Draft Water Quality Management Plan

2025 Umpqua River Basin TMDL for Temperature

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State of Oregon
DEQ Department of Environmental Quality

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Table of contents

List of tables

List of figures

1 Introduction

The Oregon Department of Environmental Quality provides this **DRAFT** Water Quality Management Plan to meet the requirement in Oregon Administrative Rule 340-042-0040(4)(l) that every Total Maximum Daily Load includes a Water Quality Management Plan. This WQMP describes strategies to achieve the pollutant allocations in the Umpqua River Basin Temperature TMDL established by EPA in 2025 and to attain water quality standards.

This WQMP describes strategies to achieve TMDL allocations and provides a framework for implementation, monitoring, and evaluation. It identifies the responsible persons who are accountable for pollution sources addressed in the TMDL and assigns responsibilities for developing and carrying out implementation plans.

DEQ updates this WQMP in response to two court decisions affecting Oregon's temperature standards. In Northwest Environmental Advocates v. U.S. Environmental Protection Agency (2012), the court led EPA to disapprove Oregon's Natural Conditions Criterion for temperature. A subsequent 2019 decision directed DEQ and EPA to replace 15 temperature TMDLs developed using that criterion. EPA reissued the Umpqua River Basin Temperature TMDL on June 27, 2025, using the remaining elements of Oregon's temperature criteria. Under OAR 340-042-0040(8), DEQ may prepare a WQMP to implement an EPA-established TMDL.

DEQ will present this temperature WQMP to the Oregon Environmental Quality Commission for adoption as OAR 340-042-0090(5)(a). DEQ may amend the WQMP as new TMDLs are issued for the Umpqua Basin. References to administrative rules in this WQMP include future amendments, revisions, or renumbering.

This WQMP replaces the temperature portion of the 2006 Umpqua Basin WQMP (DEQ, 2006). It applies to all waters of the state within the temperature TMDL project area (Figure 1), except the Little River Watershed (Table 1). All other TMDLs and associated WQMPs in the Umpqua Basin remain in effect.

Table 1. Waterbodies included in the Umpqua River Basin WQMP for temperature.

Subbasin	Waterbodies included
North Umpqua Subbasin (HUC17100301)	All waters of the state. Excludes the Little River watershed, HUC 1710030111 where a TMDL in 2002.
South Umpqua Subbasin (HUC 17100302)	All waters of the state.
Umpqua Subbasin (HUC 17100303)	All waters of the state.

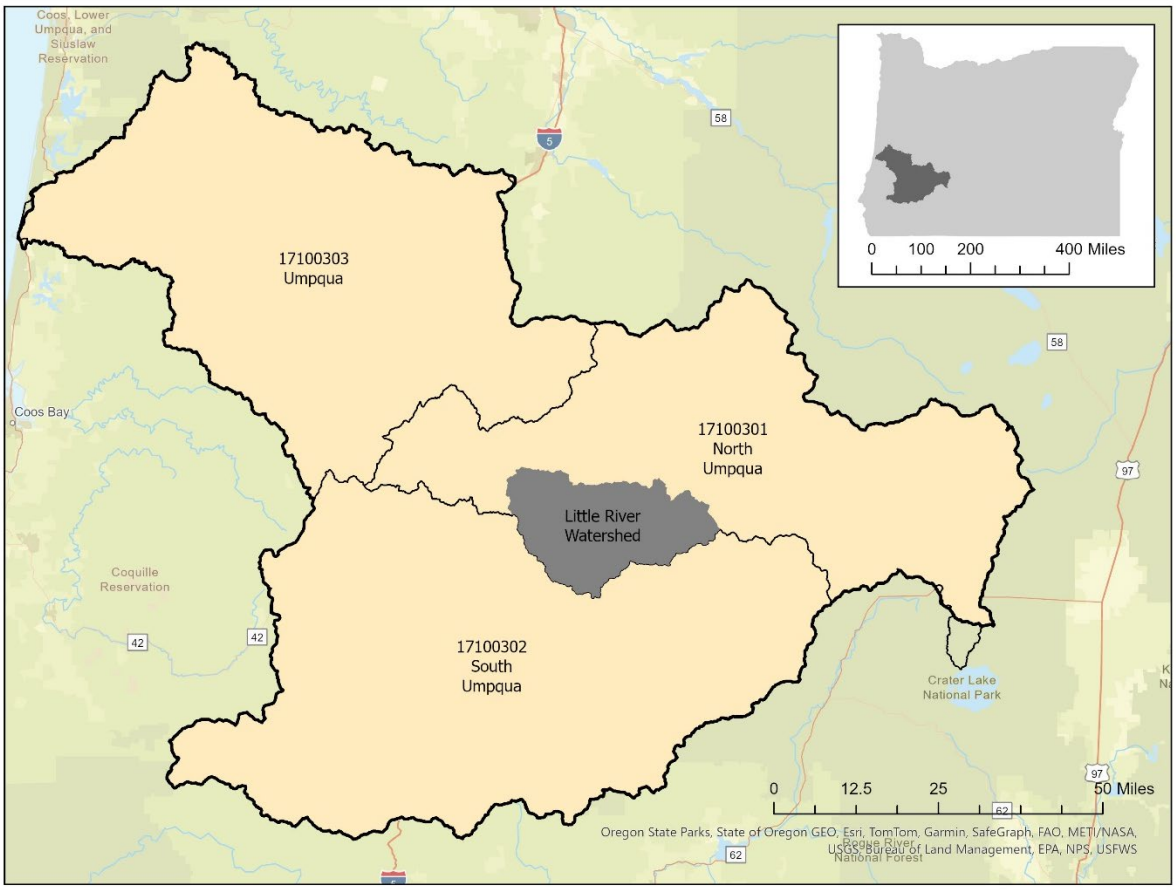

Figure 1. Map of the 2025 Umpqua River Basin temperature TMDL project area.

2 Condition assessment and problem description

OAR 340-042-0040(4)(I)(A) requires each WQMP to include a condition assessment and problem description. The TMDL identifies temperature-impaired waters (categories 5 or 4A) listed in Oregon's 2022 Integrated Report (DEQ, 2025). These waters exceed Oregon's numeric temperature criteria established to protect fish and aquatic life beneficial uses, including salmon and trout spawning, core cold water habitat, and salmon and trout rearing and migration. The TMDL identifies excess heat as the pollutant of concern and establishes thermal wasteload allocations, load allocations, and surrogate measures to control heat sources.

The TMDL is a watershed analysis, therefore its allocations and surrogate measures apply to all waters of the state within the project area, not just impaired streams. TMDL allocations apply to all streams with surface flow or residual pools during the critical period (May 1–October 31). This approach ensures that upstream activities protect downstream water quality and helps prevent future temperature impairments. The goal is to restore and protect water quality throughout the watershed.

3 Goals and objectives

OAR 340-042-0040(4)(I)(B) requires each WQMP to identify goals and objectives. The goal of this WQMP is to implement the 2025 Umpqua River Basin Temperature TMDL and meet temperature standards. The objectives of this WQMP are to:

1. Provide a framework for temperature management strategies.
2. Assign responsibility for implementing those strategies.
3. Establish monitoring to track progress and guide adjustments.
4. Apply adaptive management based on results and new information.

4 Proposed management strategies

OAR 340-042-0040(4)(I)(C) requires each WQMP to propose management strategies designed to achieve TMDL allocations. OAR 340-042-0030(6) defines “management strategies” as measures to control the addition of pollutants to waters of the state, including pollutant control practices, technologies, processes, siting criteria, operating methods, best management practices, or other alternatives.

This WQMP identifies management strategies to address heat sources (TMDL, Section 7) and supports attainment of TMDL allocations, surrogate measure targets, and temperature standards. It organizes the strategies by TMDL source category.

4.1 Point Sources

Point source permitting is DEQ’s primary means of achieving the TMDL wasteload allocations. DEQ incorporates these WLAs into National Pollutant Discharge Elimination System permits during issuance, renewal, or modification. Under federal rules, effluent limits in NPDES permits must be consistent with the assumptions and requirements of the TMDL. Permits translate WLAs into enforceable effluent limits and permit conditions under federal and state regulations. TMDL (Section 9) describes thermal wasteload allocations to point sources. Facilities can meet their WLAs through direct discharge controls, extended compliance schedules, water quality trading, or other mechanisms allowed under state and federal rules.

DEQ encourages NPDES permit holders to work with responsible persons to develop water quality trading programs that meet allocations and support surrogate shade targets. Water quality trading is an approved compliance option under Oregon’s trading rules (OAR 340-039). Trading allows permitted sources to secure equivalent or greater pollutant reductions from other sources in the watershed, most often through riparian restoration that increases shade. Programs must use DEQ-approved methods to quantify reductions, demonstrate equivalency, and verify performance through monitoring. Green infrastructure established through trading can also improve watershed resilience to climate change.

For more information, see DEQ’s Water Quality Trading page. Additional information supporting NPDES permit development is included in TMDL Appendix E.

4.2 Nonpoint Sources

Nonpoint heat sources in the Umpqua River Basin include dam and reservoir operations, riparian habitat removal, channel modifications, changes in flow or discharge, climate change effects, and background nonpoint sources (TMDL, Sections 7.1.4 to 7.1.9). Table 2 summarizes nonpoint source management strategies proposed to achieve load allocations and surrogate measure targets. These strategies draw on recommendations from the Oregon Department of Agriculture, USDA Natural Resources Conservation Service, Oregon State University Extension, Oregon Watershed Enhancement Board, Oregon Plan for Salmon and Watersheds, EPA, the U.S. Bureau of Reclamation, and other partners. This list is not exhaustive, and alternative or additional practices may be if they achieve equivalent or better outcomes and comply with applicable rules.

Table 2. Priority temperature management strategies

Source	Management Strategies
Dam and reservoir operations	• Manage releases to draw cooler water from deeper layers and adjust timing and volume to limit warming and support baseflow during critical periods • Retrofit or modify outlets to allow selective withdrawal and improve temperature control • Remove or modify small in-channel reservoirs and ponds, where feasible, to reduce thermal loading
Riparian habitat removal	• Plant native trees and shrubs in riparian areas; maintain until free-to-grow and monitor survival • Protect existing canopy using fencing, conservation easements, or ordinances; prioritize areas meeting effective shade targets • Thin overly dense stands and remove invasive species to promote riparian vegetation; minimize shade loss during treatment (TMDL Appendix C) • Install off-channel watering systems or fencing to exclude livestock and prevent trampling of riparian vegetation • Apply riparian setbacks, overlay zones, or design standards to limit vegetation removal during development • Relocate or modify infrastructure (e.g., culverts, roads, utilities) that restrict riparian growth or contribute to warming • Support landowners with planting programs, cost-share incentives, outreach, and technical assistance
Channel modification and widening	• Reconnect incised channels with floodplains to restore hydrologic exchange and reduce heating • Restore side channels and off-channel wetlands to increase hydrologic complexity • Place large wood or other structures to reduce solar exposure and create cool water refugia • Stabilize eroding banks with native vegetation or bioengineering to limit channel widening and solar exposure • Remove or modify levees, berms, culverts, ponds, tide gates, or other barriers that restrict floodplain access • Support natural beaver activity or install beaver dam analogs to promote overbank flow and channel complexity • Modify or remove streamside roads that restrict channel function • Protect intact channel areas that provide natural shade and floodplain connection and do not require active restoration

Source	Management Strategies
Modifications to flow/discharge	• Improve irrigation efficiency (e.g., converting open ditches to piped or pressurized systems) • Implement municipal water conservation; repair leaks; reduce summer demand • Provide incentives for voluntary water conservation • Restore wetlands and floodplains to support baseflow and groundwater recharge • Lease or transfer water rights to instream use during the critical period • Coordinate water rights reviews, drought planning, and flow agreements • Apply seasonal water use restrictions during low-flow conditions

4.2.1 Dam and reservoir operation management strategies

Surface water impoundments contribute to elevated stream temperatures where reservoir operations increase exposure to warm surface water and reduce delivery of cold water during the critical period. The TMDL source assessment (TMDL Section 7.1.4 and Table 26) and thermal modeling (TMDL Appendix G) identified dams and reservoirs as sources of thermal loading under certain conditions. Dams of all sizes can increase stream temperature, depending on dam and stream characteristics, location, and watershed density.

The TMDL allocates a portion of the human use allowance to dam and reservoir operations in some locations (TMDL Tables 30 - 33) and establishes requirements that no net warming occur below the dam beyond the assigned HUA during the critical period, expressed through upstream temperature surrogate measure targets (TMDL Section 9.1.5.). Implementation strategies include modifying outlet structures for selective withdrawal of cooler water, adjusting release timing and volume to avoid warming, and coordinating operations with downstream conditions.

4.2.2 Streamside vegetation strategies

The loss of streamside vegetation is one of the largest contributors to excess solar loading in the Umpqua Basin (TMDL, Section 7.1.5). Overstory riparian vegetation reduces solar radiation by shading streams. Effective shade is the amount of sunlight blocked by vegetation and terrain and serves as the primary surrogate used to express load allocations in the TMDL (TMDL Section 9.1.5). Effective shade targets represent another way to express the amount of solar loading that will meet the human use allowance and load allocations for entities managing streamside vegetation. TMDL Appendix C summarizes the factors that influence effective shade.

Primary management strategies to meet effective shade targets include:

1. **Planting and establishment -** Plant native trees and shrubs in streamside areas with little or no shade-producing overstory to increase effective shade and improve riparian function; manage invasive species that limit canopy development and shade potential.
2. **Protection, enhancement, and maintenance -** Protect existing streamside vegetation from removal to maintain shade levels and support additional growth where needed to meet effective shade targets. Enhance and maintain vegetation to support growth and survival to meet effective shade targets.

3. **Thinning and management -** Overly dense tree stands, or invasive species can limit the development of healthy, shade-producing forests. Thin or manage vegetation as needed to promote a healthy, mature riparian canopy and support long-term shade benefits. These actions must minimize the extent, duration, and severity of shade loss to protect long-term conditions and prevent significant or prolonged reductions.

4.2.3 Channel modification strategies

Changes to channel form and complexity influence stream temperature by altering water depth, width, and exposure to solar radiation. Hydromodification activities that alter channel morphology can impact stream temperature (Galli and Dubose, 1990). Simplified or incised channels are often wider and shallower, increasing the surface area exposed to sunlight and reducing opportunities for hyporheic exchange which elevates thermal loading (Larson and Larson, 1996). These physical changes limit the effectiveness of riparian and flow restoration efforts. Activities such as uncontrolled livestock access, channelization, and floodplain disconnection contribute to these changes and raise stream temperatures. As stream banks erode and slough, sediments can accumulate on the streambed, further reducing depth and increasing solar exposure. Loss of riparian vegetation also diminishes shade and increases vulnerability to thermal loading (EPA, 2007, EPA 2017).

