table 13-12. Example List of BLM Management Strategies for Sediment/Mercury

Best Management Practices
Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height.
Disconnect road runoff to the stream channel by out sloping the road approach.
Suspend ground-disturbing activity if forecasted rain will saturate soils to the extent that there is potential for movement of sediment from the road to wetlands, floodplains, and waters of the State.

Best Management Practices
Road closure and decommissioning: After tilling the road surface, pull back unstable road fill and end-haul or contour to the natural slopes.
Place residual slash on severely burned areas, where there is potential for sediment delivery into waterbodies, floodplains and wetlands.
Emergency stabilization or rehabilitation BMPs related to wildfire
Water bar spacing requirements by percent gradient and erosion class
Implement erosion control measures at recreation sites to stabilize exposed soils where water flows or sediment, may reach waterbodies.
Locate new Off Highway Vehicle trails on stable locations (for example, ridge tops, benches, and gentle-to-moderate side slopes). Minimize trail construction on steep slopes where runoff could channel to a waterbody.
Use erosion-reduction practices, such as seeding, mulching, silt fences, and woody debris placement, to limit erosion and transport of sediment to streams from quarries.

Measurable objectives, milestones, and WQMP reporting requirements

BLM will continue to implement their best management practices program. In addition, BLM will also identify specific measurable objectives with milestones and associated implementation timelines for implementing best management practices that address runoff and erosion. Because stream crossings, road prism failures, and hydrologically-connected roads are known sources of sediment to waterbodies across land uses, DEQ expects to work with BLM to develop measurable objectives related to roads and a schedule for implementing these strategies following the issuance of the TMDL. Examples of such strategies include: inventorying hydrologically-connected roads and potentially unstable road prisms and at-risk stream crossings. Measurable objectives may also include an evaluation of hillslope erosion potential during tethered logging operations.

A rationale, which provides context for the measurable objectives and the metrics used for tracking measurable objectives, will be submitted to DEQ within 18 months of TMDL issuance. The measurable objectives and milestones will be included in revised Water Quality Restoration Plans based on either sixth field level watersheds (HUC12) or combined into one Water Quality Restoration Plan for the entire Willamette Basin. Water Quality Restoration Plan(s) must be made available on a publicly accessible website.

BLM will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

13.3.1.13 U.S. Forest Service

The United States Forest Service (within the US Department of Agriculture) is the federal agency tasked with the management and care of the National Forests and Grasslands. As a DMA in this TMDL, the USFS is required to develop and implement TMDL strategies and actions that address erosion and runoff.

A DEQ and USFS Memorandum of Understanding signed in 2014, identifies Water Quality Restoration Plans as the implementation planning document to meet USFS TMDL

implementation plan requirements. The USFS submits these Water Quality Restoration Plans to DEQ for review and approval. The memorandum specifies that USFS will provide an annual status to DEQ on Water Quality Restoration Plans, including a five-year report on implementing each WQRP. The most recent publication date of the Willamette Basin Water Quality Restoration Plan is 2008.

The USFS relies on the following mechanisms to support TMDL implementation:

- Aquatic Conservation Strategy in the Northwest Forest Plan
- National Core BMP Technical and Monitoring guides. There is a summary of a two-year effort to demonstrate and document best management practices performance. The National BMP Program provides a nationally consistent, systematic, and objective approach to best management practices monitoring on USFS lands.
- The 2005 Travel Management Rule (36 CFR 212.5) directed all National Forests to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands. The rule requires each National Forest to:
    - Identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of national forest lands;
    - Identify the roads on lands under Forest Service jurisdiction that are no longer needed to meet forest resource management objectives;
    - Under separate actions, decommission or consider for other uses those roads identified as unneeded.

The Mt. Hood, Willamette and Umpqua National Forests completed Travel Analysis Plans for their respective road systems by September 30, 2015. These high-level plans provided a starting point for right sizing road systems, balancing public use, administrative use and resource protection. All subsequent planning on National Forest lands within the Willamette Basin tiers to these Travel Analysis Plans to inform and prioritize road maintenance, reconstruction, storage and decommission.

Table 13-13. Example List of USFS Management Strategies for Sediment/Mercury

Best Management Practices
Roads • Design or reconstruct stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts and lowering the fill height. • Disconnect road runoff to the stream channel by either out sloping or adding additional drainage features to the road. • Road closure and decommissioning: depending on aquatic risk, treatment activities could range from water barring and berm closure, to removal of all fills/culverts to complete obliteration and re-contour.
Timber Harvest • To prevent sediment delivery to streams, prescribe adequate no-harvest buffers on both perennial and intermittent streams within treatment areas.

Best Management Practices
• Suspend ground-based harvest activities during saturated soil conditions where there is potential for sediment delivery into waterbodies, floodplains and wetlands. • Dependent on road condition, suspend timber haul to prevent sediment delivery to waterbodies, floodplains and wetlands during wet weather.
Erosion Control Measures during Construction • Require a dewatering and erosion control plan for construction activities such as culvert replacement and aquatic restoration projects to prevent sedimentation to waterbodies, floodplains and wetlands to the greatest extent practicable.
Wildfire • Where there is potential for sediment delivery into waterbodies, floodplains and wetlands, obliterate (de-compact and re-contour) all direct and indirect dozer and hand lines constructed for emergency suppression after fire is controlled.

Measurable objectives, milestones, and WQMP reporting requirements

In addition to continued implementation of the strategies provided in Table 13-13, the USFS will identify specific measurable objectives with milestones and an associated implementation timeline for implementing best management practices that address runoff and erosion. Because stream crossings, road prism failures, and hydrologically-connected roads are known sources of sediment to waterbodies across land uses, DEQ expects to work with USFS to develop measurable objectives related to roads and a schedule for implementing these strategies following the issuance of the TMDL. Examples of such strategies include: inventorying hydrologically-connected roads and potentially unstable road prisms and at-risk stream crossings. Measurable objectives may also include an evaluation of hillslope erosion potential during tethered logging operations.

A rationale, which provides context for the measurable objectives and the metrics used for tracking measurable objectives, will be submitted to DEQ within 18 months of TMDL issuance. The measurable objectives and milestones will be included in revised Water Quality Restoration Plans based on either sixth field level watersheds (HUC12) or combined into one Water Quality Restoration Plan for the entire Willamette Basin. Water Quality Restoration Plans must be made available on a publicly accessible websites.

The USFS will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

13.3.1.14 U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service is an agency that manages fish, wildlife and natural habitats. In the Willamette Basin, the USFWS manages four wildlife refuges, including WL Finley National Wildlife Refuge near Corvallis, Ankeny Wildlife preserve near Ankeny Wildlife Refuge near Jefferson, Baskett Slough Wildlife Refuge near Dallas, and Tualatin River National Wildlife Refuge near Wilsonville. In addition to providing wildlife habitat, these areas are also managed for recreational activities including hunting, wildlife observation and hiking.

Measurable objectives, milestones, and WQMP reporting requirements

The USFWS will update their current implementation plan to include management strategies and actions that address mercury load reductions, including but not limited to those provided in Table 13-14. USFWS will implement these and other management strategies in order to ensure that USFWS, as well as all persons applying for, and holding authorizations to use, USFWS owned land are implementing best management practices that reduce runoff, sediment and erosion.

In addition, the USFWS implementation plan will include specific measurable objectives, milestones and timelines for management strategies that address runoff and soil erosion within 18 months of the issuance of this TMDL.

The USFWS will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

Table 13-14. Management Strategies that the U.S. Fish and Wildlife Service implements that reduce mercury loading to the Willamette Basin.

Management Strategies
Continually monitor trail systems; repair or re-route trails to reduce runoff and erosion.
Continue to require permittees with Agricultural Leases to apply best management practices to prevent and reduce runoff and erosion, including retaining 50 foot no-till buffers along fish-bearing streams, and maintaining ground cover during wet, winter months.
Reduce number of drain tile systems in former agriculture fields to promote infiltration of stormwater.
Monitor and assess how water is managed on the refuges through ditches, pumps, weirs, lakes, etc.
Continue to meet or exceed all Forest Practices Act rules during forestry operations. Implement riparian restoration projects, which help to filter and reduce sediment delivery to streams.
Use on-site stormwater retention in new park designs to infiltrate stormwater.

Special Districts

13.3.1.15 Metro (Portland Metropolitan Government)

Metro is the regional government for the Portland metropolitan area. Metro manages the solid waste program, regional parks and natural areas system, coordinates growth in the metro area, and oversees large facilities, such as the Oregon Zoo, Oregon Convention Center and the Portland Expo Center.

Metro is currently a DMA for a number of Willamette Basin TMDLs. Metro's activities include proposing bond measures to acquire natural areas. Parks and natural area levies allow for natural area restoration, such as tree and shrub planting, removal of invasive vegetation, and reconnecting rivers to their floodplains. Metro follows local MS4 permit requirements in construction and post construction for any new or redeveloped Metro projects.

Measurable objectives, milestones, and WQMP reporting requirements

As a DMA for the mercury TMDL, DEQ will work with Metro following the issuance of the TMDL to focus on stormwater control activities that will reduce erosion and runoff of stormwater from Metro properties. In addition, Metro will identify specific measurable objectives with milestones and associated implementation timeline for implementing best management practices that

address runoff and erosion. An updated implementation plan will be due 18 months following the issuance of the TMDL. Metro must post their implementation plan on a publicly accessible website.

13.3.1.16 Port of Portland

The Port of Portland is a regional government with jurisdiction in Multnomah, Washington and Clackamas counties. Port of Portland property in the Lower Willamette Basin includes the Portland International and Hillsboro Airports, four marine terminals (Terminals 2, 4, 5 and 6), and the Swan Island, Rivergate, Portland International Center, and Cascade Station business and industrial parks. The Port also owns a number of undeveloped properties within the basin that include open space, mitigation areas, and industrial parcels for future development. Some of these properties are occupied by tenants, which have lease agreements with the Port.

