

Draft Water Quality Management Plan

2025 Umpqua River Basin TMDL for Temperature

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Document information

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1 Introduction

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

A Total Maximum Daily Load is a plan for attaining and maintaining water quality standards. It establishes the maximum amount of pollution a waterbody can receive while still meeting water quality standards, assigns wasteload and load allocations, and includes a Water Quality Management Plan (OAR 340-042-0040(4)(I)).

This WQMP describes strategies to achieve **TMDL allocations**~~and provides a framework for implementation, monitoring, and evaluation~~**identified in the TMDL to attain water quality standards**. It identifies the responsible persons who are accountable for **thermal** 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 and EPA's subsequent replacement of the Umpqua River Basin Temperature TMDL. ~~In~~**Following** *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 ~~replaced~~**established** the Umpqua River Basin Temperature TMDL on June 27, 2025, using the remaining elements of Oregon's temperature criteria,~~to comply with the court's order~~. 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~~**This WQMP is intended to provide comprehensive information for implementation of the temperature TMDL, and will be amended, as newneeded, upon issuance of any future TMDLs are issued for within** the Umpqua **River** 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. All other TMDLs and associated WQMPs in the Umpqua Basin remain in effect and unchanged (Table 1).

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

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

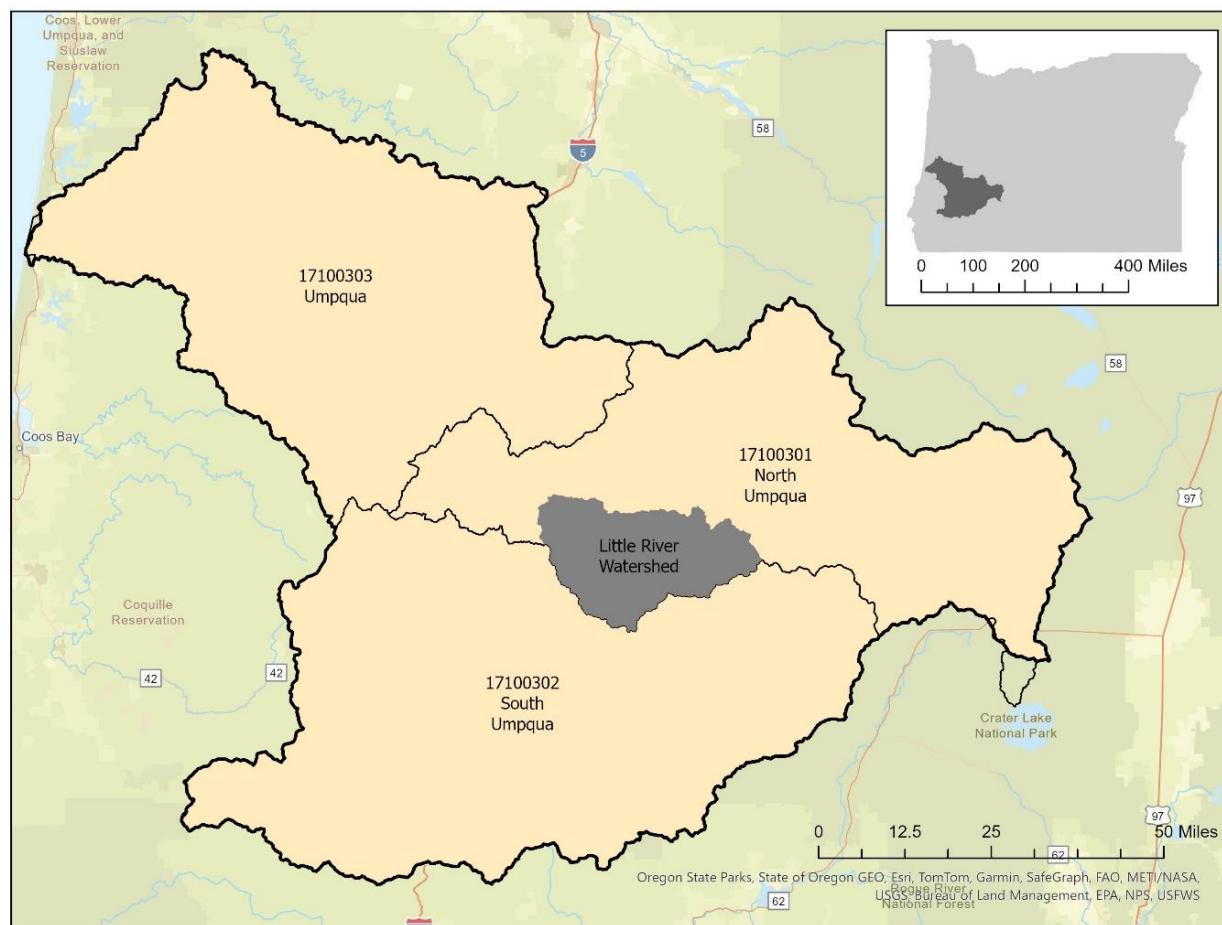


Figure 1. Map of the 2025 Umpqua River Basin temperature TMDL project area.

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 steelhead 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 **excess** 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~~ **including waters that are unimpaired or have not been assessed for temperature impairment**. TMDL allocations apply to all streams with surface flow or residual pools during the critical period. The critical period ~~is~~ **extends** from May 1 through October 31 for all waterbodies in the basin except for Rock Creek. ~~The critical period for Rock Creek is, where it begins~~ April 1 ~~through October 31~~ (TMDL, Section 6). ~~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 goals of this WQMP are to implement the 2025 Umpqua River Basin Temperature TMDL ~~and meet temperature standards,~~ **achieve and maintain Oregon's temperature criteria, including narrative criteria, and meet antidegradation requirements**. The objectives of this WQMP are to:

1. Provide a framework ~~for~~ **of** temperature management strategies.
2. Assign ~~responsibility~~ **responsibilities** for implementing those strategies.
3. Establish monitoring to track **implementation** 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 and includes application of pollutant control practices, technologies, processes, siting criteria, operating methods, best management practices, or other alternatives.