Loss of floodplain connection reduces groundwater recharge and summer baseflows, increasing stream temperatures (EPA, 2017). The TMDL incorporates thermal loading from channel modification into background loading rather than assigning separate allocations or surrogate measures. Restoring natural channel form supports attainment of temperature standards by reducing solar exposure and promoting physical processes that retain cold water. Restoration may include reconnecting incised streams with floodplains, stabilizing eroding banks with bioengineering, placing large wood to increase habitat complexity, and restoring side channels or off-channel habitats. Management of hydromodification activities may also include BMPs such as riparian restoration, livestock fencing, flow augmentation, reservoir operations, and site-specific channel restoration projects.

4.2.4 Flow management strategies

Flow-related changes influence stream temperature by reducing stream volume, increasing water residence time, and limiting the cooling effect of groundwater inputs. The TMDL (TMDL, Section 7.1.7) determined that reduced flows from withdrawals contribute to elevated temperatures during the critical period in several locations (TMDL, Table 27). Lower flows also reduce a stream's ability to dilute pollutants and increase daily fluctuations in temperature.

The TMDL allocates a portion of the human use allowance to flow modifications in some locations (water management and withdrawals in TMDL, Tables 30 - 33). Strategies to improve baseflow, reduce seasonal withdrawals, and restore hydrologic function in critical conditions are needed throughout the basin to support temperature criteria and, where applicable, meet allocations.

Restoring baseflows, reducing seasonal withdrawals, and improving hydrologic function are strategies to meet load allocations. Priority actions include improving irrigation efficiency, protecting instream flows, reconnecting wetlands and floodplains, modifying infrastructure, and coordinating with water providers. Management strategies also include water conservation and, where appropriate, establishing instream water rights. Although DEQ does not regulate water

rights, these strategies can improve stream conditions, support load allocations, and strengthen riparian and channel restoration efforts.

4.2.5 Effects of climate change

The TMDL does not quantify thermal loading from climate change. TMDL Appendix D summarizes scientific studies showing increasing stream temperatures in Oregon and identifies contributing factors such as rising air temperatures, earlier snowmelt, declining summer flows, and more frequent wildfire. These impacts, including higher air temperatures, reduced snowpack and water availability, and loss of effective shade from wildfire, already affect the Umpqua River Basin and are expected to increase in the future.

This WQMP addresses climate-related impacts through adaptive management that increases watershed resilience. Efforts at the local, state, federal, and international levels are needed. Accelerated restoration and multiple restoration approaches, coordinated across partners and land uses, help streams buffer against future warming.

4.2.6 Background sources

“Background sources” include all pollution not originating from human activity, as well as anthropogenic sources beyond the regulatory authority of the state, such as pollutants from other states or tribal lands (OAR 340-042-0030(1)). TMDL Appendix G quantifies background thermal loading by isolating natural contributions from landscape, hydrology, and meteorology. TMDL Table 28 shows that background sources can alone cause temperature criteria exceedances.

Implementation addresses background sources through long-term restoration that improve watershed processes. Actions such as riparian planting, channel restoration, and flow protection can reduce background thermal loading and support attainment of temperature standards over time.

4.2.7 Restoration partnerships and coordination

Many organizations in the Umpqua Basin, including watershed councils, soil and water conservation districts, and tribal governments, have decades of experience conducting streamside restoration. They provide expertise, established relationships with landowners, and offer knowledge of technical approaches and funding opportunities.

Collaborating with these partners can enhance ecological benefits by targeting restoration efforts where they most effectively reduce stream temperatures. Examples of these efforts include the South Umpqua River Coho Action Team, Oregon Plan for Salmon and Watersheds, Strategic Implementation Areas, and species recovery plans.

5 Timelines for implementing strategies

OAR 340-042-0040(4)(I)(D) requires each WQMP to describe timelines for implementing management strategies, including permit revisions, achieving appropriate incremental and

measurable water quality targets, implementing control actions, and completing other measurable milestones.

5.1 DEQ permit revisions

DEQ incorporates wasteload allocations from the TMDL into NPDES permits during issuance, renewal, or modification. DEQ updates individual and general permits to ensure consistency with the TMDL. NPDES permits are issued on five-year cycles. TMDL Section 9 lists NPDES permittees with assigned wasteload allocations.

5.2 Schedule for targets, actions, and milestones

Implementation plans must include timelines for management strategies, schedules for achieving incremental water quality targets, and schedules for completing measurable milestones.

DEQ uses a benchmark of 10% cumulative improvement in effective shade every 10 years to evaluate basin-wide progress toward surrogate shade targets. This benchmark is based on vegetation growth rates described in the Upper Yaquina and Willamette Subbasins temperature WQMP replacements and assumes consistent implementation of the three primary streamside vegetation strategies outlined in Section 4.2.2, along with normal vegetation growth rates without major disturbance.

For strategies where shade targets do not apply, DEQ expects implementation plans to include appropriate incremental and measurable targets relevant to those actions. Annual reports must demonstrate how actions contribute toward these targets, and DEQ reviews basin-wide progress every five years. If monitoring results indicate insufficient progress, conditions change, or adjustments are needed, implementation plans must be revised accordingly.

DEQ expects priority control actions, such as streamside vegetation planting, to begin as soon as feasible following WQMP adoption. The timing of these actions will depend on project readiness, permitting requirements, restoration opportunities, and reasonable planning assumptions. Timelines may also be influenced by factors such as restoration site availability, land ownership patterns, climate change impacts, invasive species, or natural disturbances.

DEQ recognizes that full attainment of surrogate targets may not be feasible in all locations due to physical, legal, or regulatory constraints. Where such constraints exist, responsible persons must identify them and explore feasible mitigation opportunities. If these factors delay progress, DEQ will work collaboratively with responsible persons to revise schedules and establish interim milestones.

DEQ will not consider shade reductions caused by natural disturbances as a violation or failure to implement a plan. In such cases, responsible persons should assess and prioritize these areas for restoration or protection following the disturbance.

Responsible persons required to develop and carry out nonpoint source implementation plans must ensure their plans meet the requirements in Section 10. These include implementing management strategies with phased or prioritized actions and measurable milestones (Section 10.3), tracking progress through performance and effectiveness monitoring with periodic review and adjustments (Section 10.4), and completing other measurable milestones, including monitoring and assessment deliverables (Table 6).

6 Attaining water quality standards

OAR 340-042-0040(4)(I)(E) and (F) require each WQMP to describe how implementing management strategies supports attainment of water quality standards and to provide timelines for achieving those standards.

6.1 How management strategies support attainment of water quality standards

Management strategies proposed in Section 4 reduce excess thermal loading from both point and nonpoint sources and support attainment of Oregon's temperature criteria. For nonpoint sources, the TMDL establishes effective shade as the primary surrogate target to evaluate whether load allocations are being met. TMDL Section 9.1.5 provides site-specific effective shade targets. Where site-specific targets are unavailable, the TMDL provides effective shade curves that describe the expected shade for a given stream width, orientation, and vegetation type.

Implementation plans must include strategies sufficient to meet load allocations and surrogate measure targets. While individual actions may not immediately change stream temperatures, cumulative increases in shade reduce solar loading over time. In addition to riparian shading, channel restoration, flow enhancement, and dam and reservoir management can provide measurable temperature benefits.

Consistent with the TMDL, implementation success depends on the achievement of load allocations measured through meeting surrogate measure targets, not solely on measured in-stream temperatures. DEQ tracks progress through annual reports and monitoring data. For large dams and reservoirs, DEQ evaluates load allocations primarily through surrogate measure targets based on in-stream temperatures.

Modeled shade gap data (TMDL Section 9.1.5.1.1) reflects conditions from past data sets. They may not reflect more recent vegetation changes from wildfire, restoration, land use change, or policy shifts. Monitoring streamside conditions and shade assessments is necessary to identify protection and restoration priorities, evaluate progress towards meeting surrogate measure targets, and to refine management strategies. These evaluations provide the technical foundation for implementation planning, including streamside evaluations and shade gap analysis (Section 10.2.1). They also support adaptive updates to implementation plans, basin-wide tracking, and compliance evaluations through annual reports and year-five reviews.

This monitoring framework allows for locally tailored strategies. It also maintains accountability through measurable milestones, adaptive updates, and performance tracking. When actions align with the WQMP and approved implementation plans, responsible persons remain in compliance even if full attainment of numeric criteria by all sources takes decades.

6.2 Timelines for attaining water quality standards

Restoring stream temperatures to meet Oregon's water quality standards is a long-term effort. Some localized improvements may occur within a few years but full attainment across the basin requires decades and sustained implementation actions across land uses and jurisdictions.

Effective shade surrogate measure targets are the primary measure of progress towards meeting load allocations. DEQ uses a benchmark of 10 percent cumulative improvement in effective shade every ten years. At this pace, basin-wide targets may be achieved by the mid-2100s. The benchmark is an estimate based on vegetation growth rates and assumes consistent implementation across the basin. Actual progress varies with site conditions, land use, restoration actions, and natural disturbances such as wildfire. Recovery rates vary by stream size, vegetation potential, disturbance history, and restoration opportunity. DEQ expects responsible persons to consider these projections and interim targets when establishing implementation plan timelines.

DEQ will establish timelines for dam and reservoir operators on a case-by-case basis based on site-specific conditions and operational constraints.

This WQMP does not assign a fixed deadline to meet load allocations. Instead, it emphasizes consistent implementation of temperature control measures, incremental progress toward surrogate measure targets, adaptive updates, and accountability through annual reports and five-year reviews. DEQ assesses progress using annual reports, condition assessments, and monitoring data. For nonpoint sources, meeting load allocations expressed through surrogate measure targets demonstrate compliance.

7 Identification of responsible persons

OAR 340-042-0040(4)(I)(G) requires each WQMP to identify the persons, including DMAs, responsible for implementing management strategies and preparing implementation plans. Responsible sources must meet TMDL allocations either through discharge permits or through strategies developed in implementation plans (OAR 340-042-0025(2)).

Designated Management Agencies are public entities formally designated by DEQ to implement TMDLs. Under OAR 340-042-0030(2), DMAs are federal, state, or local agencies with authority over pollutant sources and designated by DEQ in a TMDL. As a component of the Umpqua Basin Temperature TMDL, this WQMP assigns implementation responsibilities to responsible persons named below, including DMAs.

Other responsible persons include utilities, dam and reservoir operators, and special districts that impact water quality that do not meet the definition of a DMA. For the purposes of this WQMP, a responsible person is any entity accountable for sources of pollution addressed by the TMDL.

DEQ excludes certain entities from responsibility. The National Park Service is not a responsible person because Crater Lake National Park falls under exclusive federal jurisdiction and falls outside the scope of this WQMP. Likewise, the Cow Creek Band of Umpqua Tribe of Indians is not a responsible person because it is a federally recognized sovereign tribal nation.

DEQ identified responsible persons by analyzing GIS-based jurisdictional data, reviewing responsible persons listed in other temperature-related WQMPs, and discussing operations and authorities with affected entities. DEQ estimated streamside jurisdictional areas by calculating buffers from the stream centerline: 150 feet for typical streams, 300 feet for the North and South Umpqua Rivers, and 650 feet for the Umpqua Estuary. GIS data are available upon request.

Appendix A lists all responsible persons identified in this WQMP, including entities with current TMDL implementation responsibilities and others not currently required to submit implementation plans. This list does not include every individual or entity that bears responsibility for TMDL implementation. Broad participation across the basin is necessary to meet standards and protect beneficial uses.

Table 3 identifies the responsible persons DEQ requires to prepare and carry out a TMDL implementation plan. It includes DMAs carried forward from previous TMDLs in the Umpqua River Basin as well as newly identified entities.

Table 3. Responsible persons required to submit a TMDL implementation plan

Responsible person	Area of Jurisdiction
Oregon Department of Agriculture	Agricultural or farm-related activities, both commercial and noncommercial including livestock stable and pastures, both inside and outside of municipal boundaries
Oregon Department of Forestry	Commercial activities involving the establishment, management, or harvesting of trees in Oregon's nonfederal forestlands, state forest lands
Oregon Department of State Lands	DSL managed lands and facilities
Oregon Parks and Recreation Department	OPRD managed lands and facilities
Oregon Department of Fish & Wildlife	ODFW managed lands and facilities, including the Rock Creek Hatchery
Oregon Department of Transportation	State highways, rights-of-way, and facilities
U.S. Bureau of Land Management	BLM and O&C managed lands, roads, and facilities
U.S. Forest Service	USFS managed lands, roads, and facilities
Douglas County*	Urban, rural, and non-resource land use, including zoning, permitting and riparian protection; operation and maintenance of governmental facilities including transportation corridors; operation and maintenance of governmental facilities including transportation corridors and dam/reservoir operations at Galesville and Berry Creek (Ben Irving)
Municipalities - Canyonville, Drain, Elkton, Glendale, Myrtle Creek, Oakland, Reedsport, Riddle, Roseburg, Sutherlin, Winston, Yoncalla	City land use, including zoning, permitting and riparian protection; operation and maintenance of governmental facilities including transportation corridors and dam/reservoir operations.
PacifiCorp*	Dams and appurtenant structures associated with the North Umpqua Hydroelectric Project

* PacifiCorp and Douglas County must perform reservoir monitoring and assessment (Section 10.2.2). DEQ will use results to determine whether implementation plans are required.

DEQ expects all responsible persons to manage heat sources originating within their jurisdiction, regardless of their implementation plan responsibilities. DEQ tailors implementation plan expectations to each responsible person's relative contribution to heat sources and capacity to implement effective strategies.

DEQ does not require all named responsible persons to submit implementation plans. DEQ exempts persons whose jurisdictions or responsibilities:

- Are addressed under another TMDL
- Occur through existing permits other implementation pathways.
- Do not involve lands requiring management strategies.
- Include de minimus streamside jurisdiction (generally less than 25 acres).
- Have limited opportunity to implement management strategies due to physical or public safety constraints.