The Port of Portland's MS4 permit can serve as the implementation plan for the mercury TMDL for the MS4 permit applicable service area. In addition, the Port of Portland will also implement, or continue to implement, management strategies to reduce runoff and erosion from Port of Portland properties that could discharge mercury in stormwater directly to waterbodies in the Willamette Basin, as well as discharges through MS4-permitted conveyances. The Port of Portland must update its TMDL implementation plan to ensure that management measures to reduce erosion and runoff directly to waterbodies are included in their suite of pollutant reduction programs. In addition, the Port of Portland must post its nonpoint source implementation plan to address areas not covered by their MS4 permit applicable service area on a publicly accessible website. Other NPDES permits held by the Port of Portland will be implemented according to requirements set forth in section 13.3.2.2.1.

13.3.1.17 Clean Water Services

Clean Water Services is a water resources management utility for residents living in the Tualatin Basin in Washington County. They manage four wastewater treatment plants and implement the MS4 stormwater permit for approximately 13 jurisdictions.

CWS's MS4 permit can serve as the implementation plan for the mercury TMDL for the MS4 permit applicable service area. In addition, CWS will also implement, or continue to implement, management strategies to reduce erosion and runoff within its stormwater service area that could discharge mercury in stormwater directly to waterbodies, in addition to discharges through MS4-permitted conveyances. CWS must update its TMDL Implementation plan to ensure that management measures to reduce erosion and runoff directly to waterbodies are included in their suite of pollutant reduction programs. In addition, CWS must post its nonpoint source Implementation plan on a publicly accessible website. Other NPDES permits held by CWS will be implemented according to requirements set forth in section 13.3.2.2.1.

13.3.1.18 Tualatin Hills Park and Recreation District

Tualatin Hills Park and Recreation District is responsible for managing over 2,000 acres of land in Washington County. THPRD is a special park and recreation service district funded primarily by property taxes and program fees. Its service area spans the City of Beaverton and many unincorporated areas of eastern Washington County. The district has 27 miles of streams and three lakes within its boundaries.

Measurable objectives, milestones, and WQMP reporting requirements

THPRD will develop an Implementation plan that will include multiple management strategies and actions that address mercury load reductions, including but not limited to those provided in Table 13-15. THPRD will implement these and other management strategies in order to ensure that THPRD, as well as all persons applying for, and holding authorizations to use, THPRD owned land are implementing best management practices that reduce runoff, sediment and erosion.

In addition, THPRD will update their TMDL implementation plan to include specific measurable objectives, milestones and timelines for management strategies that address runoff and erosion within 18 months of the issuance of this TMDL.

Table 13-15. Management Strategies that THPRD implements that reduce mercury loading to the Willamette Basin.

Management Strategies
Continually monitor trail systems; repair or re-route trails to reduce runoff and erosion.
Continue to meet or exceed all Forest Practices Act rules during forestry operations.
Implement riparian restoration projects, which help to filter and reduce sediment delivery to streams.
Use on-site stormwater retention in new park designs to infiltrate stormwater.
Continue to provide education and outreach activities including promoting biking and walking to reduce air emissions.

13.3.1.19 Oak Lodge Water Services District

Oak Lodge Water Services District provides drinking water, wastewater, and watershed protection services in Oak Grove, Jennings Lodge, and portions of Milwaukie and Gladstone.

OLWSD's MS4 permit can serve as the implementation plan for the mercury TMDL for the MS4 permit applicable service area. In addition, OLWSD will also implement, or continue to implement, management strategies to reduce erosion and runoff from OLWSD properties that could discharge mercury in stormwater directly to waterbodies, in addition to discharges through MS4-permitted conveyances. OLWSD must update its TMDL implementation plan to ensure that management measures to reduce erosion and runoff directly to waterbodies are included in their suite of pollutant reduction programs. In addition, OLWSD must post its nonpoint source implementation plan on a publicly accessible website. Other NPDES permits held by OLWSD will be implemented according to requirements in section 13.3.2.2.1.

13.3.1.20 Responsible persons: Sector-specific Water Quality Management Plans

13.3.1.21 Water Delivery and Conveyance Systems

Irrigation districts, drainage districts, and other water delivery and conveyance systems influence the quantity and timing of sediment delivery to downstream river reaches. Return flows

can enter waters of the state through ditches and pipes. Consequently, owners and operators of these systems are included as responsible persons in this WQMP because maintenance and management of these systems can impact sediment transport and erosion. Such systems are responsible only for sedimentation resulting from conveyance systems, not from upland agricultural activities.

Irrigated agriculture is the largest consumptive surface water use in the Willamette Basin, and the volume of water consumed is predicted to increase over the next 50 years. A USGS study found that more than 75 percent of water use in the Willamette Basin was derived from surface flow, and the largest single use was for irrigated agriculture. Growth in irrigation water rights leveled off in the 1990's (Jaeger, Plantinga, Langpap, Bigelow, & Moore, 2017), however the US Army Corps of Engineers recently projected irrigated acres on lands already in agricultural production to increase by more than 70,000 acres between 2020- 2070 within their study area (US Army Corps of Engineers, 2017). While irrigated agriculture continues to be an important and potentially growing demand, there remains a need to characterize the location and extent of irrigation systems in the basin, as well as the management practices used to maintain and operate these systems.

Drainage districts and systems exist primarily to manage stormwater drainage and flooding. Many of these districts were originally formed to help protect the land from flooding so that farming could occur year round. Presently, drainage districts that are registered with the state as special districts often have a tax base that comprise rural tracts of land, as well as commercial and residential properties and parks. Levees, pump stations, ditches, sloughs, streams and culverts are important components of a drainage system and must be continually maintained in order to protect the environment, property and safety.

Water conveyance systems, including those that are managed for irrigation and drainage, are currently regulated by multiple state and federal agencies, including Oregon Water Resources Department, DSL, USACE, and DEQ's 401 water quality certification program. For most waters, a DSL permit is required if a project will involve 50 cubic yards of fill and/ or removal within the ordinary high water line of a stream; this requirement also applies to some ditches. Projects that require a DSL removal-fill permit may also require a Clean Water Act Section 404 permit from the USACE. For these projects, a joint application form can be submitted to both agencies. Existing regulatory programs relevant to these activities are summarized in Table 13-16.

Implementing the requirements and conditions of these permits and Water Quality Certifications include best management practices that meet the TMDL requirements. For projects and activities that are exempt or not permitted by the agencies and programs shown in Table 13-16, owners and operators of water conveyance systems must implement similar best management practices to reduce sediment and erosion, in order to meet the TMDL requirements.

Table 13-16. Existing state and federal agencies and programs that regulate water conveyance systems

Agency	Program	Regulatory permit or certification
U.S. Army Corp of Engineers and U.S. Bureau of Reclamation	Willamette Valley Project	Water Service Contracts
DEQ	401 Program	Water Quality Certification
Department of State Lands	Waterways and Wetlands	Removal/ Fill Permit
Oregon Water Resources Department	Water Rights	Permits for withdrawal, storage, and use

Appendix E: List of designated management agencies and responsible persons lists the water conveyance entities that DEQ has identified as responsible persons. Operation and maintenance of any hydro-modification system that discharges return flows to waters of the state has the potential to impact the timing and quantity of sediment delivery to streams, thus there remains a need to better characterize the geographic location and current operation and maintenance activities related to water conveyance entities in the Willamette Basin. This information will help DEQ and system owners and operators gain a better understanding of their potential impact on reducing sediment and erosion.

There may be additional water conveyance systems in the Willamette Basin that are not included in Appendix B due to limited availability of information about existing systems. However, all systems that have return flows or the potential to discharge to waters of the state should implement management measures to reduce sediment and erosion.

Measurable objectives, milestones, and WQMP reporting requirements

DEQ developed proposed milestones and timelines for working with owners and operators of water conveyance systems (Table 13-17). DEQ will collaborate with watershed partners including ODA and Oregon Water Resources Congress to conduct outreach and education to water conveyance entities over the next two years. DEQ will also work individually with owners and operators of water conveyance systems to gather information and better characterize their potential to discharge or have return flows to the Willamette Basin river network and determine what management and reporting strategies are relevant to their specific operations and maintenance activities.

DEQ expects Water Conveyance entities identified in Appendix E: List of designated management agencies and responsible personsThis spreadsheet calculates wasteload and load allocations for the Willamette Basin Mercury TMDL.

https://www.oregon.gov/deq/wq/Documents/WillHgAllocations.xlsx

Appendix E: List of designated management agencies and responsible persons to work with DEQ as outlined in Table 13-17. Examples of the types of management strategies that responsible persons will be required to implement are shown in Table 13-18.

Table 13-17. Milestones and timelines for DEQ to work with water conveyance entities to plan and carry out implementation of the 2019 Willamette Basin Mercury TMDL

Strategy	Action	Milestone	Estimated Timeline
Conduct outreach and education to water conveyance systems in the Willamette Basin, specifically those identified in Appendix E of the 2019 Willamette Basin Mercury TMDL WQMP.	DEQ will work with Oregon Department of Agriculture, Oregon Department of State Lands, Oregon Water Resources Congress and other watershed partners to provide informational and educational opportunities relevant to the Willamette Basin Hg TMDL.	Individually contact Water Conveyance Entities identified in Appendix E of the Willamette Basin Hg TMDL WQMP using available contact information.	Initial contact completed by June 30, 2019.
		Provide at least one in-person informational meeting during the public comment period	Informational meeting will occur in 2019
Work directly with Water Conveyance Entities to better identify and characterize water conveyance systems identified in Appendix E of the 2019 Willamette Basin Mercury TMDL WQMP.	DEQ will work with water conveyance entities to characterize and document water conveyance systems for purpose of identifying relevant management strategies, and implementation tracking and reporting requirements.	Complete at least one in-person meeting after the public comment period.	Meeting to occur between December 1, 2019 and April 30, 2020.
Work directly with Water Conveyance Entities to develop implementation strategies, objectives, and timelines, and reporting requirements.	Finalize implementation strategies, objectives, timelines and reporting requirements.	Schedule implementation planning and development meetings.	Implementation planning and development meetings to occur between May 1, 2020 and September 30, 2021.
		Water Conveyance Entities will submit DEQ- requested information that is necessary to develop implementation, tracking and reporting strategies and requirements.	All information to be submitted according to schedule identified during one-on-one and/ or aggregate implementation planning and development meetings (see above).
		DEQ will finalize implementation, tracking and reporting requirements.	DEQ will finalize implementation, tracking and reporting requirements by December 31, 2021.