DEQ identifies thirteen responsible persons who are currently exempt from submitting implementation plans. These include Bonneville Power Administration, Central Oregon & Pacific Railroad, Coos Bay Rail Link, Highland Ditch Irrigation District, Jackson County, Klamath County, Lane County, Longview, Portland & Northern Railroad, Port of Umpqua, Sutherlin Water Control District, U.S. Department of Agriculture, Union Pacific Railroad, Winchester Water Control District.

DEQ may require these exempt responsible persons to submit and carry out implementation plans in the future if they acquire additional jurisdiction or ownership or jurisdiction of streamside areas increases, or if new information indicates an implementation plan is needed to achieve the thermal load allocations and surrogate shade targets.

8 Existing implementation plans

OAR 340-042-0040(4)(l)(H) requires each WQMP to identify implementation plans that are available at the time the TMDL is issued. In this context, implementation plans refer to plans to not subject to permit requirements under ORS 486.050.

Douglas County and the cities of Canyonville, Drain, Elkton, Glendale, Myrtle Creek, Oakland, Reedsport, Riddle, Roseburg, Sutherlin, Winston, and Yoncalla are existing designated management agencies operating under DEQ approved implementation plans developed for previous TMDLs.

ODOT, ODA, ODF, BLM, and USFS are also existing DMAs that rely on statewide or federal programs that serve as their implementation plans. PacifiCorp is an existing responsible person that operates under a DEQ-issued Section 401 Water Quality Certification (FERC License No. 1927).

This WQMP requires all new and existing responsible persons named in Table 3 to submit TMDL implementation plans to DEQ for review and approval.

ODA, ODF, BLM, and USFS collectively manage land use and land management activities on approximately 93 percent of the streamside lands in the Umpqua Basin. Their participation in TMDL implementation is essential to meeting TMDL load allocations measured by surrogate shade targets. The sections below present DEQ's evaluation of current state and federal programs for their ability to meet these allocations.

8.1 Oregon Department of Agriculture

The Agricultural Water Quality Management Program (ORS 568.900–568.933, ORS 561.191, and OAR 603, divisions 90 and 95) provides the framework for protecting water quality from agricultural sources. Under this program, ODA developed 38 watershed-based Agricultural Water Quality Area Rules and Area Plans, including the Umpqua Basin Agricultural Water Quality Area Rules and Area Plan, established in 2001. OAR 340-042-0080(3) states that agricultural water quality management area plans and rules must be sufficient to meet TMDL load allocations.

The Umpqua Basin Area Rules, updated in 2025, define an "unacceptable condition" as agricultural management or soil-disturbing activities that preclude the establishment and development of adequate riparian vegetation for streambank stability and shading, consistent with site capability, along a perennial stream. The rules allow minimal breaks in shade vegetation for essential management activities. However, they do not provide protection for all streams subject to TMDL allocations. The TMDL assigns a 0.0 °C human use allowance for solar loading from nonpoint sources, including loss of streamside vegetation. TMDL allocations also apply to intermittent streams with surface flow or residual pools during the critical period (May 1–October 31), but these streams are not protected under the current rules.

The Umpqua Basin Area Plan (ODA, 2020) emphasizes voluntary land management measures and encourages protection and restoration of riparian vegetation. However, it only defines measurable objectives for Focus Areas and Strategic Implementation Areas, does not specify the streamside conditions necessary to achieve TMDL load allocations as measured through effective shade targets (TMDL, Appendix C), and lacks timelines or clear methods to evaluate progress. Because the plan relies on voluntary measures and lacks clear objectives and evaluation methods for all areas, it does not provide reasonable assurance that TMDL load allocations will be achieved. DEQ participates in the biennial review process to provide feedback on Area Plan implementation and to recommend actions to better align actions with TMDL load allocations. In the 2020 full review and the 2023 and 2025 light reviews, DEQ recommended that ODA prioritize protecting and restoring streamside vegetation, establish measurable objectives and timelines, and improve tracking of implementation and outcomes.

As agreed, in the 2023 Memorandum of Agreement between DEQ and ODA, ODA will either adapt the Area Plan and Area Rules to act as the TMDL implementation plan or develop a separate TMDL implementation plan. In the case of the Umpqua Basin temperature TMDL, DEQ has determined that taken together, the Area Rules, Area Plan[s], and biennial reports do not provide reasonable assurance to adequately achieve TMDL load allocations in all locations under ODA's jurisdiction. Therefore, ODA is required to prepare a TMDL implementation plan for DEQ review and approval. DEQ will assist ODA in developing an approvable TMDL implementation plan that includes appropriate measurable objectives and timelines to address identified water quality priorities and allocations (surrogate measures). In addition, DEQ will work with ODA to identify additional regulatory measures that could be implemented by rule revisions, incentive programs, and resources that may be available to help with program and project implementation to provide reasonable assurance of achieving TMDL targets.

8.2 Oregon Department of Forestry

The Forest Practices Act (ORS 527.610–527.992; OAR 629-600–629-665) provides the framework for protecting water quality on state and private forestlands. Forest operations conducted in compliance with the Act and voluntary measures are generally sufficient prevent violations of water quality standards (ORS 527.770). OAR 340-042-0080(2) allows DEQ to require rule revisions to site-specific Forest Practices Act rules if DEQ determines that the generally applicable rules are not adequate to implement TMDL load allocations. The Board of Forestry revised the rules in 2022 following the Private Forest Accord, which expanded riparian buffers and tree retention to enhance aquatic habitat protections. Post-disturbance harvest rules adopted in 2025 clarify how vegetation retention prescriptions apply after catastrophic disturbances and support continued riparian protection under the Forest Practices Act's water quality framework.

Table 4 summarizes Forest Practices Act riparian management area protections. ODF's standard practice vegetation retention buffers, ranging from 100 to 110 feet, may achieve effective shade targets in some locations, depending on residual tree density, stream orientation, topography, and other site-specific factors. However, buffers on Type N, small type streams, and streams under the Small Forestland Option are generally narrower than the 120-foot slope distance that DEQ determined is sufficient to achieve TMDL load allocations as measured through effective shade targets (TMDL, Appendix C). The TMDL assigns a 0.0 C° human use allowance to solar loading from other nonpoint source categories, including loss of streamside vegetation.

DEQ finds that current ODF buffers on certain small and Type N streams are not adequate to implement TMDL load allocations. ODF's implementation plan must address this shortfall and identify strategies to ensure that forest lands subject to ODF jurisdiction meet TMDL load allocations.

As outlined in the 2021 Memorandum of Understanding between DEQ and ODF, DEQ will collaborate with ODF to identify additional measures, such as rule revisions, stewardship agreements, or incentive programs to increase reasonable assurance of achieving load allocations. This collaboration can occur through the TMDL implementation plan process.

Table 4. ODF riparian management area vegetation retention buffers stream type.

ODF Stream Type *	Standard Practice Vegetation Retention (Feet)	Small Forestland Option Vegetation Retention (Feet)
Large Type SSBT	110	100
Medium Type SSBT	110	80
Small Type SSBT	100	60
Large Type F	110	100
Medium Type F	110	70
Small Type F	100	50
Large Type N	75	70
Medium Type N	75	50
Small Type N	See Type Np	See Type Np
Small Type Np flows into to Type SSBT	75 feet vegetation retention for 500 feet upstream from the confluence with the Type SSBT, then 50 feet buffer retention for 650 feet upstream. Retention distance is the shorter of	35 feet vegetation retention from the confluence with the Type SSBT to the upper most flow feature or 1,150 feet upstream (RH Max), whichever is shorter.

ODF Stream Type *	Standard Practice Vegetation Retention (Feet)	Small Forestland Option Vegetation Retention (Feet)
	1,150 feet (RH Max+) or the uppermost flow feature.	
Small Type Np flows into to Type F	75 feet vegetation retention from the confluence with the Type F to the upper most flow feature or 600 feet upstream (RH Max), whichever is shorter.	35 feet vegetation retention from the confluence with the Type F to the upper most flow feature or 600 feet upstream (RH Max), whichever is shorter.
Small Type Ns	35' Equipment Limitation Zone (ELZ)	
Large Type F	110	100

***ODF Stream Type Definitions:**

SSBT -- salmon, steelhead, or bull trout
F -- fish-bearing (non-SSBT)
N -- non-fish-bearing, non-domestic
Np -- perennial, Type-N
Ns -- seasonal, Type-N

+ "RH Max" means the maximum distance described for any particular small Type Np stream.

8.3 U.S. Bureau of Land Management

The Bureau of Land Management manages streamside vegetation on federal lands in the Umpqua River Basin under two Resource Management Plans. The Swiftwater Field Office implements BLM's *Northwestern and Coastal Oregon Resource Management Plan* (BLM, 2016a), while the South River Field Office follows the *Southern Oregon Resource Management Plan* (BLM, 2016b).

BLM defines riparian reserves as management areas along streams, measured as slope distance from the ordinary high-water line on each side of the stream. Reserve widths vary by stream type (Table 5) and reflect site-potential tree height, the average maximum height of the tallest dominant trees (≥200 years old) for a given site class. On BLM lands, SPTH generally range from 140 feet to 240 feet.

Table 5. BLM riparian reserve buffer distance by water feature.

Feature	Riparian reserve distance and management directions
Fish-bearing streams and perennial streams	One SPTH distance from the ordinary high waterline or from the outer edge of the channel migration zone for low-gradient alluvial shifting channels, whichever is greatest, on each side of the stream
Intermittent, non-fish-bearing streams	Class I and II subwatersheds: One SPTH distance from the ordinary high waterline on each side of the stream Class III subwatersheds: 50 feet from the ordinary high waterline on each side of a stream
Unstable areas that are above or adjacent to stream channels and are likely to deliver	The extent of the unstable area; where there is stable area between such unstable areas and a stream, and the unstable area has the potential to deliver material such as

Feature	Riparian reserve distance and management directions
material such as sediment and logs to the stream if the unstable area fails	sediment and logs to the stream, extend the riparian reserve from the stream to include the intervening stable area as well as the unstable area
Lakes, natural ponds and reservoirs >1 acres, and wetland >1 acres	100 feet extending from the ordinary high waterline

BLM prohibits timber salvage within riparian reserves except for public safety or maintaining roads and infrastructure. BLM also prohibits thinning within 120 feet of fish-bearing and perennial streams and within 50 feet of intermittent, non-fish-bearing streams, except where thinning supports specific restoration or habitat enhancement objectives. In Class I and II subwatersheds, BLM allows thinning beyond 50 feet if stands maintain required canopy cover and tree-retention levels.

The TMDL assigns a 0.0 °C human use allowance for solar loading from nonpoint sources, including loss of streamside vegetation. DEQ considers a 120-foot slope-distance buffer generally sufficient to prevent stream warming and achieve TMDL load allocations as expressed through effective shade targets (TMDL, Appendix C).

SPTH on BLM lands generally range from 140 feet to 240 feet. Therefore, DEQ finds that minimum riparian reserve widths for fish-bearing streams and perennial streams, as well as intermittent, non-fish-bearing streams in Class I and II subwatersheds, are likely adequate to meet TMDL load allocations. In contrast, riparian reserve widths for intermittent, non-fish-bearing streams in Class III subwatersheds, lakes, natural ponds, and reservoirs and wetlands over an acre, are less than 120 feet and likely inadequate to meet TMDL load allocations. TMDL allocations apply to intermittent streams with surface flow or residual pools during the critical period (May 1–October 31).

BLM's implementation plan should describe management strategies on intermittent, non-fish-bearing streams in Class III subwatersheds, lakes, natural ponds, and reservoirs and wetlands over an acre that will attain TMDL load allocations. The plan should also emphasize strategies to protect, maintain and enhance current streamside vegetation and restore shade lost to legacy land use practices and natural disturbances.

8.4 U.S. Forest Service

The U.S. Forest Service manages streamside lands in the Umpqua River Basin under the Northwest Forest Plan (USFS and BLM, 1994). This plan includes the Aquatic Conservation Strategy, which aims to restore and maintain the ecological health of watersheds and aquatic ecosystems on federal lands, with a particular focus on habitat for salmon and steelhead. The core objective of the strategy is to protect and improve water quality through careful management of riparian areas, referred to as riparian reserves.

Like BLM, USFS uses site-potential tree height to define many riparian reserve distances. On USFS lands, SPTH is the average maximum height of dominant trees 200 years or older for a given site class. SPTH in the Umpqua National Forest generally ranges from 150-200 feet (Personal communication, Joe Blanchard, USFS Watershed Manager).

The Northwest Forest Plan sets riparian reserve widths based on waterbody type (USFS and BLM, 1994, Attachment A, Standards and Guidelines, Section C):

- **Fish-bearing streams** – Reserves include the stream and the extend from the active channel to the top of the inner gorge, outer edge of the 100-year floodplain, outer edge of riparian vegetation, or 300 feet slope distance (two SPTH) on each side of the stream, whichever is greatest.
- **Perennial non-fish-bearing streams** – Reserves extend from the stream edge to the same physical features or 150 feet slope distance (one SPTH), whichever is greatest.
- **Constructed ponds, reservoirs, and wetlands over 1 acre** – Reserves extend to the edge of riparian vegetation, seasonally saturated soils, unstable or potentially unstable areas, or 150 feet slope distance, whichever is greatest.
- **Lakes and natural ponds:** Reserves extend to the same physical features or 300 feet slope distance (two SPTH), whichever is greatest.
- **Intermittent streams, wetlands under 1 acre, and unstable areas** – Reserves include the channel or wetland, unstable or potentially unstable areas (e.g., earthflows), the top of the inner gorge, edge of riparian vegetation, and a slope distance 100 feet or one SPTH, whichever is greater.

Clearcutting is prohibited, while thinning and other silvicultural treatments are permitted when intended to promote late-successional forest conditions, improve riparian function, or enhance habitat.

The TMDL assigns a 0.0 °C human use allowance for solar loading from nonpoint sources, including loss of streamside vegetation. DEQ considers a 120-foot slope-distance buffer generally sufficient to prevent stream warming and achieve TMDL load allocations as expressed through effective shade targets (TMDL, Appendix C). SPTH in the Umpqua National Forest generally ranges from 150–200 feet, so minimum riparian reserve widths of all stream times are likely adequate to meet TMDL load allocations.

USFS's implementation plan should emphasize strategies to protect, maintain and enhance current streamside vegetation and restore shade lost to legacy land use practices and natural disturbances.

9 Schedule for implementation plan submittal and revisions

OAR 340-042-0040(4)(l)(I) requires each WQMP to include a schedule for submittal of implementation plans by responsible persons and the process for revising those plans. OAR 340-042-0080(4)(a) further requires entities identified in the WQMP with implementation responsibilities to prepare and submit implementation plans for DEQ approval according to the schedule in this WQMP.

The responsible persons listed in Table 3 must submit their implementation plans to DEQ for approval within 18 months of Environmental Quality Commission adoption of this WQMP. Depending on the monitoring and assessment results in Section 10.2.2, DEQ may also require select dam and reservoir operators to develop implementation plans. If DEQ determines an

implementation plan is required, it will coordinate with the operator to set a reasonable timeline for plan submittal. Once approved, responsible persons must implement the plan according to the timelines and measurable milestones established in the plan.

Responsible persons must review and revise their implementation plans every five years and submit them to DEQ for approval. Revisions must update timelines for continued implementation and should reflect information gained through monitoring and evaluation. If DEQ identifies deficiencies that prevent the acceptance of the implementation plan, it will set a deadline for submitting a revised plan for approval.

10 Implementation plan requirements

Responsible persons identified in Table 3 must prepare and submit implementation plans. As required under OAR 340-042-0080(4)(a), each implementation plan must include the following components:

- Identify the management strategies the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading.
- Provide a timeline for implementing management strategies and a schedule for completing measurable milestone.
- Provide for performance monitoring with a plan for periodic review and revision of the implementation plan.
- Provide any other analyses or information specified in the WQMP.

Implementation plans describe how each responsible person will carry out their responsibilities required by this WQMP to meet load allocations and surrogate measure targets.

For public transparency, each responsible persons must post their TMDL implementation plan and annual reports on their website. If the entity does not have a website, these documents must be made available to the public in another manner.

10.1 Management strategies

Each implementation plan must include the management strategies needed to achieve load allocations. Plans must also identify the nonpoint sources and activities within the responsible person's jurisdiction, with emphasis on streamside areas that affect shade. Each plan must incorporate applicable strategies from Table 2 and any additional strategies suited to local pollutant sources and landscape conditions.

Plans should also identify existing ordinances, policies, programs, and practices that function as current management strategies supporting TMDL implementation. If additional measures are needed, new strategies must be included, such as developing or revising ordinances, rules policies, programs, or practices.

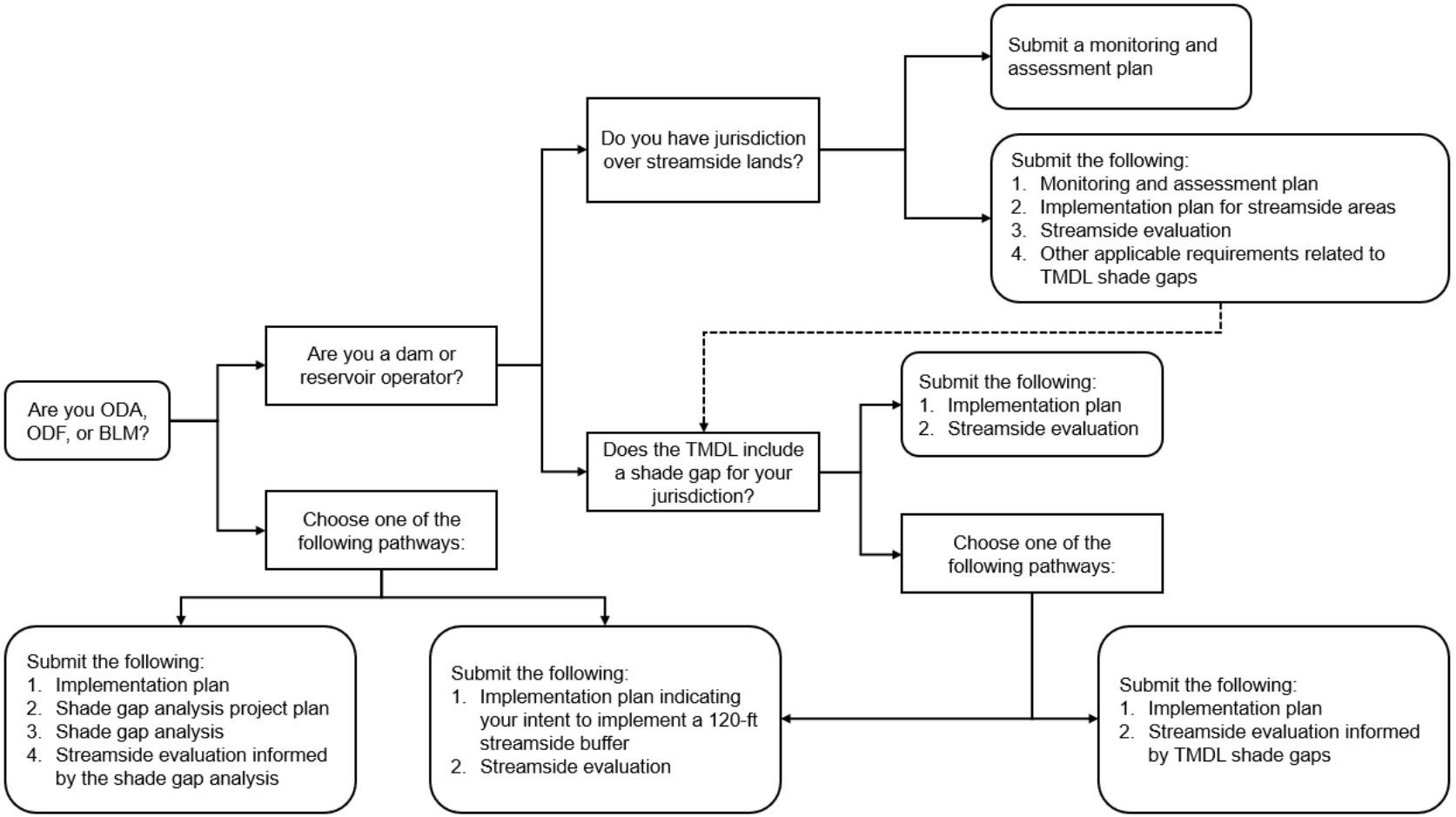

Figure 2. Decision tree to identify additional monitoring and assessment requirements

10.2 Additional analysis and information to support implementation

Implementation plans must include additional analysis and information required by the WQMP to support effective and long-term implementation. This includes monitoring and assessments, public engagement, long-term strategy maintenance, and identification of funding mechanisms. Figure 2 provides a decision tree that illustrates additional monitoring and assessment requirements.

In addition to TMDL implementation plans, the responsible persons listed in Table 3 must submit the information and analysis described below according to the schedule in Table 6. The results must be used to inform, update, and revise implementation plans including strategies, timelines, and measurable milestones. Implementation plans must also identify all streamside areas and streamside activities within each entity's jurisdiction.

10.2.1 Shade monitoring and assessment

Responsible persons listed in Table 3 with jurisdiction over streamside lands must conduct shade monitoring and assessments according to the schedule in Table 6.

The monitoring and assessments provide the technical basis for implementation plans by evaluating riparian conditions and identifying priority areas for protection or restoration most likely to meet load allocations. They also support tracking progress toward effective shade targets, recovery from natural disturbances, and adjustment of management strategies.

To guide these evaluations, the TMDL establishes effective surrogate shade measures to express nonpoint source load allocations. The TMDL includes two types of surrogate effective shade targets: site-specific targets modeled in the TMDL (TMDL Section 9.1.5.1.1), and effective shade curves based on stream orientation, channel width, and mapping unit (TMDL Section 9.1.5.1.2). These curves provide shade targets where site-specific targets are not available. Appendix B provides Ecoregion 1a shade curves developed for the Coquille subbasin that also apply to the Umpqua Basin. Responsible persons may use either type of target to conduct a shade gap analysis and inform a streamside evaluation. Alternative targets must be reviewed and approved by DEQ. Surrogate shade targets do not apply to waters that cannot be shaded due to their size such as oceans and bays.

10.2.1.1 Streamside evaluation

The streamside evaluation provides the foundation for implementation. It requires responsible persons to identify streamside areas within their jurisdiction and determine where protection, enhancement, or alternative strategies are appropriate. These results must guide the priorities, milestones, and measurable objectives in their implementation plans.

The evaluation must classify streamside areas into the following categories:

- **Needs protection** – Areas that currently meet or are trending toward effective shade targets. Actions focus on maintaining or enhancing existing canopy and streamside conditions to sustain long-term shade.

- **Needs enhancement** – Areas that do not meet effective shade targets and require active intervention. These include sites with insufficient canopy, degraded streamside vegetation, or dominance by non-native species. Actions focus on restoring shade through planting, vegetation management, and other practices that improve streamside conditions. In some cases, selective thinning or other active management may be needed to promote healthy canopy development and long-term shade.
- **Constraint-limited** – Areas where achieving effective shade targets is not feasible due to physical barriers (e.g., infrastructure, buildings) or jurisdictional limitations (e.g., private ownership without cooperative agreements). Focus is on documenting these constraints and identifying opportunities for future action if conditions change.
- **Alternative strategy** – Areas where streamside shade is not the primary driver of thermal loading. In these cases, non-vegetative practices (e.g., flow augmentation, in-stream restoration, cold-water refuge protection) may provide more effective temperature management.

Responsible persons with modeled shade gaps for their jurisdictions (TMDL Figure 52 and Table 37), or those DEQ required to complete one under Section 10.2.1.2, must use the shade gap results to inform their streamside evaluation.

The evaluation must summarize the extent of each category in acres or linear feet, identify priority areas for protection or restoration based on potential to reduce thermal loading, magnitude of the shade gaps, and feasibility. It must also describe the data sources, indicators, and assumptions used. Responsible persons may define reasonable evaluation units (e.g. stream reach, ownership block, or another relevant planning scale) subject to DEQ approval. Methods may include field observations, remote sensing, vegetation surveys, professional judgment, or other appropriate approaches suited to available resources.

The evaluation must also identify opportunities to implement alternative best management practices, such as in-stream restoration, flow augmentation projects, experimental temperature management techniques, or the protection and enhancement of cold-water refuges where present.

The final evaluation must present the responsible person's streamside lands in a format (e.g. map, table, or other product) that clearly shows the categories, constraints, and opportunities in a way that DEQ can readily review and interpret. Areas recovering from disturbance may be designated for passive restoration, where natural regrowth is expected to restore shade. Where recovery is unlikely without intervention, responsible persons should identify opportunities for active restoration.

DEQ will review streamside evaluations as part of the five-year implementation plan review to assess whether the evaluation and associated strategies align with load allocations as measured through effective shade targets. DEQ will consider the evaluation complete if it includes the required elements in this section. DEQ may require responsible persons to revisit or update the streamside evaluation in the future to assess progress.

10.2.1.2 Shade gap analysis

A shade gap analysis compares the amount of shade that currently exists along a stream to the amount of shade required under the TMDL. The purpose of a shade gap analysis is to determine whether responsible persons are meeting effective shade.

EPA modeled shade gaps and effective shade targets for some streams (see TMDL Section 9.1.5), but only for a limited number of stream segments. As a result, not all responsible persons have shade gap results. Where results do exist, they apply only to the modeled stream segments. EPA also averaged results across modeled waterbodies within each responsible person's jurisdiction, and site-specific results are available upon request.

This WQMP requires ODA, ODF, and BLM to complete a shade gap analysis in streamside areas where EPA did not provide modeled results and where DEQ has determined that existing management may be inadequate to meet load allocations (Section 8). These analyses must include intermittent streams.

Where EPA provided shade gap results, responsible persons must use them for streamside evaluations, recognizing they apply only to modeled segments. Responsible persons who are not required to complete a shade gap analysis may do so voluntarily. Those with existing TMDL shade gap results are not required to update them, but they are encouraged to do so if land conditions have changed substantially since the period used in the TMDL modeling.

Any responsible persons completing a shade gap analysis must use DEQ-approved methods and submit a project plan describing the method, data sources, and overall approach.

Project plans must be submitted to DEQ for review and approval according to the schedule in Table 6. Responsible persons may propose alternative effective shade targets through a DEQ-approved project plan that provides site-specific data supporting revised targets.

Approved methods include:

- **Field-based measurements** – Measure current effective shade at the stream surface using a Solar Pathfinder™, hemispherical photography, or similar equipment and software. Document vegetation category, canopy density, stream width, and stream orientation. Compare results to either the site-specific modeled targets (TMDL Section 9.1.5.1.2), the shade curves (TMDL Section 9.1.5.1.2), or other DEQ-approved site-specific targets. Field methods should follow OWEB's Water Quality Monitoring Technical Guidebook, Chapter 14.
- **Modeling** – Apply Heat Source modeling, as used in the TMDL (TMDL Appendix G), to estimate current shade and calculate the difference from applicable effective shade targets.
- **Other DEQ-approved method** – Propose an alternative approach, such as remote sensing, through a project plan submitted to DEQ for approval.

10.2.1.3 120-foot slope buffer alternative

Responsible persons who are required to complete a shade gap analysis, as well as those who choose not to use EPA's shade gap results where they are available, may instead apply a 120-foot slope-distance buffer measured up-slope along the grounds contour from top of bank. This buffer must protect overstory and woody vegetation and must be enforceable through ordinance or regulation. Management activities within the buffer must result in only limited shade reduction and meet applicable surrogate shade targets.

The literature review in TMDL Appendix C indicates that a 120-ft buffer is generally sufficient to maintain stream shade and that potential shade loss at this distance is unlikely to cause stream temperature increases for most waterbodies.

Streamside evaluations are still required to identify locations where restoration or protection strategies are needed and to support adaptive implementation. Responsible persons may use the buffer option alone or in combination with other strategies.

10.2.2 Dam and reservoir requirements

The TMDL establishes a surrogate measure to implement load allocations for dams and reservoirs (TMDL, Section 9.1.5). Dam and reservoir operations must meet the surrogate measure of no net warming of downstream outflow temperatures above upstream inflow temperatures, expressed as the seven-day average daily maximum (7DADM), plus the assigned Human Use Allowance above the applicable criteria in downstream waters (TMDL Tables 30-33). DEQ requires monitoring and assessment to determine whether dam and reservoir operations comply with this surrogate measure.

To identify which operators must conduct monitoring, DEQ used data from the Oregon Water Resources Department and the National Inventory of Dams (Appendix C) and applied the following screening criteria:

- Dams/reservoirs that are off-channel.
- Facilities that do not discharge during the TMDL critical period.
- Privately owned dams not operated for public benefit.
- Facilities storing water solely for environmental purposes.
- Facilities storing less than 5,000 acre-feet.
- Dams/reservoirs not identified in the 2006 WQMP.