Table 13-18. Examples of Management Strategies that will be required of water conveyance entities named as responsible persons in the 2019 Willamette Basin Mercury TMDL WQMP

Water Quality Protection Management Strategies for Water Conveyance Entities
List of turbidity/sediment control best management practices for watercourse maintenance activities.
Maintain a list of construction or ditch maintenance activities that require state and/ or federal permits or ODFW approval.
Use streambank and/ or canal stabilization practices, including structural and non-structural best management practices.
Manage upland conveyance system infrastructure, for example, roads, pumps, etc. to prevent soil erosion, and sediment delivery to waterbodies.
Conduct education and outreach to water users and upland agricultural and urban land owners that discharge to system.
Monitor and evaluate best management practices and strategies.
Flow and drainage management to reduce erosion, and sediment delivery to streams.
Maintain a schedule for operation and maintenance activities.
Maintain a current map of system, including canals, ditches, pumps, weirs, etc.

13.3.1.22 Reservoir management

Impoundments create conditions where mercury methylation rates are higher than flowing stream segments. Higher methylation rates produce more bioavailable mercury for uptake by the reservoirs' biota resulting in higher fish tissue methylmercury concentrations. There is also potential for release of methylmercury from impoundments to lower stream segments.

According to the Oregon Department of Water Resources dam inventory, there are 414 dams in the Willamette Basin that can store at least 9.2 acre-ft. Included in the inventory are dams defined by OAR 690-020-0022(8):

> "Dam" means hydraulic structure built above the natural ground line that is used to impound water. Dams include all appurtenant structures, and together are sometimes referred to as "the works". Dams include wastewater lagoons and other hydraulic structures that store water, attenuate floods, and divert water into canals.

Collectively, Willamette Basin dams can store over 2.7 million acre-ft. Many of the dams are located in areas under the authority of various DMAs. Appendix E: List of designated management agencies and responsible persons shows dams, owners and DMAs for the 124 dams storing at least 100 acre-ft, which is the smallest capacity of the dams owned by the four largest owners. All DMAs and responsible persons operating reservoir must be aware of factors contributing to increased reservoir methylation rates, which include water level fluctuations, thermal stratification and upland activities that may contribute elemental mercury to reservoirs. DMAs and responsible persons must also be familiar with the operations or conditions resulting in dam releases or discharges to surface water.

The U.S. Army Corps of Engineers, Portland General Electric, U.S. Bureau of Reclamation and Eugene Water and Electric Board are the four largest owners and operators of reservoirs in the Willamette Basin, based on maximum storage volumes. Reservoir implementation requirements pertaining to for these four DMAs are specified below.

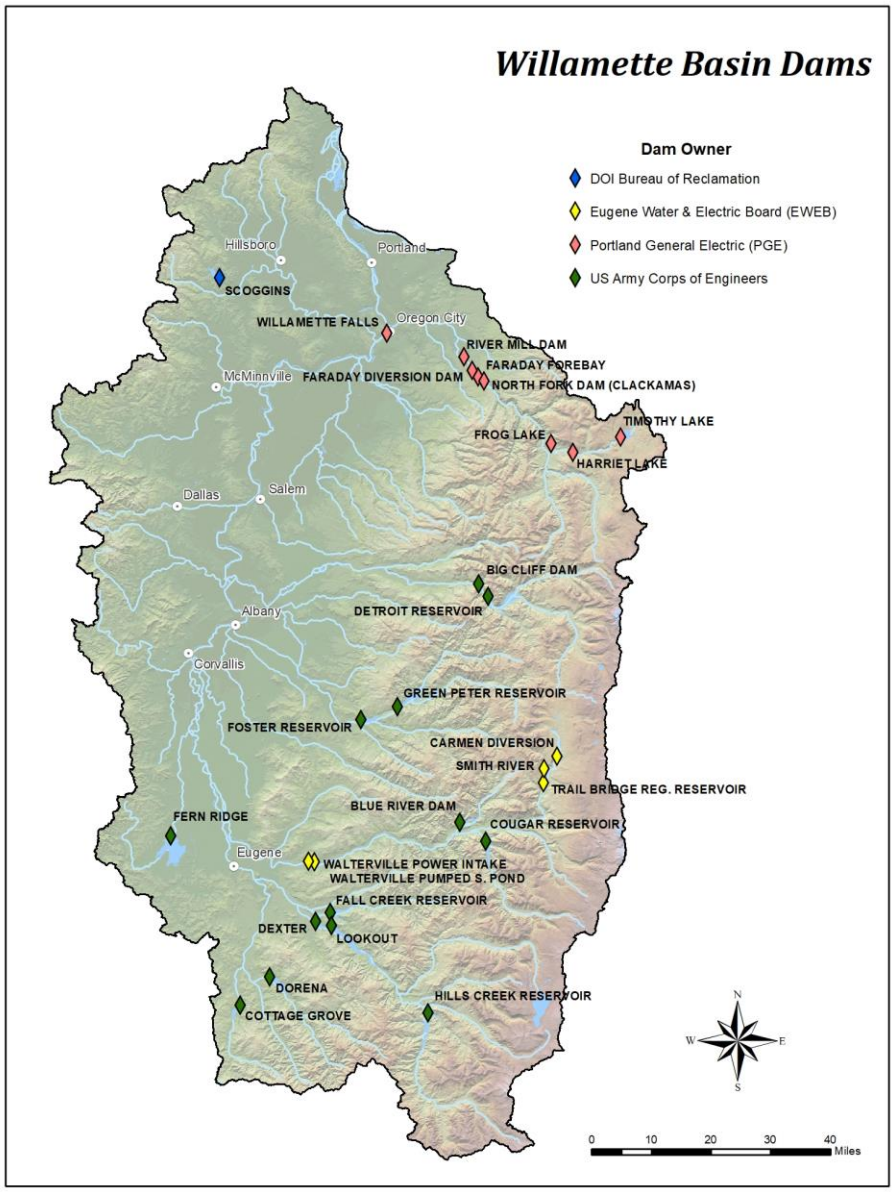

Figure 13-2. Map of Reservoirs Belonging to the Four Largest Owners in the Willamette Basin

Table 13-19. Example of Best Management Practices for Reservoirs

Best Management Practices
Oxidant addition to reservoir bottom waters
Hypolimnetic oxygenation systems
In-reservoir sediment removal or encapsulation
Artificial circulation
Reduction of average water level fluctuations
Vegetation management
Sediment amendment

Measurable objectives, milestones, and WQMP reporting requirements

USACE, PGE, USBOR and EWEB will assess factors affecting methylation rates in their reservoirs by evaluating DEQ specified metrics. These metrics include (1) a reservoir specific-mercury translator, which relates water column total mercury to dissolved methylmercury, like the translator used in the TMDL model, (2) nutrient status, (3) dissolved oxygen profile, (4) water level fluctuations and (5) area of reservoir-adjacent wetlands affected by water level fluctuations. This assessment step will establish baseline conditions for use in adaptive management and inform evaluations of site-specific approaches to reduce methylmercury production. The DMAs will also identify specific measurable objectives with milestones and associated implementation timeline for implementing best management practices that address methylation rates in their reservoirs.

A TMDL implementation plan must be submitted to DEQ within 18 months of TMDL issuance. The plan will describe the timeline for completing the assessment of factors affecting methylation rates, evaluation of site-specific best management practices for reducing methylation, and implementing best management practices to address methylation rates in their reservoirs. The plan will also include a rationale for identifying specific measurable objectives and any additional DMA determined metrics used for tracking measurable objectives. Development of implementation plan elements for the Cottage Grove Reservoir must be coordinated with EPA's Black Butte Mine Superfund Remedial Investigation and Feasibility Study.

The USACE, PGE, USBOR and EWEB will also take part in the Willamette Basin five year review. For more information about five year reviews, see section 13.4.

13.3.1.22.1 U.S. Army Corps of Engineers

Stream flow in the Willamette Basin is highly modified by dam and reservoir operations. The U.S. Congress passed 15 flood control acts between 1938 and 1974 that affect the Willamette Basin and are implemented by USACE. The 13 USACE dams comprise 91 percent of the total dam storage capacity in the basin. These dams provide flood control, navigation, hydroelectric power, and water in summer for irrigation, recreation, and downstream water quality. Dam operations have dramatically changed the natural flow patterns of the Willamette River by reducing peak flows in winter and artificially augmenting summer low flows.

13.3.1.22.2 U.S. Bureau of Reclamation

USBOR operates Scoggins Dam, which impounds Scoggins Creek forming Hagg Lake in the Tualatin sub-basin. Hagg Lake comprises approximately 2 percent of the total dam storage capacity in the Willamette Basin.

13.3.1.22.3 Eugene Water and Electric Board

EWEB is Oregon's largest customer-owned public utility providing electricity and water to Eugene and portions of East Springfield and the McKenzie River Valley. EWEB owns and operates Carmen Diversion, Smith River, Trail Bridge Reservoir, Leaburg Dam and Waterville in the Upper McKenzie sub-basin. These five dams comprise approximately 0.6 percent of the total dam storage capacity in the Willamette Basin.

The Leaburg-Walterville Hydroelectric Project is comprised of two run-of-the-river dams on the McKenzie River. The Leaburg Dam impounds and diverts the McKenzie River through the Leaburg Canal to the Leaburg power plant. Flow from the Leaburg power plant returns to the McKenzie River. The impoundment forms the Leaburg Reservoir.

13.3.1.22.4 Portland General Electric

PGE provides electricity to Portland, Salem and the surrounding areas. PGE owns and operates Timothy Lake, North Fork Dam, River Mill Dam, Faraday Forebay, Faraday Diversion Dam, Frog Lake and Harriet Lake. These seven dams comprise approximately 5 percent of the total dam storage capacity in the Willamette Basin.

13.3.2 Management strategies for point sources

As required in OAR 340-042-0040(4)(l)(E), the following section describes management strategies for point sources. As noted in this TMDL, point source wasteload allocations are applied as percent reductions aggregated across two sectors – permitted wastewater discharges and permitted stormwater discharges. Wasteload allocations are assigned to the permitted source sectors, not to specific dischargers. DEQ determined that the most effective way to optimize mercury reductions is to apply mercury and erosion minimization and control measures that are appropriate for each sector, facility, land use, or activity. Reasonable assurance that point source wasteload allocations will be met is addressed through the issuance or revision of National Pollutant Discharge Elimination System permits.