Based on this screening, DEQ determined that Douglas County must monitor and analyze Ben Irving (Berry Creek) and Galesville reservoirs.

For PacifiCorp, DEQ did not apply the screening criteria to individual reservoirs because EPA's TMDL analysis (Appendix G) found that cumulative operations of the North Umpqua Hydroelectric Project cause measurable warming below the Soda Springs Powerhouse. Therefore, DEQ requires PacifiCorp to monitor and assess the entire project, including all dams and appurtenant structures.

Depending on the monitoring and assessment results, DEQ may require these operators to develop implementation plans that address warming from dam and reservoir operations. If DEQ determines an implementation plan is required, it will coordinate with the operator to set a reasonable timeline and reporting expectations.

All dams and reservoir operators, regardless of ownership or inclusion in this list, must ensure their operations meet the surrogate measure targets, and the applicable HUAs.

10.2.2.1 Dam and reservoir monitoring and analysis

The temperature monitoring and analysis is essential to verify whether dam and reservoir operators meet surrogate measure targets, attain the assigned HUA, and provide the basis for adaptive management. Reservoirs can alter solar heat flux, trap and release heat, and shift seasonal temperature cycles. Stratified reservoirs may cool rivers in the summer by releasing colder deep water, but they can also release warmer surface waters in the fall when reservoirs mix.

Douglas County and PacifiCorp must submit temperature monitoring and assessment plans according to the schedule outlined in Table 6. Note that this may be in addition to the implementation plan required to meet shade targets for streamside lands under their jurisdiction. The monitoring and assessment plan must define the methods needed to evaluate compliance with the surrogate measure and assigned HUA during the critical period (May 1 through October 31). Continuous upstream and downstream temperature monitoring data are required to evaluate whether operations meet the surrogate measure and HUA.

Operators may propose a mechanistic model or empirical model to estimate "free-flowing" conditions for comparison. With DEQ approval, modeled upstream conditions may be used to define the surrogate measure target and evaluate compliance with the applicable HUA.

Each monitoring and assessment plan must include a plan to collect continuous upstream and downstream temperature data for at least four consecutive years. If multiple streams flow into a reservoir, operators may combine inflow temperatures as a flow-weighted mean. Previously collected temperature data may be used if it reflects current operations and meets quality control and assurance protocols consistent with DEQ, EPA, or other recognized standards.

Dam and reservoir operators may also propose additional monitoring to inform assessment models or decisions about management changes, such as collecting reservoir temperature profiles or measuring reservoir water levels and outflow rates, to support modeling or interpret temperature dynamics and operational influences.

Monitoring data collected to meet TMDL objectives must follow established quality control and assurance protocols consistent with DEQ, EPA, or other recognized standards. Temperature monitoring data, audit information, and other monitoring data shall be submitted to DEQ at a mutually agreed upon timeline, in electronic format using DEQ approved templates or made available in a publicly accessible database approved by DEQ.

Monitoring and assessment data will be used to establish baseline conditions, evaluate compliance with surrogate targets and applicable HUAs, guide adaptive management, and evaluate site-specific approaches to reduce temperature impacts.

10.2.2.2 Implementation pathways

DEQ will use the monitoring and analysis results to determine which implementation pathway applies.

1. **No temperature increases and/or attains human use allowance -** If DEQ determines sufficient data show no measurable temperature increase between the inflow and outflow above the assigned HUA, an implementation plan may not be required.
2. **Temperature increases above the surrogate measure target -** If monitoring shows operations increase outflow temperatures, the operator must either:
    a. **Conduct a cumulative effects analysis** demonstrating that warmer release temperatures do not cause cumulative downstream exceedances to the assigned HUA when temperatures exceed the applicable criteria. This analysis requires a DEQ-approved Quality Assurance Project Plan.
    b. **Submit an implementation plan** for DEQ approval that includes structural and/or operational management strategies designed to mitigate reservoir warming.

If a cumulative effects analysis demonstrates that dam or reservoir operations contribute to downstream warming that may result in exceedances of water quality standards, operators must submit an implementation plan that includes structural and/or operational management strategies designed to mitigate reservoir warming.

Adjustments to the surrogate measure target may be allowed under specific conditions described in the TMDL (Section 9.1.5).

DEQ recognizes that in addition to TMDL requirements, operators may be subject to other state or federal obligations such as discharge permits, water quality certifications, or conditions established under other environmental programs that address aspects of operation beyond the TMDL surrogate measures. Monitoring and assessment plans should identify these requirements and outline any current operational strategies used to limit downstream warming. DEQ will review monitoring and assessment results and alternative operational plans to determine whether operations meet TMDL requirements.

PacifiCorp may pursue TMDL compliance through the TMDL implementation plan process or by updating temperature mitigation measures under the 401 WQC for the North Umpqua Hydroelectric Project. If determined necessary, DEQ may modify the 401 WQC to include updated TMDL requirements.

10.2.2.3 Protecting Cold Water Criterion

The Protecting Cold Water criterion (OAR 340-041-0028(11)) applies to waters that have summer seven-day-average maximum ambient temperatures that are colder than the biologically based criteria. In reaches where the protecting cold water criterion applies, the same no-net-warming surrogate measure is also used. Warming from all sources combined may not exceed 0.3°C (0.5°F) above the colder upstream ambient temperature at the point of maximum impact where salmon, steelhead or bull trout are present. PCW is evaluated against the colder upstream ambient temperature, not the biologically based criteria. Operators on these reaches are responsible for evaluating surrogate measures and attainment of applicable HUAs relative to the colder ambient temperature.

The TMDL (Table 16) identifies five dams where the Protecting Cold Water criterion potentially applies in upstream waters entering the reservoir:

- Stump Lake (Clear River)
- Lemolo (North Umpqua River)
- Toketee (North Umpqua River, Clearwater River)
- Slide Creek (North Umpqua River)
- Soda Springs (North Umpqua River)

DEQ assumes the Protecting Cold Water criterion applies unless DEQ determines that sufficient demonstrate the criterion is not applicable.

10.2.3 Public involvement

Implementation plans must describe how responsible persons use education and outreach to build understanding and support for management strategies. Plans should identify outreach methods (e.g., meetings, mailings, online tools), target audiences, identify opportunities for input, and describe how feedback will inform actions.

10.2.4 Maintenance of strategies over time

Implementation plans must describe how responsible persons will maintain strategies to support continued progress toward load allocations, surrogate measure targets, and water quality standards. Plans should specify maintenance actions (e.g., inspections, repairs, updates), assign responsibilities, and set review schedules.

10.2.5 Implementation costs and funding

Implementation plans must include a five-year estimate of the costs to install, maintain, and monitor management strategy effectiveness. Plans should provide reasonable estimates of major costs, such as staffing, materials, operations, monitoring, outreach, and other relevant expenses. Plans should also identify funding sources and any gaps.

DEQ encourages responsible persons to report actual expenditures to support evaluation of cost-effectiveness. Appendix C lists some of the funding and assistance programs available to assist with implementing TMDL related actions.

10.3 Timeline for implementing management strategies and schedule for completing measurable milestones

Each implementation plan must provide a timeline for implementing management strategies and a schedule for completing measurable milestones. Timelines and milestones must align with the expectations provided in Sections 5 and 6 and reflect the results of monitoring and assessments requirements in Sections 10.2.1 and 11.1.

Strategies and milestones should use the SMART framework—Specific, Measurable, Achievable, Relevant, and Time-bound (Doran, 1981)—to show progress during DEQ's five-year review.

Plans must commit to implementing management strategies on a reasonable timeline and provide a schedule that shows steady, incremental progress. Alternative schedules differing from Table 6 must be approved by DEQ.

Table 6. Schedule for implementation plans and additional information and analysis

Requirement	Responsible persons	Submission date or timeframe
Submit an implementation plan to DEQ for review and approval	Responsible persons listed in Table 3 with jurisdiction over streamside lands	18 months after EQC adoption of this WQMP
Shade gap analysis project plan	ODA, ODF, BLM, USFS	18 months after EQC adoption of this WQMP
Dam and reservoir monitoring and assessment plan	Douglas County and PacifiCorp	18 months after EQC adoption of this WQMP
Streamside evaluation	Responsible persons listed in Table 3 with jurisdiction over streamside lands	Year-four annual report

Requirement	Responsible persons	Submission date or timeframe
Shade gap analysis results OR documented adoption of a 120-foot streamside buffer	ODA, ODF, BLM, USFS and responsible persons not using the TMDL shade gap analysis for their streamside evaluation	Year-four annual report
Dam and reservoir cumulative effects analysis and/or implementation plan updates	Douglas County PacifiCorp	Following completion of the temperature monitoring and assessment, operator consults with DEQ to set submittal dates

10.4 Implementation plan performance monitoring and review

Each implementation plan must provide for performance monitoring and include a plan for periodic review and revision.

10.4.1 Implementation plan performance monitoring and review

Implementation plans must describe how responsible persons will monitor and report progress. Plans must include metrics and methods they will use to track implementation and evaluate effectiveness. Responsible persons must submit annual reports to DEQ on a specified date. Annual reports must describe the management strategies they implemented, progress toward timelines and milestones, monitoring results, coordination with partners, and any significant changes that influence implementation. Reports may also include metrics such as the number and type of projects completed, practices applied, education activities, or technical assistance delivered.

Responsible persons generally report on their own actions but may also include activities supported through partnerships or by individual landowners. They must report projects that use practices listed in OWEB's Oregon Watershed Restoration Inventory, except for routine maintenance activities, to OWRI or other DEQ-approved publicly accessible databases. This reporting is in addition to annual reports submitted to DEQ.

Figure 3 shows the five-year nonpoint source TMDL implementation plan schedule. Implementation begins with plan development and continues through five-year implementation cycles. Within each cycle, annual reports and five-year plan reviews track progress, inform plan revisions, and support adaptive management.

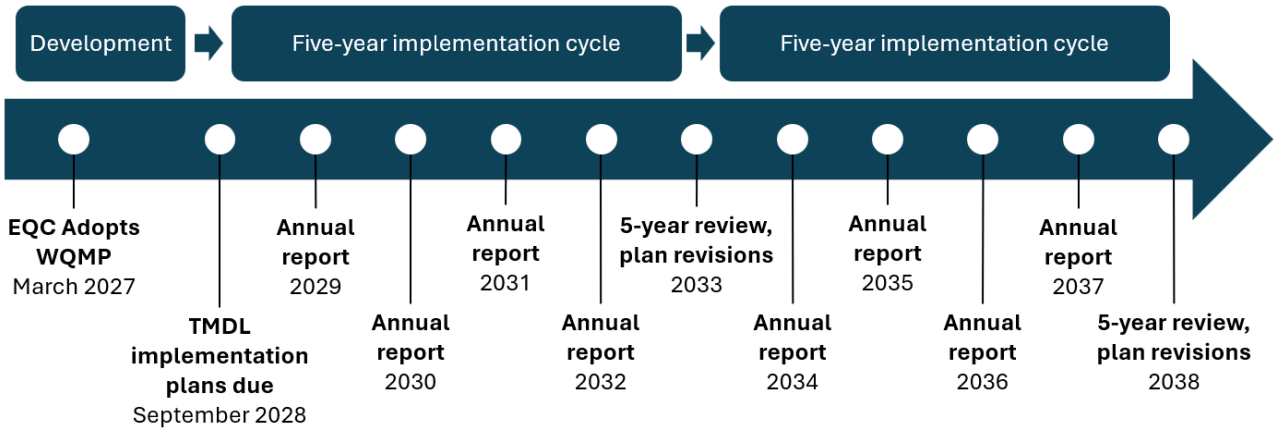

Figure 3. Five-year nonpoint source TMDL implementation plan schedule

10.4.2 Adaptive management and periodic review

Implementation plans must commit to adaptive management. Responsible persons should describe effectiveness monitoring methods in their implementation plans and summarize results in five-year reviews. DEQ may require responsible persons to revisit or update the streamside evaluation in the future to assess progress.

Responsible persons must review, and revise implementation plans every five years and submit them to DEQ for approval. They must update timelines for continued implementation and incorporate lessons learned through monitoring and evaluation. If DEQ identifies deficiencies during its review, it will set a deadline for submission of a revised plan.

11 Monitoring and evaluation of progress

OAR 340-042-0040(4)(I)(K) requires each WQMP to include a plan to monitor and evaluate progress toward achieving TMDL allocations and water quality standards, including (i) identification of persons responsible for monitoring, (ii) a plan and schedule for reviewing monitoring information and revising the TMDL.

Monitoring under this WQMP includes two components:

- **Implementation and effectiveness monitoring** carried out by responsible persons through their implementation plans, annual reports, and five-year reviews.
- **Environmental monitoring** to assess water quality status and trends for the impairments that constitute the basis for this TMDL.

Together, these monitoring activities support adaptive management by tracking implementation, assessing effectiveness, and evaluating environmental conditions relevant to meeting load

allocations, surrogate measures targets, and water quality standards. Surrogate measure targets serve as regulatory benchmarks for evaluating interim progress.

DEQ acknowledges that restored streamside areas will require decades to develop mature overstory woody vegetation capable of providing effective stream shading. As a result, DEQ will rely primarily on progress and effectiveness monitoring documented through DEQ-approved implementation plans, annual reports, and comprehensive year five reviews to evaluate progress towards TMDL allocations and water quality standards.

11.1 Monitoring responsibilities

All responsible persons identified in Table 3 must track the implementation and effectiveness of their strategies according to their implementation plans (Section 10.4) and conduct applicable monitoring and assessments consistent with Section 10.2.

ODA, ODF, BLM, and USFS combined manage approximately 93% of the streamside lands in the basin. These agencies must monitor stream temperatures within their jurisdictions, contribute to long-term temperature monitoring efforts, and coordinate with DEQ and other basin partners to improve monitoring coverage. Their implementation plans must recognize this monitoring responsibility. Existing monitoring activities may be sufficient to achieve the goals of this monitoring requirement.

The Umpqua River Basin already benefits from established temperature monitoring partnerships involving agencies, watershed councils, and local organizations. DEQ may work with partners to develop a basinwide Umpqua temperature monitoring strategy and may require ODA, ODF, BLM, or USFS to participate. This strategy is intended to build on existing programs, not replace or duplicate them, and to provide information to support adaptive management and evaluation of progress toward TMDL allocations and water quality standards.