13.3.2.1 NPDES Wastewater Permits

As described in Section 10, the wastewater sector wasteload allocation is a 10 percent reduction from estimated existing mercury loads discharged under all wastewater permits. Permit categories under the aggregate 10 percent reduction wasteload allocation include: major and minor domestic sewage treatment plant permits; major and minor industrial wastewater permits; and wastewater discharges covered under non-stormwater general permits.

13.3.2.1.1 Domestic Sewage Treatment Plant Wastewater Permits

Major sewage treatment plant facilities

Major sewage treatment plant facilities are facilities with discharges greater than 1 million gallons per day, populations greater than 10,000 or with pretreatment programs classified as "major" and are listed in Table 9-3 in Section 9 on source assessment. For these major STP facilities, consideration of permit renewal will include enforceable conditions for monitoring and reporting of total mercury and development and implementation of mercury minimization programs, in accordance with the most recent version of DEQ's Internal Management Directive on Implementation of Methylmercury Criterion in NPDES Permits, 2013. Required elements include:

- Identification of potential sources of mercury in discharge;
- Implementation and tracking of source reduction activities;
- Monitoring to document effectiveness; and
- Reporting.

As part of the Accountability Framework described in Section 14.1, reporting from major STPs will be tracked and evaluated for progress toward the 10 percent overall wastewater sector reduction of approximately 0.44 g/day or 0.16 kg/yr.

Minor sewage treatment plant facilities

Within the Willamette Basin, estimated total discharge flows from all minor STPs are less than 10 percent of the total discharge flows from all major STPs. In the TMDL Technical Support Document (TetraTech, 2019), the total mercury load from all minor STPs was estimated at 0.095 kilograms/year, or essentially 0 percent of the total mercury load in the basin. DEQ determined that the potential mercury load from minor STP discharges is an insignificant contribution to the estimated 0.8 percent of total mercury load from all STPs within the basin. Therefore, no additional controls or monitoring will be required from minor STPs toward achieving the 10 percent overall wastewater sector reduction of 0.44 g/day or 0.16 kg/yr. As minors qualify to become majors, permit requirements will reflect those described above for major STPs.

13.3.2.1.2 Industrial and General Wastewater Permits

As described in the TMDL Technical Support Document (TetraTech, 2019), the following NPDES permitted industrial activity categories have the potential to include mercury in their process operations:

- timber products;
- paper products;
- chemical products;
- glass/clay/cement/concrete/gypsum products;
- primary metal industries;
- fabricated metal products;
- electronics and instruments.

Permits for facilities that do not include process wastewater discharges of any of the categories of activities in the list above will not include requirements specific to achieving a portion of the aggregated sector-specific 10 percent reduction wasteload allocation.

Major and minor industrial

DEQ evaluated whether the existing eight major (as determined using EPA Industrial Classification worksheet) and 57 minor industrial wastewater permits in the Willamette Basin

discharge process wastewater from any of the above categories of activities. DEQ determined that there are seven major industrial discharges with active permits, and 15 minor facilities that fall into SIC code categories with activities that have the potential to increase mercury in process wastewater discharge. DEQ will confirm these determinations during renewal of each permit. For confirmed facilities, DEQ will evaluate existing data to determine the significance of mercury loads in discharges. DEQ will also consider the potential for measurable reductions toward the 10 percent sector aggregate wasteload allocation in making a determination as to whether development and implementation of a mercury minimization plan is warranted for the facility. Depending on mercury and flow data availability and quality, permits will include, either:

1. If sufficient mercury and flow data exists, enforceable conditions for monitoring and reporting of influent and effluent total mercury and, if determined to be warranted, development and implementation of a mercury minimization plan, in accordance with the most recent version of DEQ's Internal Management Directive on Implementation of Methylmercury Criterion in NPDES Permits, 2013. Required elements include:

    - Identification of potential sources of mercury in discharge;
    - Implementation and tracking of source reduction activities;
    - Monitoring to document effectiveness; and
    - Reporting.

2. If there is insufficient mercury and flow data, enforceable conditions on influent and effluent monitoring and reporting of total mercury and discharge flows. After two years of data collection, effluent mercury and total suspended solids concentrations and discharge flows will be evaluated to determine estimated mercury load discharged, to determine whether development and implementation of a mercury minimization plan is warranted for the facility.

Mercury influent data will also be evaluated in comparison to effluent to inform decisions regarding the need for mercury minimization plans and the potential for intake credits (described in section 13.3.2.1.3).

As part of the Accountability Framework described in Section 14.1, reporting from these industrial facilities will be tracked and evaluated for progress toward the 10 percent overall wastewater sector reduction of approximately 0.44 g/day or 0.16 kg/yr.

General wastewater

With the exception of the 700PM general permit for suction dredge mining, DEQ determined that all categories of the 158 entities currently issued general wastewater permits (36 cooling water, 24 filter backwash, 4 fish hatcheries, 4 boiler blowdown, 9 petroleum hydrocarbon cleanup, 21 wash water, 60 pesticide application) have little to no potential for mercury to be increased in permitted discharges. In addition, flow volumes are insignificant as contributors to the estimated 0.3 percent total load of mercury from industrial discharges into Willamette basin streams. Therefore, no permit requirements are necessary specific to achieving a portion of the aggregated sector-specific 10 percent reduction wasteload allocation.

Discharge flows from suction dredges permitted under the 700PM generally are also insignificant. However, as noted in Section 9.4.1, when operated in areas of historical mercury contamination, studies in Oregon, California, Nevada, Wisconsin and Florida have shown that significant levels of mercury can be disturbed, mobilized and methylated by suction dredging. The high potential for high concentrations of mercury to be released and converted in this

specific subbasin constitutes a significant mercury load. Therefore, upon renewal of the 700PM permit, DEQ will prohibit dredging locations in streams that flow from the former Bohemia Mining District and are tributary to the Dorena Reservoir (including Row River, Brice Creek, Sharps Creek and Champion Creek).

Reductions from ceasing these discharges are expected to contribute to the 10 percent overall wastewater wasteload allocation of approximately 0.44 g/day or 0.16 kg/yr, but will be locally effective in Dorena Reservoir and its tributaries. This small portion of the wasteload allocation will be evaluated as part of the Monitoring Framework, being developed by DEQ and EPA.

13.3.2.1.3 Additional NPDES wastewater permit implementation tools

Variances

If the wasteload allocation results in an unattainable effluent limit for a facility, and treatment options to achieve the effluent limit are not technically, economically or otherwise feasible, the facility has the option of applying to DEQ for a variance in accordance with the variance rule (OAR 340-041-0059). In addition, the Environmental Quality Commission is considering a proposed multiple discharger variance for mercury in the Willamette Basin. If a variance is authorized and applied for, DEQ will incorporate conditions of the variance in the facility's permit consistent with federal and state requirements.

Mercury in intake water

OAR 340-045-0105 specifies the process for intake credits. For some facilities, the only source of mercury in a discharge may be mercury in the intake water drawn directly from the same body of water to which the facility discharges. When intake credits are allowed under the rule, DEQ may reasonably conclude that there is no contribution to an exceedance of the water quality standard. In those instances, DEQ may conclude compliance with the aggregate sector waste load allocation is achieved.

13.3.2.2 NPDES Stormwater Permits

The permitted stormwater sector wasteload allocation is a 75 percent reduction from estimated existing mercury loads discharged under all stormwater permits. As noted in the TMDL and TMDL Technical Support Document (TetraTech, 2019), atmospheric deposition is the major source of mercury. Once mercury is deposited on the landscape it can be eroded and/or transported in stormwater to rivers, streams and other waterbodies.

Permittees will be responsible for applying controls to prevent mercury discharges from within their jurisdictions in light of these mixed sources and delivery mechanisms of mercury. Controls cannot accurately distinguish or specifically target sources, thus DEQ acknowledges that some portion of background sources will be captured by permittee implemented controls and that some portion of sources will remain uncontrolled. The goal is to show achievement of measureable objectives within each jurisdiction toward a 75 percent reduction as an overall sector. Permit categories under the 75 percent reduction wasteload allocation include: MS4 Phase I; MS4 Phase II; 1200-A; 1200-Z; and1200-C/CN/CA.

13.3.2.2.1 Municipal Separate Stormwater Sewer System

As noted in Section 9.4.2, coverage is required for 47 entities under Phase I and Phase II MS4 permits within the Willamette Basin, as listed in Table 9-5.

MS4 Phase I

Upon permit renewal, each MS4 Phase I permit will include the following requirements:

- Develop and submit a mercury minimization section within the Stormwater Management strategy with the second annual report of the renewed permit term, that includes:
    - Evaluation of current actions and their relative effectiveness of reducing the amount of solids discharged into the MS4 system (similar to the actions currently required in Schedule A of the permits); and
    - An effectiveness monitoring strategy to inform implementation of future control measures.
- Continued implementation of the actions described in the stormwater management plan that are effective for mercury reduction, along with documentation in each subsequent annual report (beginning with the third year annual report) of implementation progress.
- An analysis of the effectiveness of the actions taken and qualitative pollutant load reductions achieved in the fourth annual report. Due to data limitations, mercury benchmarks are not applicable in the first permit cycle after the TMDL is finalized.
- Collection of paired total mercury and total suspended solids samples.
- Submittal of monitoring data in the appropriate DEQ data submission template, pollutant load reduction evaluation and wasteload allocation attainment analysis.

MS4 Phase II

DEQ's MS4 Phase II general permit became effective in March 2019. The permit includes requirements for controlling erosion and other pollutants associated with solids entrained in stormwater. Therefore, the jurisdictions covered under the Phase II general permit will not be required to implement any additional control measures toward achieving the 75 percent reduction sector wasteload allocation during the permit term.

For Phase II jurisdictions covered under an individual permit, upon renewal each permit will include, at minimum, the conditions in the MS4 Phase II general permit effective at the time regarding construction and post-construction requirements or requirement to develop, submit and implement a mercury minimization plan with the goal of demonstrating achievement of objectives toward attaining the 75 percent overall sector reduction. The plan must include:

- A description of both structural and non-structural control measures the permittee intends to implement;
- An evaluation of current structural and non-structural control measures and their relative effectiveness;

A control measure effectiveness monitoring strategy to inform implementation of future control measures.

As part of the Accountability Framework described in Section 14.1, reporting from these MS4 Phase I and II jurisdictions will be tracked and evaluated for progress toward the 75 percent overall stormwater sector reduction of approximately 8.48 g/day or 3.10 kg/yr. DEQ will use information from the first permit cycle following issuance of the TMDL to determine future permit requirements needed, if any, to adaptively manage mercury reduction achievement.

13.3.2.2.2 Stormwater General Permits (1200-A, 1200-Z and 1200-C/CN/CA)

Most of the general stormwater permitted sites are located within MS4-permitted and non-permitted urban areas. In the Willamette Basin, these include approximately: 109 registrants under the 1200-A for non-metallic mining and asphalt and concrete plants; 629 registrants under the 1200-Z for industrial facilities; and approximately 1,000 short term registrants under the 1200-C/CN/CA for stormwater control during construction activities.

As noted in the TMDL and Technical Support Document (TetraTech, 2019), mercury loads from general stormwater permits (1200-A, 1200-Z, and 1200-C/CN/CA) were implicit in the modeled MS4-permitted mercury load estimates. There are several existing requirements and planned revisions for these permits that DEQ expects will result in reduction of mercury loads contributing toward the achievement of the overall stormwater sector wasteload allocation of 75 percent reduction.

The NPDES 1200-Z Industrial General Stormwater Permit was re-issued in 2017 and updated in 2018. The 1200-Z permit includes a reduced benchmark for total suspended solids for discharges into the geographic regions of the Portland Harbor (approximately the lowest 10 miles of the Willamette River) and the Columbia Slough. These are the most densely industrialized areas of the Willamette Basin and, according to the TMDL modeling, represent key areas for mercury load reductions from stormwater (TetraTech, 2019). The total suspended solids benchmark for discharges to these areas was set at 30 mg/L, reduced from 100 mg/L for discharges into Portland Harbor and from 50 mg/L in the Columbia Slough. In part, the reduced benchmark targets reduction of toxic substances (including mercury) that are associated with solids in stormwater and wastewater discharges. Upon renewal, it is expected that the 1200-A permit will also include the 30 mg/L total suspended solids benchmark in these two key geographic areas. Implementation of the lowered total suspended solids benchmark in these permits, as well as prohibitions on turbid discharge in the widespread, but temporary 1200-C/CN/CA permits, is anticipated to enhance reduction of mercury loads toward achievement of the overall stormwater sector wasteload allocation of 75 percent reduction. As a result, mercury reductions achieved through current and future general stormwater permit requirements for permitted activities conducted within the MS4-permitted jurisdictions will contribute to the aggregate stormwater sector reductions needed to achieve the wasteload allocation.

13.3.3 Other DEQ Mercury Reduction Programs

13.3.3.1 Regulatory Programs

Air Emissions Mercury Reductions

DEQ achieves mercury reductions from air emissions through implementation of federal Title V permits, state Air Contaminant Discharge permits and the newly adopted state Cleaner Air Oregon program.

Environmental Cleanup Program

DEQ requires responsible parties to remediate contaminated land, groundwater and stream sediment as authorized by OAR 340-122-0070. DEQ Cleanup Program activities related to mercury are focused on abandoned mines in the state and responding with EPA to mercury spills. The Black Butte Mine site, which is a significant source of mercury to the Cottage Grove

Reservoir, is an EPA Superfund site where cleanup actions were implemented in 2018 to address this source.

State Legislation on Mercury in Products

With regard to preventing mercury pollution, the Oregon Legislature adopted several bans, restrictions or management requirements for mercury in products since the 1990s. Those products include:

- Lighting fixtures
- Novelty items
- Thermostats, and
- Vehicle switches

In addition, the 2007 Legislature required dental offices to install dental amalgam separators and related maintenance best management practices to ensure mercury-containing amalgam waste does not end up in wastewater systems.

13.3.3.2 Voluntary programs

Household and small business mercury waste collection activities

DEQ's Solid and Hazardous Waste programs have initiated and implemented multiple specialized collection and exchange projects for mercury-containing products, including collecting mercury wastes at numerous one-day household hazardous waste collection events throughout Oregon. For more information about household hazardous waste events visit DEQ's website: https://www.oregon.gov/deq/Hazards-and-Cleanup/hw/Pages/hhw.aspx.

- **Thermometers** – A thermometer exchange program was initiated to reduce the amount of mercury in homes and ensure proper disposal of mercury thermometers. DEQ provides free digital thermometers at collection events to citizens turning in a mercury containing thermometer. DEQ also supplies local governments with free digital thermometers to encourage them to implement their own exchange programs. Currently, DEQ averages approximately one digital thermometer exchange for every 50 participants.
- **Thermostats** – The Thermostat Recycling Incentive project was initiated by DEQ, Portland General Electric, the Thermostat Recycling Corporation and the Product Stewardship Institute to encourage recycling of mercury containing thermostats. Between 2006 and 2007, contactors participating in the program received $4 rebate coupons for each mercury-containing thermostat they returned to a participating wholesaler for recycling. The coupons could be used toward the purchase of mercury-free Energy Star ® qualified thermostats. From 2010 to 2013, DEQ covered the $25 registration cost for contractors and local governments to receive a Thermostat Recycling Corporation collection bin.
- **Dairy Manometers** – DEQ worked with dairy and agricultural organizations in 2005 and 2006 to replace mercury manometers (pressure-measuring devices) used in dairy farm milking operations with mercury-free digital vacuum gauges. The mercury-containing manometers were managed and disposed of properly by DEQ's hazardous waste contractor. An EPA grant provided $300 to each participant to cover most of the costs associated with supplying and installing the mercury-free replacement pressure-measuring device.

- **Dental Mercury Wastes** – DEQ has been working with the Oregon Dental Association and the Oregon Association of Clean Water Agencies since 2003 to improve the management of mercury-containing wastes, such as dental amalgam. The partners sponsor an annual mercury waste collection event held in conjunction with the annual dental association conference. DEQ's Solid Waste program funded the collection and disposal of the waste in collaboration with local household hazardous waste programs.
- **Mercury Auto Switches** – The Northwest Auto Trades Association, the Oregon Environmental Council, local governments, and DEQ began a program in 2001 to replace mercury-containing automotive light switches in consumer automobiles with mercury-free ball-bearing switches free of charge. Eligible cars were 2002 and older. DEQ's Hazardous Waste program also developed and distributed a fact sheet on mercury switch removal for automobile dismantlers in Oregon.
- **Suction Dredge Mining Waste Mercury** – DEQ worked with a hobby mining association in 2002 and 2003 on various activities including sponsoring two mercury waste collection events in Myrtle Creek.
- **Fluorescent Lamps** – Fluorescent light tubes and compact fluorescent bulbs can be taken to a household hazardous waste collection event or facility. For more information about collection events visit DEQ's website: https://www.oregon.gov/deq/Hazards-and-Cleanup/hw/Pages/Mercury-Disposal.aspx

Household and small business mercury education and reporting activities
DEQ's Solid and Hazardous Waste programs continue to partner with various organizations, local governments and non-profits to educate households and businesses about proper management of mercury-containing products and alternatives. DEQ also initiated an effort to collect better data on mercury waste generated by businesses. Specific activities implemented between 2002 and 2006 include the following:

- **Educational materials** – DEQ developed educational fact sheets on the proper management of mercury-containing products and wastes, including cleaning up mercury spills.
- **Dental offices** – At the Oregon Dental Association's annual conference DEQ staff assist with educational outreach to participating dentists. In addition, DEQ developed a simplified tax credit application and fact sheet for dentists installing amalgam separators.
- **Fluorescent lamps** – The Hazardous Waste program participated in several lighting fairs sponsored by electric utilities to provide educational information on proper disposal of mercury-containing fluorescent lamps. In addition, DEQ worked with the Oregon Environmental Council to develop a lamp fact sheet for property management companies.
- **Suction dredge miners** – DEQ developed printed educational information for miners on proper mercury management
- **Reporting on mercury containing hazardous waste** –DEQ's hazardous waste generation annual reporting form was modified to request specific information on the generation and management of mercury containing wastes from businesses and other entities required to submit these reporting forms.

13.4. Timeline for implementing management strategies

The purpose of this element of the WQMP, required by OAR 340-042-0040(4)(l)(D), is to demonstrate a strategy for implementing and maintaining the implementation plan, and to evaluate water quality improvements over time. Included in this section are timelines for TMDL implementation activities for nonpoint sources and point sources.

13.4.1 Nonpoint Source DMAs and responsible persons

Each nonpoint source DMA and responsible person will submit a TMDL implementation plan that includes timelines for implementation of the measurable objectives and milestones described in section 13.3.1. Timelines will be specific wherever possible and will include a schedule for implementation and evaluation of strategies, and reporting dates and milestones for evaluating progress. TMDL implementation plans must be submitted to DEQ for approval within 18 months of the issuance of the TMDL, or earlier if desired (for example, DMA's may wish to have their plans coincide with already established deadlines for annual reports). DMAs should work with DEQ basin coordinators on specific submission requirements.

Adaptive management is a central element of individual implementation plans, this WQMP, and the TMDL. As part of adaptive management, DEQ intends to regularly review the progress of implementation plans. Through ongoing monitoring and evaluation, DEQ, DMAs and responsible persons can learn from experience and modify policy and implementation approaches in order to achieve better environmental outcomes.

Annual reports

Cities and counties that have been named DMAs in this WQMP will have annual reporting requirements. DMAs will report on progress in implementing nonpoint source strategies identified in the TMDL implementation plans, including any delays or challenges DMAs had in implementing strategies. DMAs may combine reporting for mercury along with other Willamette Basin TMDL pollutants. Annual reports must be posted on a publicly accessible website unless a DMA does not have a website.