Responsible persons collecting temperature data for TMDL implementation must follow DEQ, EPA, or equivalent quality control and assurance protocols and prepare Quality Assurance Project Plans or project-specific Sampling and Analysis Plans for DEQ approval by the schedule set by DEQ. Data must be submitted to DEQ or to a DEQ-approved public database. ODA, ODF, BLM, and USFS may coordinate their QAPPs/SAPs under a collaborative umbrella QAPP. DEQ staff will assist in developing the umbrella QAPP upon request, in advance of submission.

11.2 Plan and schedule for reviewing monitoring information and revising the TMDL

This section establishes DEQ's plan and schedule for reviewing monitoring information and revising the TMDL as needed. Monitoring and reporting give DEQ and responsible persons the feedback needed to adjust strategies and guide adaptive management. Surrogate measure targets serve as regulatory benchmarks for evaluating implementation progress over time.

The annual review evaluates whether implementation actions are carried out as committed to in DEQ-approved implementation plans. Annual reports from responsible persons summarize actions taken, monitoring results, and observations. DEQ and responsible persons use this information to confirm implementation, identify needed adjustments, and evaluate other

restoration efforts that contribute to improved stream temperature, such as channel morphology, and streamflow restoration.

The five-year review evaluates whether implemented actions effectively advance basin progress toward surrogate measure targets, load allocations, and water quality standards. DEQ compiles cumulative monitoring results, annual reports, and other relevant information to assess progress, determine whether strategies remain effective, and identify where updates to implementation plans, monitoring approaches, or other elements of the WQMP are needed. If DEQ finds plans ineffective, it may require revisions. The review incorporates new science, improved practices, and changes in basin conditions over time.

Based on these reviews, if DEQ determines monitoring data shows allocations are insufficient to meet water quality criteria or protect designated beneficial uses, DEQ may revise the WQMP, request EPA to revise the TMDL, or prepare a revised TMDL for EPA approval. All DEQ revisions follow the public participation requirements in OAR 340-042-0040(7).

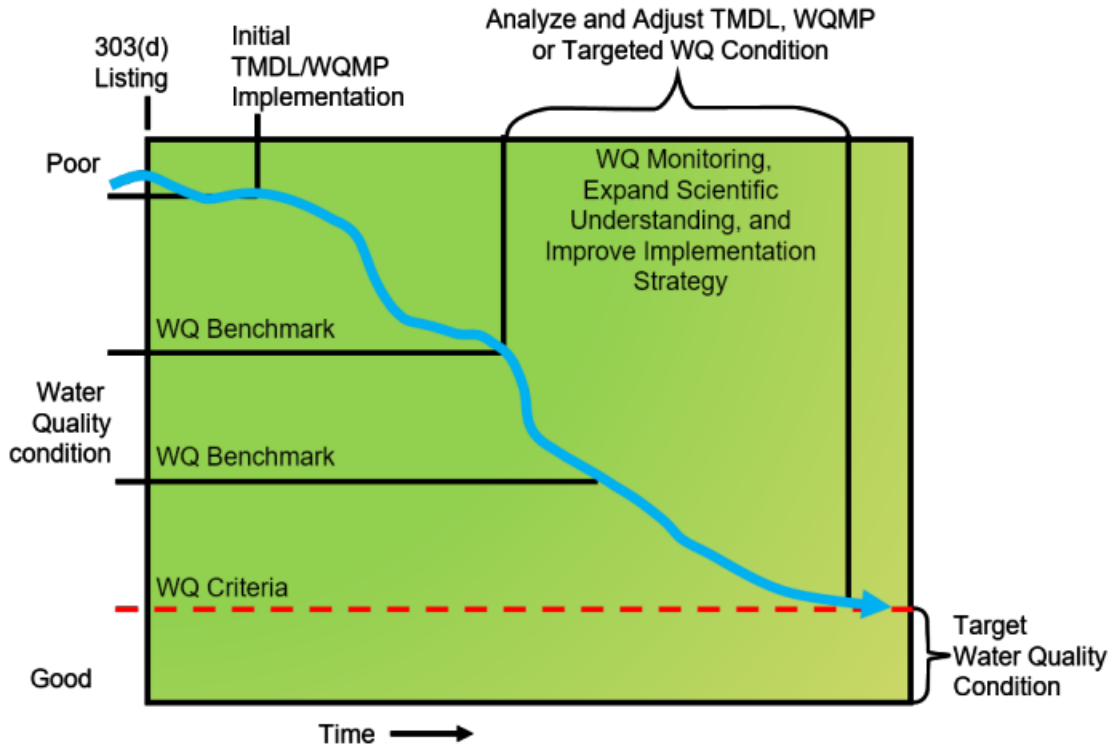

Figure 4. Conceptual representation of adaptive management.

12 Supporting program elements: public involvement, maintenance, and funding

OARs 340-042-0040(4)(l)(L)-(N) require each WQMP to describe a plan for public involvement in implementing management strategies, efforts to maintain strategies over time, and discussion of costs and funding to support implementation.

12.1 Public involvement

DEQ engaged the public during WQMP development by holding three TMDL development webinars in collaboration with EPA, a public informational meeting on the WQMP, two rulemaking advisory committee meetings, a public hearing, and a public comment period. DEQ will continue to provide opportunities throughout TMDL implementation. Updates will be provided during major WQMP revisions and five-year reviews. Summaries of implementation progress will be available to the public.

12.2 Maintenance of management strategies

DEQ ensures strategies remain effective and enforceable over time by reviewing implementation plans, annual reports, and five-year evaluations; assessing progress toward TMDL load allocations; and recommending updates when needed. If plans are incomplete or ineffective, DEQ issues written feedback and sets deadlines for revisions.

Day-to-day maintenance of individual strategies remains with responsible persons, including DMAs, who must describe in their plans how long-term maintenance will be supported through regular updates, resource commitments, and coordination mechanisms.

12.3 Costs and funding

Implementing strategies may result in capital and operational costs for responsible persons and DEQ. Costs vary with land use, pollutant sources, and existing controls. Most direct costs will be borne by those contributing heat to streams.

Expenses may include developing implementation plans, implementing projects and management strategies, conducting monitoring and assessments, and preparing annual reports and five-year reviews. Some strategies may reduce long-term costs through preventive maintenance or operational efficiencies, and water quality improvements can provide community-wide benefits such as healthier ecosystems and restored fisheries.

Estimated costs to DEQ, local businesses, and responsible persons are summarized in the Fiscal Impact Statement for this rulemaking. Responsible persons must describe costs and funding strategies in their implementation plans. Appendix B lists funding opportunities and grant programs that can support implementation of the Umpqua River Basin temperature TMDL.

13 Reasonable assurance of implementation

This section demonstrates that the TMDL implementation framework in this WQMP and the implementation plans required under OAR 340-042-0080 will proceed through regulatory and voluntary actions. These actions reduce human-caused heat inputs, meet TMDL wasteload and load allocations, and support attainment of temperature-related water quality standards consistent with federal antidegradation rules (40 CFR 131.12(a)(2)) and Oregon's antidegradation policy (OAR 340-041-0004). OAR 340-042-0040(4)(l)(J) requires a description of reasonable assurance that those strategies and plans will proceed.

OAR 340-042-0030(9) defines reasonable assurance as a demonstration that a TMDL will be implemented through regulatory or voluntary actions. OAR 340-042-0040(6)(g) requires that practices exist, be technically feasible, and have a high likelihood of implementation. This three-point test, consistent with EPA practice including the Chesapeake Bay TMDL (EPA, 2010), guides DEQ's determination that this WQMP will be implemented.

EPA guidance (1991 and 2012) emphasizes that reasonable assurance must connect enforceable mechanisms, monitoring, and adaptive management to demonstrate that practices exist, are feasible, and will be implemented. The Clean Water Act Section 303(d) further requires that a TMDL be established at a level necessary to implement the applicable water quality standard. This framework reinforces the three-point test and supports DEQ's approach. For point sources, the NPDES program provides reasonable assurance; for nonpoint sources, DEQ applies the three-point test to determine whether reductions are achievable. Without such a demonstration, DEQ may require additional point source reductions.

13.1 Implementation mechanisms

illustrates DEQ's accountability framework. It links pollutant reduction strategies to responsible persons, assigns timelines and milestones, tracks progress through monitoring and reporting, and provides adaptive management and enforcement actions if implementation falls short. This stepwise approach shows how DEQ maintains reasonable assurance over time.

The core of reasonable assurance comes from enforceable requirements:

- **NPDES permitting** – DEQ implements wasteload allocations for point sources through NPDES permits consistent with 40 CFR 122.44(d)(1)(vii)(B). Federal regulations require that water quality-based effluent limits in permits align with the assumptions and requirements of the approved TMDL, providing enforceable mechanisms to meet these allocations.
- **WQMP and DEQ-approved implementation plans** – DEQ implements nonpoint source load allocations through this WQMP and implementation plans required under OAR 340-042-0080. These plans must identify management strategies to meet allocations, include timelines and milestones, provide performance reporting, ensure public involvement, describe how strategies will be maintained, and include cost estimates for installing, maintaining, and monitoring practices. DEQ reviews each plan for adequacy before approval and oversees implementation through required reporting and adaptive management. Only plans that meet these required elements receive DEQ approval.

- **Section 401 water quality certifications** – DEQ issues Section 401 water quality certifications for certain dams that include enforceable measures to maintain compliance with water quality standards and implement applicable TMDL load allocations. Section 401 water quality certifications apply to each dam or hydropower project and include conditions for management of water quality and protection of beneficial uses potentially impacted by dam operations. Section 401 water quality certifications are an enforceable mechanism for managing temperature-related impacts from dam operations.

Figure 5. DEQ reasonable assurance accountability framework

Voluntary and collaborative efforts also strengthen basin-wide implementation capacity, including:

- Riparian restoration and habitat improvement projects that increase shade, stabilize streambanks, and reconnect floodplains.
- Basin-wide monitoring and data-sharing networks that track conditions and support adaptive management.
- Education, outreach, and technical and financial assistance programs that help responsible persons adopt effective management strategies.

Variable lag times for riparian recovery and site-specific conditions create uncertainty. Ongoing monitoring and adaptive management help address this uncertainty. If monitoring shows that some strategies are less effective than anticipated, DEQ may require substitution or additional practices to achieve load reductions. DEQ relies on its accountability framework (including implementation plan approval, annual and five-year reports, performance monitoring, and adaptive management reviews) to maintain progress and require corrections if strategies fall short.

Climate change is altering precipitation, streamflow, and temperature patterns in Oregon. These shifts increase thermal loading risks and can slow stream recovery. The Office of Greenhouse Gas Programs within DEQ leads state efforts to reduce greenhouse gas emissions through policies such as the Greenhouse Gas Reporting Program, the Clean Fuels Program, and the Climate Protection Program. The CPP, re-adopted in November 2024, establishes enforceable declining caps on fossil-fuel emissions, with goals of reducing statewide emissions about 50 percent by 2035 and 90 percent by 2050. The State Agency Climate Change Adaptation Framework further guides agencies and local partners in building resilience. Although these initiatives are not enforceable under this WQMP, they complement local implementation actions by reducing long-term stressors, supporting adaptation, and reinforcing the likelihood of attaining temperature standards.

The enforceable requirements in this WQMP demonstrate a high likelihood of implementation because DEQ reviews and approves implementation plans for adequacy, requires periodic reporting, and uses monitoring to track compliance and address deficiencies. Voluntary and collaborative efforts, while outside DEQ's regulatory authority, further strengthen basin-wide capacity and increase the overall likelihood of achieving TMDL targets. Appendix A identifies thirty-four responsible persons with obligations tied to timelines, milestones, and performance monitoring.

13.2 Oversight, enforcement, and adaptive management

DEQ ensures implementation by reviewing implementation plans to confirm they identify strategies capable of meeting load allocations and surrogate measure targets, include measurable milestones, and commitment to monitoring and adaptive management. DEQ then tracks progress through required reporting and coordinates with responsible persons. ODA, ODF, BLM, and USFS manage most land in the basin where nonpoint source heat inputs originate, making their implementation plans central to basin-wide progress.

DEQ tracks water quality status and trends through performance reporting, demonstration of management strategy effectiveness, progress toward Oregon's Nonpoint Source Program Five-Year Plan goals, discharge monitoring reports, and instream monitoring. The Umpqua Basin Temperature Monitoring Strategy provides a coordinated framework for collecting instream temperature data to guide adaptive management decisions. DEQ Status and Trends reports and biennial Integrated Reports, required under the Clean Water Act, provide basin-wide and statewide water quality assessments that guide resources and plan revisions.

DEQ approves implementation plans, which then become enforceable. Failure to submit, timely implement, or revise a plan as required is a Class II violation under OAR 340-012-0055(2)(e). Failure to submit required annual reports on time is a Class I violation under OAR 340-012-0053(1).

DEQ evaluates annual reports and five-year reviews against established timelines and milestones to confirm that strategies remain on track. These evaluations may trigger enforcement or adaptive management actions when strategies fall short of expectations. If progress lags, DEQ may require revised strategies, stronger measures, or updates to the streamside evaluation, or additional permit conditions. If responsible persons fail to develop, implement, or revise their implementation plan, or to meet established milestones, DEQ may take appropriate action. Options include voluntary engagement, formal enforcement, or referral to the EQC under OAR 340-042-0080.

In certain cases, DEQ may adjust implementation expectations based on new information or specific permit conditions. When establishing permits for point sources, if any credit is based on future nonpoint source reductions, the record must demonstrate (1) reasonable assurance that nonpoint source controls will be implemented and maintained, or (2) that such reductions are documented through an effective monitoring program.

DEQ may also determine that plans are not necessary for some responsible persons. New information may also warrant adding additional responsible persons or requiring previously identified responsible persons to submit an implementation plan. In such cases, DEQ may revise the WQMP or reissue individual orders to require plan submittal.

If DEQ determines that current management strategies are unlikely to meet allocations and surrogate measure targets, the Agency may require implementation plan revisions, revise the WQMP, recommend EPA prepare a revised TMDL, or prepare a revised TMDL for EPA approval. DEQ will follow all public participation requirements, including convening a local technical or rulemaking advisory committee to provide input on TMDL revisions per OAR 340-042-0040(7). These adaptive management actions ensure that management strategies remain effective, protect beneficial uses, and respond to new information or changing conditions.