Responsible persons and DMAs (which include special districts, and local, state and federal agencies) will report on implementation progress of nonpoint source strategies, which may include annual reports. Implementation strategies will be identified in TMDL implementation plans, as described in an existing Memorandum of Understanding or Memorandum of Agreement, or as directed by DEQ.

Willamette Basin TMDL Five Year Review

The 2006 Willamette Basin TMDL required the development and submission of TMDL implementation plans with annual reporting to DEQ. The 2006 TMDL also required DMAs and responsible persons to submit a report every five years to assess effectiveness of the management strategies identified in implementation plans and emplaced during the preceding four years. As part of the five year review, DEQ evaluates the number of implementation plans and annual reports submitted by DMAs and responsible persons, and the adequacy of the strategies contained in those plans to reduce pollutant inputs and restore water quality. These reviews have provided valuable feedback to the agency on successes and challenges DMAs experience in implementing their nonpoint source program. For this reason, DEQ will continue

to require all nonpoint source DMAs and responsible persons, unless otherwise notified by DEQ, to include progress in implementation of mercury reduction strategies with their five year report as described in this WQMP.

Willamette Basin five year reviews occurred in 2013 and 2018, and the Molalla-Pudding five year review occurred in 2015. The next five-year reviews for the Molalla-Pudding and the Willamette Basin TMDLs are planned to occur in 2021 and 2023, respectively. DEQ expects that management strategies related to mercury will be included in the Willamette Basin 2023 five year review, even though four complete years of mercury implementation based on the updated WQMP will not have occurred by then. The objective of this timeline is to retain a consistent five-year reporting cycle for current and future Willamette Basin TMDLs. DEQ will post five year review reports to its website.

In the five year reviews, DMAs and responsible persons must address progress in implementing mercury reduction strategies, in addition to other nonpoint source pollutants established under previous Willamette TMDLs for which they were named as DMAs or responsible persons. Details of this submittal will be provided by DEQ to DMAs and responsible persons in advance of the deadline for these reports. Entities such as state and federal agencies with a Memorandum of Understanding or Memorandum of Agreement with DEQ may have different or additional reporting requirements.

During the five year review, DMAs must review their implementation plans in collaboration with DEQ staff to evaluate whether strategies, timelines, milestones, or other components of the plan should be updated for the next five years. DMAs and responsible persons may also update implementation plans more often than every five years due to significant changes in TMDL pollutant reduction strategies or program priorities.

13.4.2 Point sources

Provisions to address the appropriate point source wasteload allocations will be incorporated into National Pollutant Discharge Elimination System permits when permits are renewed by DEQ. A schedule for meeting the requirements associated with this TMDL will be incorporated into the permit. Like other permit conditions, compliance with the terms and conditions of the permit is required by state and federal law. NPDES permittees will implement the permit renewal requirements described in Section 13.3.2.

Table 13-20. The timeline for activities related to this WQMP and associated DMA and responsible person Implementation plans, and NPDES permits.

Activity	Year of Activity				
	2019	2020	2021	2022	2023
DEQ modification of affected NPDES Wastewater and Stormwater Permits	Upon permit renewal				
Ongoing implementation of DEQ- approved plans that DMAs and responsible persons already have in place	X	X			
Designated Management Agencies and responsible persons (see Appendix E of WQMP) develop and/ or update, and submit implementation plans within 18 months of TMDL issuance		X	X		

Activity	Year of Activity				
	2019	2020	2021	2022	2023
Implementation of new, updated or revised DMA and responsible person implementation plans			X	X	X
DMA and responsible person submittal of annual reports	X	X	X	X	X
DEQ, DMA and responsible person five year review of implementation					X

13.5. Timeline for attainment of water quality standards

This WQMP component is required by OAR 340-042-0040(4)(l)(F). The timeline for attainment of water quality standards for this TMDL is expected to take multiple decades. The primary source of mercury in the basin is air deposition, and while efforts to reduce emissions in North America are ongoing, continued air emissions from global sources may offset these efforts. Other sources of mercury are varied and include buffering and re-release of mercury from the ocean, re-suspension of sediment-bound mercury in waterbodies, and changes in total mercury in groundwater. These legacy mercury deposits will take years to diminish.

Nonpoint sources of mercury contribute more mercury to the basin relative to point sources. Therefore, it is especially important for this TMDL for nonpoint sources to make timely progress toward meeting the TMDL load allocations. DEQ expects nonpoint source DMAs and responsible persons to meet the interim milestones for percent reductions (Table 13-21). If interim milestones are not met, DEQ may require DMAs and responsible persons to revise their implementation plans and implementation timelines accordingly (OAR 340-042-0080(4)(b)).

If DEQ determines that private forest operations regulated under the Forest Practices Act are not making satisfactory progress toward meeting milestones or achieving load allocations, or if DEQ determines that the general Forest Practices Act rules are not sufficient for meeting allocations, site specific rules under the Forest Practices Act rules will need to be created or revised. If the site specific rules are not implemented, DEQ will request the Environmental Quality Commission to petition the Board of Forestry to make necessary changes (OAR 340-042-0080(2)).

If DEQ determines that agricultural practices subject to the Agricultural Water Quality Management Act are not making satisfactory progress toward meeting milestones or achieving load allocations, or if the area plan and rules are not adequate to ensure implementation of the load allocation, the department will provide Oregon Department of Agriculture with comments on what would be sufficient to meet TMDL load allocations during each biennial review process. Should that effort not be sufficient DEQ will request the Environmental Quality Commission to petition ODA to make the necessary changes (OAR 340-042-0080(3)).

Table 13-21. Timeline for reaching interim milestones for the general nonpoint source 88 percent reduction in instream mercury levels. Assessment of progress will be supported by water quality monitoring conducted by DEQ and watershed partners.

Assessment Year	Cumulative Percent Reduction Milestones for Instream Mercury
2028	30
2038	60
2048	88

13.6. Monitoring and evaluation

As required in OAR 340-042-0040(4)(l)(K), this section describes DEQ's plan to monitor and evaluate progress toward achieving TMDL allocations and water quality standards.

Accountability and evaluation has two basic components: 1) tracking the implementation of DMA-specific water quality implementation plans identified in this document and 2) monitoring the physical, chemical and biological parameters for water quality. Monitoring will provide a check on the progress being made toward achieving the TMDL allocations and meeting water quality standards, and will be used as part of the Adaptive Management process (Figure 13-1) The estimated timeline for achieving water quality standards is multiple decades.

The objectives of this monitoring effort are to demonstrate long-term recovery, better understand natural variability, and track implementation of projects and best management practices, and track effectiveness of TMDL implementation. This monitoring and feedback mechanism is a major component of the "reasonable assurance of implementation" for the Willamette Basin WQMP.

DMA-specific implementation plans will be tracked by accounting for the numbers, types and locations of projects, best management practices, education activities, or other actions taken to improve or protect water quality. The mechanism for tracking DMA and responsible person implementation efforts will be annual reports to be submitted to DEQ.

The information generated by each of the agencies or entities gathering data in the Willamette 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 five year cycle. If progress is not occurring, then the appropriate DMA or responsible person will be contacted with a request for action.

DEQ and EPA are currently developing an *Assessment and Monitoring Strategy to Support Implementation of Mercury Total Maximum Daily Loads for the Willamette Basin*. This monitoring strategy will be used to evaluate effectiveness of DMA and responsible person implementation strategies at meeting allocations and may require certain DMAs to collect data. The monitoring strategy will also be used to determine progress in the Willamette River and its tributaries toward meeting the total mercury loading capacity of 0.14 ng/L, methylmercury fish tissue criteria of 0.04 mg/kg, and instream total suspended solid surrogate allocations. DEQ will finalize this monitoring strategy after the issuance of the TMDL.

13.7. Costs and funding

This section provides a general discussion of costs and funding for implementing management strategies as required by Oregon Administrative Rule 340-042-0040(4)(l)(N). Please note that sector-specific or source-specific implementation plans may provide more detailed analyses of costs and funding for specific management strategies.

Designated Management Agencies will be expected to provide a fiscal analysis of the resources needed to develop, execute and maintain the programs described in their Implementation plans. The purpose of this element is to describe estimated costs and demonstrate there is sufficient funding available to begin implementation of the WQMP. Another purpose is to identify potential future funding sources for project implementation.

Funding is essential to implementing projects associated with this WQMP. There are many sources of local, state, and federal funds. Table 13-22 provides a partial list of funding and assistance programs available in the Willamette Basin.

Table 13-22. Partial list of funding programs available in the Willamette Basin that may be used to support planning and implementation activities that benefit water quality

Program	General Description	Contact
Clean Water State Revolving Fund	Loan program for below-market rate loans for planning, design, and construction of various water pollution control activities.	DEQ
Conservation Reserve Enhancement Program (CREP)	Provides annual rent to landowners who enroll agricultural lands along streams. Also cost-shares conservation practices such as riparian tree planting, livestock watering facilities, and riparian fencing.	NRCS, SWCDs, ODF
Conservation Reserve Program (CRP)	Competitive CRP provides annual rent to landowners who enroll highly erodible lands. Continuous CRP provides annual rent to landowners who enroll agricultural lands along seasonal or perennial streams. Also cost-shares conservation practices such as riparian plantings.	NRCS, SWCDs
Conservation Stewardship Program (CSP)	Provides cost-share and incentive payments to landowners who have attained a certain level of stewardship and are willing to implement additional conservation practices.	NRCS, SWCDs
Drinking Water Source Protection Fund	These funds allow states to provide loans for certain source water assessment implementation activities, including source water protection land acquisition and other types of incentive-based source water quality protection measures.	Oregon Health Authority
Emergency Watershed Protection Program (EWP)	Available through the USDA-Natural Resources Conservation Service. Provides federal funds for emergency protection measures to safeguard lives and property from floods and the products of erosion created by natural disasters that cause a sudden impairment to a watershed.	NRCS, SWCDs
Environmental Protection Agency Section 319 Grants	Fund projects that improve watershed functions and protect the quality of surface and groundwater, including restoration and education projects.	DEQ, SWCDs, Watershed Councils
Environmental Quality Incentives Program (EQIP).	Cost-shares water quality and wildlife habitat improvement activities, including conservation tillage, nutrient and manure management, fish habitat improvements, and riparian plantings.	NRCS, SWCDs
Farm and Ranchland Protection Program (FRPP)	Cost-shares purchases of agricultural conservation easements to protect agricultural land from development.	NRCS, SWCDs
Federal Reforestation Tax Credit	Provides federal tax credit as incentive to plant trees.	Internal Revenue Service

Program	General Description	Contact
Grassland Reserve Program (GRP)	Provides incentives to landowners to protect and restore pastureland, rangeland, and certain other grasslands.	NRCS, Farm Service Agency, SWCDs
Landowner Incentive Program (LIP)	Provides funds to enhance existing incentive programs for fish and wildlife habitat improvements.	U.S. Fish and Wildlife Service, ODFW
Oregon Watershed Enhancement Board (OWEB)	Provides grants for a variety of restoration, assessment, monitoring, and education projects, as well as watershed council staff support. 25 percent local match requirement on all grants.	SWCDs, Watershed Councils, OWEB
Oregon Watershed Enhancement Board Small Grant Program	Provides grants up to $10,000 for priority watershed enhancement projects identified by local focus group.	SWCDs, Watershed Councils, OWEB
Partners for Wildlife Program	Provides financial and technical assistance to private and non-federal landowners to restore and improve wetlands, riparian areas, and upland habitats in partnership with the U.S. Fish and Wildlife Service and other cooperating groups.	U.S. Fish and Wildlife Service, NRCS, SWCDs
Public Law 566 Watershed Program	Program available to state agencies and other eligible organizations for planning and implementing watershed improvement and management projects. Projects should reduce erosion, siltation, and flooding; provide for agricultural water management; or improve fish and wildlife resources.	NRCS, SWCDs
Resource Conservation & Development (RC & D) Grants	Provides assistance to organizations within RC & D areas in accessing and managing grants.	Resource Conservation and Development
State Forestation Tax Credit	Provides for reforestation of under-productive forestland not covered under the Oregon Forest Practices Act. Situations include brush and pasture conversions, fire damage areas, and insect and disease areas.	ODF
Stewardship Program	Provides cost share dollars through USFS funds to family forest landowners to have management plans developed.	ODF
State Tax Credit for Fish Habitat Improvements	Provides tax credit for part of the costs of voluntary fish habitat improvements and required fish screening devices.	ODFW
Stewardship Incentive Program (SIP)	Cost-sharing program for landowners to protect and enhance forest resources. Eligible practices include tree planting, site preparation, pre-commercial thinning, and wildlife habitat improvements.	NRCS, SWCDs, ODF
Wetlands Reserve Program (WRP)	Provides cost-sharing to landowners who restore wetlands on agricultural lands.	NRCS, SWCDs
Wildlife Habitat Incentives Program	Provides cost-share for wildlife habitat enhancement activities.	NRCS, SWCDs
Wildlife Habitat Tax Deferral Program	Maintains farm or forestry deferral for landowners who develop a wildlife management plan with the approval of the Oregon Department of Fish and Wildlife.	ODFW, SWCDs, NRCS

13.8. Citation legal authorities

As required in Oregon Administrative Rule 340-042-0040(4)(l)(O), this section cites legal authorities relating to implementation of management strategies.

Clean Water Act, Section 303(d)

The DEQ is the Oregon state agency responsible for implementing the Clean Water Act in Oregon. The EPA delegates many Clean Water Act authorities to the State of Oregon which is administered by the Oregon Environmental Quality Commission through Oregon Revised Statute. Section 303(d) of the 1972 Federal Clean Water Act as amended requires states to develop a list of rivers, streams and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. These waters are referred to as “water quality limited.” Water quality limited waterbodies must be identified by the EPA or by a state agency which has been delegated this responsibility by EPA. In Oregon, the responsibility to delegate water quality limited waterbodies rests with DEQ and DEQ’s list of water quality limited waters is updated 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. The Oregon Environmental Quality Commission granted the DEQ Director authority to develop TMDLs and issue them as orders (OAR 340-042-0060). DEQ was granted authority by the commission to implement TMDLs through OAR 340-042 with special provisions for agricultural lands and nonfederal forestland as governed by the Agriculture Water Quality Management Act and the Forest Practices Act, respectively. The EPA has the authority under the Clean Water Act to approve or disapprove TMDLs that states submit. When a TMDL is officially submitted by a state to EPA, EPA has 30 days to take action on the TMDL. In the case where EPA disapproves a TMDL, EPA must issue a TMDL within 30 days. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed 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.

Endangered Species Act, Section 6

Section 6 of the 1973 federal Endangered Species Act, 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 the National Marine Fisheries Service to list the activities that could result in a “take” of species they are charged with protecting. With regard to this TMDL, NMFS’ protected species are salmonid fish. NMFS 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 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.

Oregon Revised Statute Chapter 468B

DEQ is authorized by law to prevent and abate water pollution within the State of Oregon. Particularly relevant provisions of this chapter include:

ORS 468B.020 Prevention of pollution

(A) 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.

(B) In order to carry out the public policy set forth in ORS 468B.015, the Department of Environmental Quality 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.

ORS 468B.110 provides DEQ and the EQC with authority to take actions necessary to achieve and maintain water quality standards, including issuing TMDLs and establishing wasteload allocations and load allocations.

NPDES and WPCF Permits

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 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.

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

'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.

USACE Dam Operation and Management

In association with other federal statues, including House Document No. 531 Volume V, the River and Harbor Act, the Flood Control Act, and the Water Resources Development Act, the USACE is charged with operating its projects in compliance with the federal Clean Water Act, and in accordance with all federal, State, interstate and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water quality pollution as per Title 1 Section 313 (33 U.S.C. 1323).

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 (ORS 527.610 to 527.992, and OAR 629 Divisions 600 through 665). The Board of Forestry has adopted water protection rules, including but not limited to OAR Chapter 629, Divisions 625, 630, and 635-660, which describe best management practices for forest operations. The Oregon Environmental Quality Commission, Board of Forestry, DEQ, and ODF have agreed that these pollution control measures will primarily be relied upon to result in achievement of state water quality standards. 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, OAR 629-035-0100, and OAR 340-042-0080.

Agricultural Water Quality Management Act

The Oregon Department of Agriculture has primary responsibility for control of pollution from agricultural sources (ORS 561.191). This is accomplished through the Agriculture Water Quality Management program authorities granted ODA under Senate Bill 1010 adopted by the Oregon State Legislature in 1993 (ORS 568.900 to ORS 568.933 and OAR 603-090-000 to 603-090-0120) The Agricultural Water Quality Management Plan 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 water 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. Water Quality area rules for areas within the Willamette Basin include OAR 603-095-2100 to 1160, OAR 603-095-2300 to 2360, OAR 603-095-2600 to 2660, and OAR 603-095-3700 to 3760.

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.

14. Reasonable Assurance

OAR 340-042-0030(9) defines Reasonable Assurance as “a demonstration that a TMDL will be implemented by federal, state or local governments or individuals through regulatory or voluntary actions including management strategies or other controls.” OAR 340-042-0040(4)(l)(J) requires a description of reasonable assurance that management strategies and sector-specific or source-specific implementation plans will be carried out through regulatory or voluntary actions.

The Clean Water Act section 303(d) requires that a TMDL be “established at a level necessary to implement the applicable water quality standard.” Federal regulations define a TMDL as “the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources and natural background” [40 CFR 130.2(i)].

When a TMDL is developed for waters impaired by point sources only, the existence of the NPDES regulatory program and the issuance of NPDES permits provide the reasonable assurance that the wasteload allocations in the TMDL will be achieved. That is because federal regulations implementing the Clean Water Act require that water quality-based effluent limits in permits be consistent with “the assumptions and requirements of any available [wasteload allocation]” in an approved TMDL [40 CFR 122.44(d)(1)(vii)(B)].

Where a TMDL is developed for waters impaired by both point and nonpoint sources, it is the state’s and EPA’s best professional judgment as to reasonable assurance that the TMDL’s load allocations will be achieved. EPA past practice directs that these determinations include consideration of whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) have a high likelihood of implementation.

Where there is a demonstration that nonpoint source load reductions can and will be achieved; a determination that reasonable assurance exists and, on the basis of that reasonable assurance, allocation of greater loads to point sources is appropriate. Without a demonstration of reasonable assurance that relied-upon nonpoint source reductions will occur, reductions to point sources wasteload allocations are needed.

Because of the well-documented lag time for instream responses to effective mercury reductions from controls on point and nonpoint sources (United Nations Environment Programme, 2019), DEQ anticipates that attainment of instream target mercury concentrations and reduced fish tissue methylmercury concentrations will take decades.

The Willamette Basin Mercury TMDL was developed to address both point and nonpoint sources with load reduction allocations proportional to estimated source contributions and in consideration of opportunities for effective measures to reduce those contributions. There are several elements that combine to provide the reasonable assurance to meet federal and state requirements. Education, outreach, technical and financial assistance, permit administration, permit enforcement, DMA or responsible person’s implementation and DEQ enforcement of TMDL implementation plans will all be used to ensure that the goals of this TMDL are met. Details of these elements are provided in the WQMP (Section 13) and are summarized in the sections that follow.

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14.1. Accountability framework

Reasonable assurance that needed load reductions will be achieved for nonpoint sources is based primarily on an accountability framework incorporated into the WQMP, together with the implementation plans of DMAs and responsible persons. This approach is similar to the accountability framework adopted by EPA for the Chesapeake Bay TMDL, which was adopted in 2010 and can be accessed from EPA's website: https://www.epa.gov/chesapeake-bay-tmdl/chesapeake-bay-tmdl-document. The reasonable assurance and accountability framework for this draft TMDL include the following elements:

Figure 14-1. A Representation of the Reasonable Assurance Accountability Framework Led by DEQ.