Together, these oversight, enforcement, and adaptive management tools ensure that implementation remains effective and responsive**.** The enforceable requirements in this WQMP and DEQ-approved implementation plans demonstrate reasonable assurance because they include the key elements needed for successful implementation and are subject to DEQ review, approval, and adaptive management. DEQ's accountability framework, linking enforceable requirements, monitoring, and adaptive management, mirrors the Chesapeake Bay TMDL approach that EPA has recognized as a model for demonstrating reasonable assurance. Together, these mechanisms provide high confidence that allocations will be met, and temperature standards attained.

14 Legal authorities

As required by OAR 340-042-0040(4)(l)(O), the following legal authorities provide the basis for implementing the management strategies outlined in this WQMP. They support both regulatory and voluntary actions by DEQ and its partners to reduce pollutant loads and protect water quality.

14.1.1 Clean Water Act, Section 303(d)

DEQ is responsible for implementing the Clean Water Act in Oregon. Under Section 303(d) of the 1972 Federal Clean Water Act, as amended, states must develop a list of rivers, streams,

and lakes that cannot meet water quality standards without additional pollution controls beyond those already required for industrial sources and sewage treatment plants. These waters are considered "water quality limited." States or the EPA must identify these waterbodies, and in Oregon, DEQ maintains and updates the list every two years. This list is known as the 303(d) list.

Section 303 of the Clean Water Act also requires the development of TMDLs for all waters on the 303(d) list. DEQ implements TMDLs through OAR 340-042, with special provisions for agricultural lands and nonfederal forestland governed by the Agriculture Water Quality Management Act and the Forest Practices Act, respectively. OAR 340-042(4)(I) requires TMDLs to include a WQMP.

A TMDL defines the maximum amount of pollution a waterbody can handle without violating water quality standards. To meet these limits, DEQ develops WQMPs that outline strategies to reduce pollution to the levels specified in the load allocations and wasteload allocations in the TMDL. This strategy aims to restore water quality and ensure compliance with water quality standards, protecting the designated beneficial uses of the water for all users.

14.1.2 Endangered Species Act, Section 6

Section 6 of the 1973 federal Endangered Species Act, as amended, encourages states to create and maintain conservation programs for federally listed threatened and endangered species. Under Section 4(d) of the ESA, the National Marine Fisheries Service must identify activities that may result in a “take,” meaning harm or harassment, of the species they protect. This WQMP focuses on protecting salmonid fish.

NMFS also defines specific precautions that, if followed, protect local governments and other entities from prosecution for take even if a listed species is unintentionally harmed. This provision, known as a limit on the take prohibition, provides greater certainty about liability.

In July 2000, NMFS published a rule responding to Section 4(d) (65 FR 42421) which lists 12 criteria to determine whether a local program includes sufficient precautionary measures to conserve fish. Local jurisdictions can submit development ordinances to NMFS for review under some or all of these criteria. The criteria for municipal, residential, commercial, and industrial development and redevelopment include:

- Avoid development in inappropriate areas such as unstable slopes, wetlands, and high habitat value areas.
- Prevent stormwater discharge impacts on water quality.
- Protect riparian areas.
- Avoid stream crossings by roads, utilities, or other linear developments.
- Protect historic stream meander patterns.
- Protect wetlands, wetland buffers, and wetland functions.
- Preserve the hydrologic capacity of permanent and intermittent streams to pass peak flows.
- Promote landscaping with native vegetation.
- Prevent erosion and sediment runoff during and after construction.
- Ensure water supply demand does not negatively impact salmon needs.
- Provide mechanisms for monitoring, enforcement, funding, and implementation.
- Comply with all relevant state and federal environmental laws and permits.

14.1.3 Oregon Revised Statute Section 468B

DEQ has legal authority to prevent and reduce water pollution across the state. Under ORS 468B.020, the law declares pollution of state waters as neither a reasonable nor natural use of those waters and states that pollution contradicts Oregon's public policy outlined in ORS 468B.015. To enforce this policy, DEQ must take necessary actions to prevent new pollution and reduce existing pollution by encouraging cooperation among individuals, industries, cities, and counties. DEQ also requires the use of all available and effective methods to meet the water quality and purity standards set in ORS 468B.048. Additionally, ORS 468B.110 gives DEQ and the Environmental Quality Commission authority to take actions necessary to meet and maintain water quality standards. This includes issuing TMDLs and establishing WQMPs.

14.1.4 NPDES and WPCF Permits

DEQ issues two types of wastewater permits under ORS 468B.050. The National Pollutant Discharge Elimination System permit regulates the discharge of waste into waters of the United States and is required under the federal Clean Water Act. The Water Pollution Control Facilities permit regulates waste disposal on land and operates as a state program.

14.1.5 401 Water Quality Certification

Section 401 of the Clean Water Act requires applicants for federal licenses or permits to obtain certification from DEQ before starting any activity that may discharge pollutants into state waters. This certification confirms that the activity complies with state water quality standards. The requirement applies to projects such as hydroelectric developments and dredge-and-fill operations. Relevant legal authorities include 33 U.S.C. 1341, ORS 468B.035 – 468B.047, and OAR 340-048-0005 – 340-048-0040.

14.1.6 Oregon Forest Practices Act

The Oregon Department of Forestry regulates land management activities on non-federal forest lands that impact water quality under ORS 527.610 to 527.992 and OAR 629, Divisions 600 through 665. The Board of Forestry has adopted water protection rules detailed in OAR 629, Divisions 625, 630, and 635-660. The Oregon EQC, Board of Forestry, DEQ, and ODF rely primarily on these pollution control measures to meet state water quality standards. Statutes and rules also include adaptive management provisions, which allow revisions to Forest Practices Act practices when necessary to meet water quality standards. These provisions appear in ORS 527.710, ORS 527.765, OAR 629-035-0100, and OAR 340-042-0080.

14.1.7 Agricultural Water Quality Management Act

The Oregon Department of Agriculture is responsible for preventing and controlling water pollution from agricultural activities under the Agricultural Water Quality Management Act (ORS 568.900 to ORS 568.933), adopted by the legislature in 1993. As the lead state agency for regulating agriculture's effects on water quality under ORS 561.191, ODA collaborates with local communities to develop Agricultural Water Quality Management Area Plans in watersheds where agricultural practices contribute to water quality impairments. The Umpqua Basin is subject to Umpqua Basin Agricultural Water Quality Management Area Plan Rules under OAR 603-095-0740.

14.1.8 Local Ordinances

Local governments must comply with applicable statewide land use requirements. Implementation plans must identify the existing local legal authorities available to carry out management strategies and any new authorities needed to meet TMDL allocations. If new or revised codes or ordinances are required, the responsible person must include code development as a management strategy.

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16 Appendices

The WQMP includes the following list of appendices.

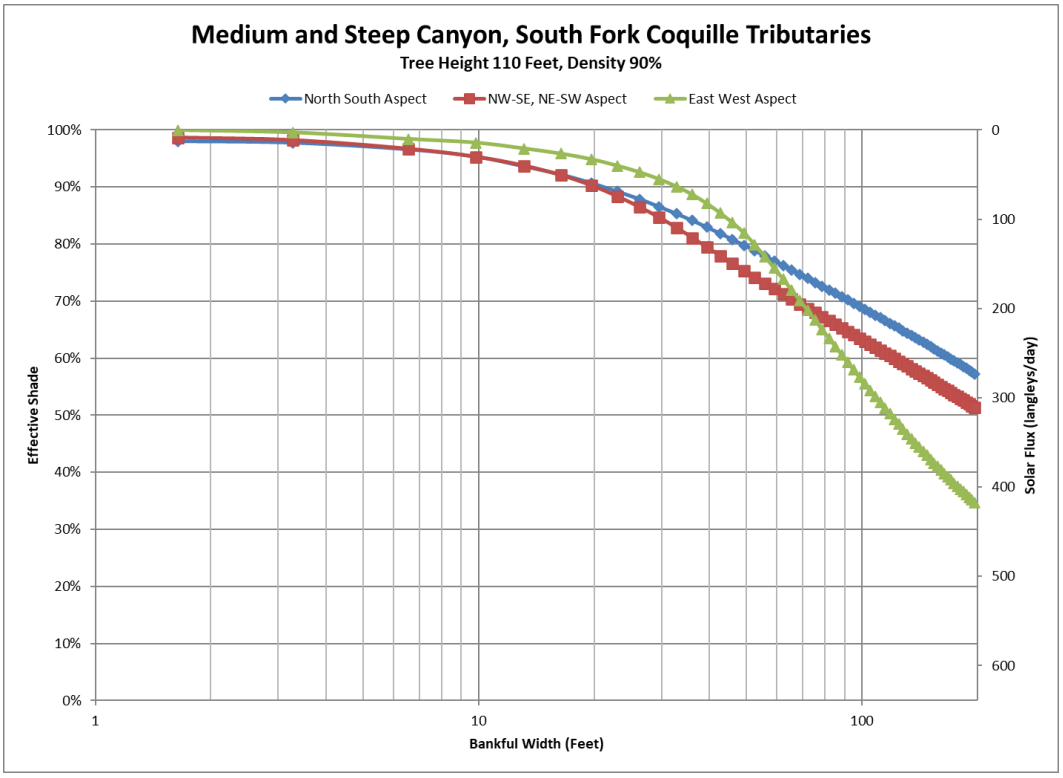
16.1 Appendix A: List of responsible persons, including DMAs

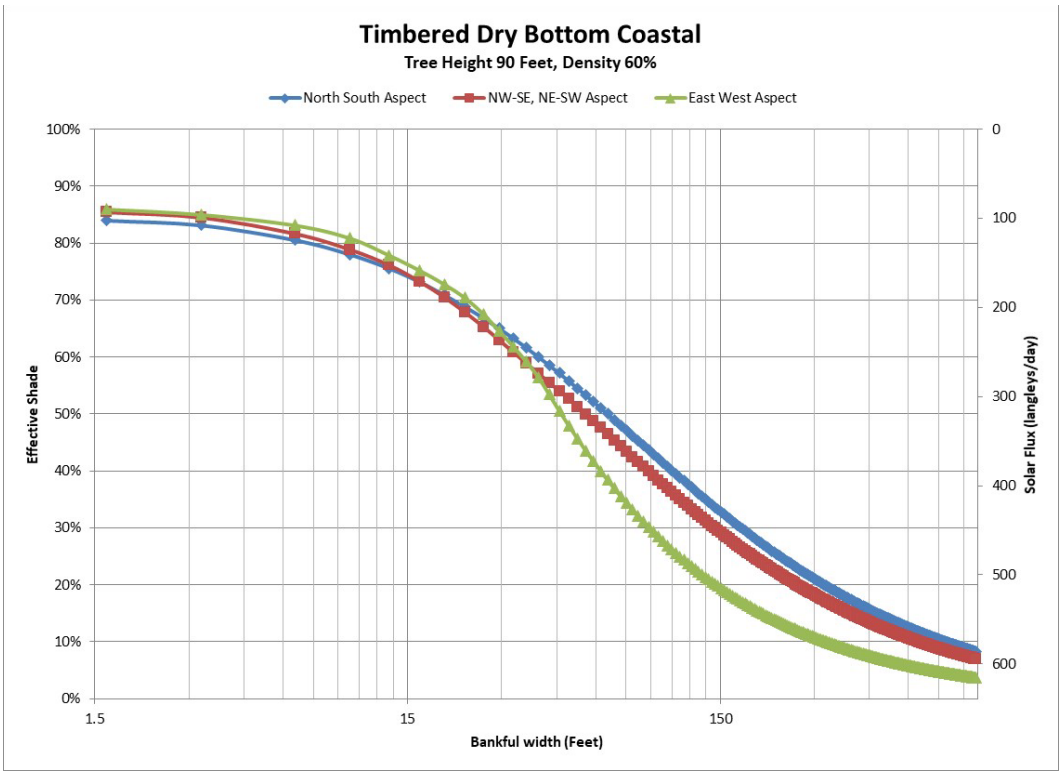
#	Name	Type	Total Acres in the TMDL project area	Streamside Acres	Status	TMDL plan needed?
1	Bonneville Power Administration	Special District	31	14	New	No
2	Central Oregon & Pacific Railroad	Railroad	1,889	1,012	New	No
3	City of Canyonville	Municipality	504	149	Existing	Yes
4	City of Drain	Municipality	296	121	Existing	Yes
5	City of Elkton	Municipality	84	42	Existing	Yes
6	City of Glendale	Municipality	171	45	Existing	Yes
7	City of Myrtle Creek	Municipality	1,341	391	Existing	Yes
8	City of Oakland	Municipality	394	112	Existing	Yes
9	City of Reedsport	Municipality	1,030	453	Existing	Yes
10	City of Riddle	Municipality	319	75	Existing	Yes
11	City of Roseburg	Municipality	5,696	835	Existing	Yes
12	City of Sutherlin	Municipality	3,718	775	Existing	Yes
13	City of Winston	Municipality	1,531	295	Existing	Yes
14	City of Yoncalla	Municipality	345	100	Existing	Yes
15	Coos Bay Rail Link	Railroad	61	55	New	No
16	Douglas County	County	147,328	47,653	Existing	Yes
17	Highland Ditch Irrigation District	Responsible Person	Not assessed	Not assessed	New	No
18	Jackson County	County	3	0	New	No
19	Klamath County	County	14	0	New	No
20	Lane County	County	164	51	New	No
21	Longview, Portland & Northern Railroad	Railroad	24	22	New	No
22	Oregon Department of Agriculture	State Agency	318,868	107,035	Existing	Yes
23	Oregon Department of Fish & Wildlife	State Agency	57	49	New	Yes
24	Oregon Department of Forestry	State Agency	987,301	344,155	Existing	Yes