14.1.1 Pollutant reduction strategies

Section 13.3 identifies management strategies and specific implementation actions needed to achieve the identified pollutant reductions. These strategies and actions are comprehensively implemented through a variety of regulatory and non-regulatory programs. Many of these are existing strategies and actions that are already being implemented within the basin or elsewhere in the state and demonstrate reduced mercury loading. These strategies are technically feasible at an appropriate scale in order to meet the load allocations that are proposed for DMAs and responsible persons. A high likelihood of implementation is demonstrated because DEQ reviews the individual implementation plans and proposed actions for adequacy, establishes a monitoring and reporting system to track implementation and is establishing surrogate outcome measures that also will be monitored. Where implementation is not occurring, or where surrogate measures are not being met, DEQ will take action to require DMAs and responsible

persons to take corrective action. Key reduction strategies include: control of all air emissions sources greater than 1 kg/year of mercury within Oregon; implementation of Oregon-wide dental amalgam treatment since 2007; Oregon bans on products containing mercury; remediation of legacy mining mercury sources; point source permit requirements; and nonpoint source implementation plans from 12 state and federal agencies and dozens of local governments, special districts and other responsible parties.

14.1.2 Identify relevant DMAs

Section 13.2.3 and Appendix E: List of designated management agencies and responsible persons identify approximately 171 DMAs and responsible persons that will implement the WQMP management strategies and develop or revise their own implementation plan. This category captures additional entities identified since the 2006 TMDL was issued. In this 2019 revision, DEQ is including explicit allocations and requirements for control of mercury in stormwater and direct discharges from urban areas that do not yet meet the population thresholds requiring municipal stormwater permits and also for water conveyance maintenance practices. This significantly expands the numbers of DMAs and responsible persons actively applying mercury controls in the Willamette Basin. DEQ Willamette Basin coordinators work individually with these DMAs and responsible persons on developing and implementing the required management strategies to reduce mercury. All of these factors increases robustness of TMDL implementation throughout the basin.

14.1.3 Develop timeline, targets, measurable objectives

Section 13.4 provides comprehensive timelines for implementing management strategies. This includes schedules for revising permits, submittal of reports, achieving appropriate incremental and measurable water quality targets, and completion of other measurable milestones. These timelines support the accountability framework by requiring timely action by both DEQ and DMAs and responsible persons so that enforcement and adaptive management actions can be triggered and evaluation of attainment of TMDL goals occurs.

14.1.4 Evaluate implementation plans and progress

As provided in Section 13.4, DEQ will evaluate new or revised implementation plans from DMAs and responsible persons. This will ensure that the actions and measures included in the plans are feasible and have a high likelihood of being implemented and achieving load allocations. In addition, DEQ is proposing TSS as a surrogate measure for evaluating implementation of the allocations for the mainstem Willamette River and its tributaries. TSS will be used for evaluating the effectiveness of implementation plans. Monitoring locations will be described in the *Assessment and Monitoring Strategy to Support Implementation of Mercury Total Maximum Daily Loads for the Willamette Basin*. DEQ will use the monitoring data to determine trends in both the TSS surrogate measure and available data for mercury in the water column and in fish tissue.

As noted in Sections 13.5 and 13.6, DEQ will track the management strategies being implemented and evaluate achievements against established timelines and milestones. At a minimum, this will occur in the Willamette Basin through DEQ's Five Year Reviews.

In making determinations about the effectiveness and implementability of mercury reduction measures, DEQ relies heavily on DMA and responsible person experience with measures

specific to reducing erosion and runoff from their specific activities. The wide variety of potential actions that will be applied by 171 DMAs and responsible persons across dozens of point source sectors and land use activities prevent unilateral mandating of preferred practices and conclusions about their specific success. However, examples of where proven techniques are applied to reduce mercury give confidence that DEQ's approach is reasonable and will effective for reducing mercury. Some examples of effective controls since implementation of the 2006 Willamette Basin Mercury TMDL began include:

- Oregon's two most significant air emissions mercury sources in 2006 were a coal-fired electric generation plant in Boardman and a cement plant in Durkee. In 2007, DEQ put strict control requirements in place on these facilities. Reductions in mercury emissions of 94 and 97 percent, respectively, have since been achieved and the coal plant is closing in 2020.
- The 2019 Cleaner Air Oregon regulations will address the largest air source of mercury in the Willamette Basin. This source currently comprises 70 percent of the total mercury air emissions within the Willamette Basin. Controls under this program are expected to achieve significant reductions.
- Clean Water Services operates four municipal sewage treatment plants serving more than a half a million residents in Washington County, Oregon. Advanced treatment technologies are employed at its facilities and mercury minimization measures have been implemented since at least 2004. While the systems are not designed specifically to address mercury, the facilities consistently achieve 97 to 99 percent mercury removal efficiencies. Effectiveness of mercury minimization measures, particularly reduced dental amalgam contributions, is also demonstrated by declining levels of mercury in biosolids between 2006 to 2018.
- ODA and DEQ have worked together to complete biennial reviews of Agricultural Water Quality Management Plans in the Upper, Middle and Lower Willamette Basin areas. These reviews report on water quality at a number of stations, including the status and trends in TSS levels. Although data are limited, these reports illustrate how DEQ will continue to work with ODA to focus work on agricultural lands to reduce sedimentation and mercury loading. DEQ will take a similar approach with both federal and non-federal forest lands.

Among both point and nonpoint sources, there is variation as to maturity of programs focused on mercury minimization measures. DEQ anticipates that entities with longer experience in implementing measures targeting mercury, particularly erosion and runoff controls, will continue to achieve modest reductions using strategies and techniques that have evolved over time. DEQ expects that entities that have not yet begun implementing mercury minimization measures can learn from practices employed by entities with more mature programs. In addition, DEQ expects that entities employing these techniques and strategies for the first time have greater reduction potential. Together, optimized mercury reduction actions applied broadly across all sources is anticipated to achieve the aggregated sector-specific allocations over time.

14.1.5 Take action on failure to implement

Following up on reviews to track progress of implementation plans, DEQ will take appropriate action if the DMAs or responsible persons fail to develop or effectively implement their implementation plan or fulfill milestones. DEQ's actions can take two tracks, enforcement or engagement in voluntary initiatives. DEQ uses both, as appropriate within the process, to achieve optimal pollutant reductions. In some cases DEQ can assist in facilitating the availability of incentives for meeting voluntary initiatives or providing education. DEQ will also take

enforcement actions where necessary based on authorities listed in Section 13.8, or raise the issue to the EQC as provided in OAR 340-042-0080.

14.1.6 Track water quality status and trends

As noted above in Section 13.6, DEQ is tracking water quality status and trends concurrently as management strategies are implemented. DEQ is relying on a system of interconnected evaluations, which include DMAs meeting measurable objectives, effectiveness demonstration of mercury management strategies, accountability of implementation, discharge monitoring and instream monitoring. Together, these data and evaluations will allow refinement of focus on specific geographic areas or discharges and appropriate implementation of adaptive management actions to attain, over time, the objectives of the TMDL. In partnership with EPA, DEQ is currently developing an *Assessment and Monitoring Strategy to Support Implementation of Mercury Total Maximum Daily Loads for the Willamette Basin*. Intended to be a living document, this plan will serve as the overarching structure to tie together the information gained from the other evaluations during implementation of the TMDL by the 171 DMAs and responsible persons.

Tracking of water quality status and trends will include DEQ tracking and reporting on:

- TMDL implementation plan submittals, reviews, and approvals
- DMA, responsible person and permittee implementation of management actions
- Instream compliance points for allocations, in conjunction with revisiting the watershed modeling
- Annual and other increment reporting from DMAs, responsible persons and permittees
- Five year reviews of implementation and evaluation of the TMDL and WQMP

14.2. Dominance of atmospheric deposition of mercury

As discussed in the TMDL Technical Support Document and preceding sections of this draft TMDL, atmospheric deposition of mercury onto the Oregon landscape is the dominant source of mercury reaching Willamette Basin streams. While these deposited air emissions originate as a mix of global, national, regional and local sources, the largest portion is derived from historical deposition of global anthropogenic mercury emissions (TetraTech, 2019). Further, the current air emissions sources originating within Oregon are small relative to the total mercury budget of the basin. Air emissions from local sources are being addressed by existing programs and mercury loads from all permitted point source discharges combined are conservatively estimated to be less than five percent of the total mercury load or approximately 18 g/day or 6.61 kg/yr. As such there is limited overall potential for reducing mercury loads within Willamette Basin streams through further reductions of air emissions and wastewater discharge point sources. Despite distant origins of the dominant sources of mercury, once on the landscape in the Willamette Basin, the greatest potential for reductions of mercury delivered to streams is through enhancing controls on nonpoint source land use activities that have the potential to result in erosion and surface runoff. DEQ's approach prioritizes focus on controls for erosion and surface runoff from both point and nonpoint sources to optimize mercury reductions into waterways.

In alignment with EPA guidance relevant to the Willamette Basin situation where mercury loadings are predominantly from air deposition (EPA 2008, 2010), DEQ opted to allocate aggregated nonpoint source loads and point source wasteloads using the proportionality

approach. These approaches also follow precedents affirmed in EPA-approved mercury TMDLs in 21 other states. These allocations include portions of natural and anthropogenic background sources that are outside of the reasonable control of designated management agencies and responsible parties.

14.3. Conclusions

DEQ's implementation approach is multi-faceted and requires many targeted management practices across the entire basin to reduce anthropogenic mercury, regardless of source origination. This is a reasonable approach that recognizes the inherent uncertainty in global atmospheric deposition reduction trends, on-going inputs from historical sources of mercury still available to be delivered to streams and long lag times until positive responses occur in streams and fish.

Because the depositional sources are mixed and the management practices that can be employed are distributed over a wide area and among many DMAs and responsible persons, there is uncertainty about reductions in mercury loading. DEQ's draft WQMP addresses this uncertainty by including an extensive monitoring, reporting, and adaptive component that is designed to match the accountability framework used by EPA in its Chesapeake Bay TMDL (2010).

The examples of effective actions employed since issuance of the 2006 TMDL (presented in Section 14.1.4 above), demonstrate that effective mercury management practices exist that can and will be employed, for both nonpoint and point source activities, to achieve the load and wasteload allocations contained in this draft TMDL.

The rationale described in this document stems from a more robust evaluation using significantly more data, captures additional urban areas not previously regulated, implements an accountability framework (including the *Assessment and Monitoring Strategy to Support Implementation of Mercury Total Maximum Daily Loads for the Willamette Basin*) and provides opportunities for adaptive management to maximize mercury reductions. Together this approach provides reasonable assurance to meet state and federal requirements and attain the goals of the TMDL.