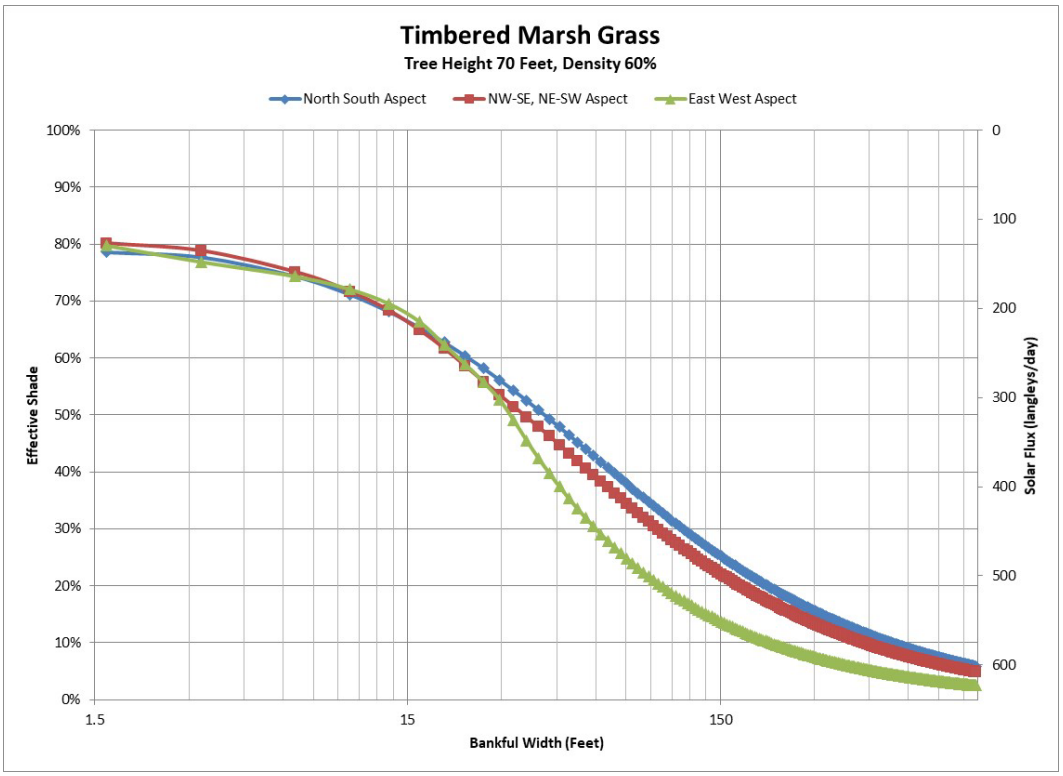
#	Name	Type	Total Acres in the TMDL project area	Streamside Acres	Status	TMDL plan needed?
25	Oregon Department of State Lands	State Agency	79	46	New	No
26	Oregon Department of Transportation	State Agency	10,280	5,005	Existing	Yes
27	Oregon Parks and Recreation Department	State Agency	627	249	New	Yes
28	PacificCorp	Private Utility	Not assessed	Not assessed	Existing	Yes
29	Port of Umpqua	Special District	950	943	New	No
30	Sutherlin Water Control District	Special District	Not assessed	Not assessed	New	No
31	U.S. Bureau of Land Management	Federal Agency	623,880	212,962	Existing	Yes
32	U.S. Forest Service	Federal Agency	934,111	191,131	Existing	Yes
33	Union Pacific Railroad	Railroad	2	1	New	No
34	Winchester Water Control District	Special District	Not assessed	Not assessed	New	No

16.2 Appendix B: Shade curves for Ecoregion 1a.

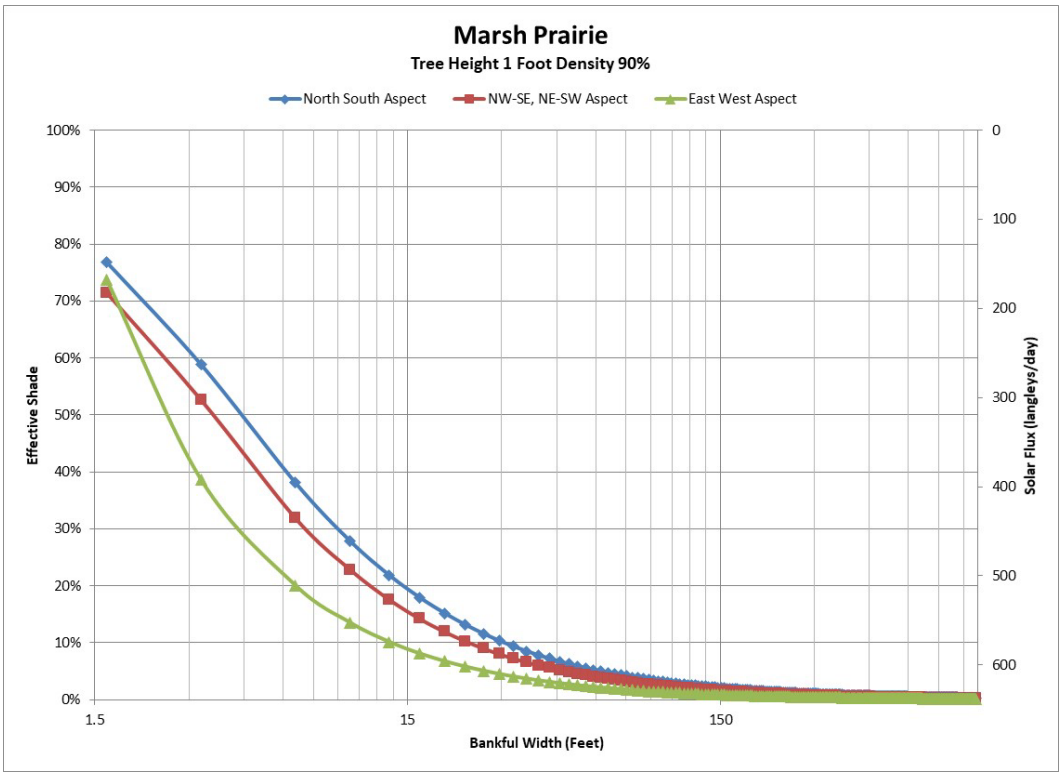
DEQ developed geographic and habitat based effective shade curves to meet nonpoint source load allocations on unmodeled reaches.




Timbered Dry Bottom Coastal
Tree Height 90 Feet, Density 60%
North South Aspect
NW-SE, NE-SW Aspect
East West Aspect
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Effective Shade
0
100
200
300
400
500
600
Solar Flux (langleys/day)
1.5
15
150
Bankful width (Feet)


Timbered Marsh Grass
Tree Height 70 Feet, Density 60%
North South Aspect
NW-SE, NE-SW Aspect
East West Aspect
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Effective Shade
0
100
200
300
400
500
600
Solar Flux (langleys/day)
1.5
15
150
Bankful Width (Feet)


Timbered Brushy Swamp
Tree Height 90 Feet, Density 70%
North South Aspect
NW-SE, NE-SW Aspect
East West Aspect
Effective Shade
Solar Flux (langleys/day)
Bankful Width (Feet)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
100
200
300
400
500
600
1.5
15
150


Marsh Prairie
Tree Height 1 Foot Density 90%
North South Aspect
NW-SE, NE-SW Aspect
East West Aspect
Effective Shade
Solar Flux (langleys/day)
Bankful Width (Feet)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
100
200
300
400
500
600
1.5
15
150

16.3 Appendix C: List of large dams and reservoirs in the Umpqua Basin

DEQ compiled a list of 50 dams in the Umpqua River Basin TMDL for Temperature project area using data from the U.S. Army Corps of Engineers National Inventory of Dams and the Oregon Water Resources Department dam safety program. Of these, DEQ requires Douglas County and PacifiCorp to monitor and assess temperature effects of their operations. Depending on the results, DEQ may require them to develop implementation plans.

No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
1	Bear Creek 3	OR00614	City of Drain	Local Government	Water Supply	500
2	Berry Creek (Ben Irving Reservoir)	OR00640	Douglas County	Local Government	Water Supply	15,000
3	Big Pond Reservoir	OR03818				0
4	Buell, Stanford	OR00969				0
5	Canyonville Reservoir	OR00683	City of Canyonville	Local Government	Water Supply	300
6	Clearwater No 1 Forebay	OR00542	PacifiCorp	Public Utility	Hydroelectric	182
7	Clearwater No 2 Forebay	OR00563	PacifiCorp	Public Utility	Hydroelectric	76
8	Cooper Creek (Sutherlin)	OR00463	Sutherlin Water Control District	Local Government	Recreation	5,200
9	Corder Log Pond	OR00215	Herbert Lumber Company	Private	Other	56
10	Creekside Development Dam No. 1	OR03902	BIA	Federal		
11	Creekside Development Dam No. 3	OR03903	BIA	Federal		
12	Denley Brothers Dam	OR00334	Carissa and Shane Spontini	Private	Irrigation	120
13	Dillard Lumber Co Dike	OR00155	Roseburg Forest Products Co	Private	Other	285
14	Dixonville Log Pond	OR00409	Ford, Allyn C. TR.	Private	Other	1,163
15	Dollar Mill Pond	OR00296	Swanson Group	Private	Other	150
16	Drain Plywood Log Pond	OR00299	Bohemia, Inc.	Private	Other	176
17	Drain Sewage Lagoon	OR01573	City of Drain	Local Government	Water Supply	40
18	Eleanor	OR01648				0

No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
19	Fish Creek Diversion Dam	OR00562	PacifiCorp	Public Utility	Hydroelectric	71
20	Fish Creek Forebay	OR03707	PacifiCorp	Public Utility	Hydroelectric	110
21	Galesville	OR00748	Douglas County	Local Government	Irrigation	117,000
22	Gardiner	OR03727	Rome Creek Timber	Private	Fish and Wildlife Pond	0
23	Georgia Pacific Log Pond	OR00165	DCIDB	Private	Other	237
24	Hayhurst Road (Drain Municipal Res.)	OR01892	City of Drain	Local Government	Water Supply	70
25	Iverson Reservoir (Douglas)	OR00526	First Interstate Bank	Private	Recreation	51
26	Lemolo No 1	OR00556	PacifiCorp	Public Utility	Hydroelectric	19,000
27	Lemolo No 2 Forebay	OR00564	PacifiCorp	Public Utility	Hydroelectric	265
28	Lemolo No. 1 Forebay	OR04091	PacifiCorp	Public Utility		
29	McComas Dam	OR02355				0
30	Paris	OR00320	Gary Hendy	Private	Hydroelectric	130
31	Paris, E.L.	OR03385				0
32	Plat I	OR00443	Sutherlin Water Control District	Local Government	Flood Risk Reduction	2,760
33	Rock Creek Hatchery	OR03979	Blogett, Sharon M. Trs of the	Private	Irrigation	1,500
34	Serafin Reservoir	OR03008				0
35	Skookum Pond Dam	OR03876	USDA FS	Federal	Fire Protection, Stock, Or Small Fish Pond	80
36	Slide Creek	OR00561	PacifiCorp	Public Utility	Hydroelectric	43
37	Smelt Dam	OR03756				0
38	Soda Springs	OR00555	PacifiCorp	Public Utility	Hydroelectric	512
39	Stump Lake Dam (Clearwater Diversion Dam #1)	OR00565	PacifiCorp	Public Utility	Hydroelectric	152
40	Sun Studs Log Pond	OR00197	Swanson Group	Private	Other	80
41	Sutherlin Log Pond	OR00333	Murphy Company	Private	Other	170
42	Sutherlin Mill (Fords Pond)	OR00274	City of Sutherlin	Private	Other	1,040
43	Toketee	OR00554	PacifiCorp	Public Utility	Hydroelectric	880
44	Updegrave	OR00491	Woods, Bill	Private	Irrigation	172
45	Wageman	OR00496	Carol Buchheim	Private	Irrigation	70

No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
46	Weaver Reservoir (Thurman-Weaver)	OR00447	Kay, Thomas W. and Zelma F.	Private	Irrigation	55
47	Wheeler Canyon Reservoir	OR03550				0
48	Whistlers Bend	OR00365	Gilbreath, William C. & EL	Private	Other	500
49	Winchester	OR00263	Winchester Water Control District	Public Utility	Recreation	700
50	Yoncalla Reservoir	OR00682	City of Yoncalla	Local Government	Water Supply	112

16.4 Appendix D: List of funding and technical assistance resources for TMDL implementation

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	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
Conservation Reserve Program	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
Conservation Stewardship Program	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
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.	OHA
Watershed Protection Program	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
Emergency Forest Restoration Program	Available through the USDA-Natural Resources Conservation Service. Helps owners of non-industrial private forests restore forest health damaged by natural disasters.	USDA
Oregon 319 Nonpoint Source Implementation Grants	Fund projects that reduce nonpoint source pollution, improve watershed functions and protect the quality of surface and groundwater, including restoration and education projects.	DEQ
Environmental Quality Incentives Program	Cost-shares water quality and wildlife habitat improvement activities, including conservation tillage, nutrient and manure management, fish habitat improvements, and riparian plantings.	NRCS

Program	General Description	Contact
Agriculture Water Quality Support Grant	Provides capacity to support voluntary agricultural water quality work in small watersheds and to meet the goals of the Agricultural Water Quality Management Area Plans and the SIA initiative.	ODA
Agricultural Conservation Easement Program	Provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.	NRCS
Farm and Ranchland Protection Program	Cost-shares purchases of agricultural conservation easements to protect agricultural land from development.	NRCS, SWCDs, ODF
Federal Reforestation Tax Credit	Provides federal tax credit as incentive to plant trees.	Internal Revenue Service
Grassland Reserve Program	Provides incentives to landowners to protect and restore pastureland, rangeland, and certain other grasslands.	NRCS
Landowner Incentive Program	Provides funds to enhance existing incentive programs for fish and wildlife habitat improvements.	U.S. Fish and Wildlife Service
Oregon Watershed Enhancement Board	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.	OWEB
Oregon Watershed Enhancement Board Small Grant Program	Provides grants up to $10,000 for priority watershed enhancement projects identified by local focus group.	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
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
Resource Conservation & Development	Provides assistance to organizations within RC & D areas in accessing and managing grants.	Resource Conservation and Development
ODF Small Forestland Investment in Stream Habitat \Grants	Provides funding for Small Forestland Owners (SFO's) to improve road conditions and stream crossings as part of forest operations.	ODF
State Forestation Tax Credit	Provides for reforestation of under-productive forestland not covered under the Oregon Forest Practices Act.	ODF

Program	General Description	Contact
	Situations include brush and pasture conversions, fire damage areas, and insect and disease areas.	
Forest Stewardship Program	Provides cost share dollars through USFS funds to family forest landowners to have management plans developed.	ODF
Western Bark Beetle Mitigation	ODF administers a cost share program for forest management practices pertaining to bark beetle mitigation for forest health and is funded through the USFS.	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
Wetlands Reserve Program	Provides cost-sharing to landowners who restore wetlands on agricultural lands.	NRCS
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
Funding Resources for Watershed Protection and Restoration	EPA's Funding Resources for Watershed Protection and Restoration (EPA, 2023) contains links to multiple funding sources	Various