This WQMP ~~identifies~~ **proposes** management strategies to address **excess** heat sources (TMDL, Section 7) ~~and supports~~. **The strategies support** 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. **NPDES** permits translate WLAs into enforceable effluent limits and permit conditions under federal and state

regulations. TMDL, Section 9 describes thermal WLAs **assigned** to point sources. Facilities ~~can meet their WLAs through~~**may use** direct discharge controls, extended compliance schedules, water quality trading, or other mechanisms ~~allowed~~**authorized** under state and federal rules ~~to comply with permit requirements~~.

DEQ encourages NPDES permit holders to work with responsible persons to develop water quality trading programs that support surrogate shade targets. Water quality trading is an approved compliance option under Oregon's trading rules (OAR 340-039). **Water quality** 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 **reflect the range of conditions across the basin and** 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, U.S. Forest Service, and other partners.

This list is ~~not~~**neither** exhaustive,~~and~~ **nor mandatory. Responsible persons may propose** alternative or additional practices ~~may be proposed and implemented~~ 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 • Reduce reservoir residence time to limit warming • Manage sediment accumulation and reservoir depth to maintain cold-water storage capacity • 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 • Pull back activities away from the riparian area that are preventing streamside vegetation from establishing and control weeds to support release and recruitment of native vegetation • Protect existing canopy using fencing, conservation easements, or ordinances; prioritize areas meeting effective shade targets • Thin streamside vegetation as needed to promote long-term shade, and remove noxious weeds and invasive species to release natural seed banks; 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 setbacks, minimum buffer distances, overlay zones, or design standards to limit vegetation removal along riparian areas and wetlands during development • Relocate or modify infrastructure (e.g., culverts, roads, utilities) that restricts riparian growth or contributes to warming, ~~including avoiding~~; limit new stream crossings, ~~decommissioning~~decommission unneeded roads, and ~~removing~~remove obsolete crossing structures • ~~Support~~Provide cost-share incentives, outreach, and technical assistance to increase landowners participation in riparian restoration. ~~with planting programs, cost-share incentives, outreach, and technical assistance~~ • Explore feasibility of mitigation and water quality trading programs
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

Source	Management Strategies
	• Stabilize eroding banks ~~with~~-using native vegetation or bioengineering to ~~limit~~-reduce channel widening and solar exposure • Remove or modify levees, berms, culverts, ponds, tide gates, ~~or~~-and other barriers that restrict floodplain access • ~~Support~~-Encourage natural beaver activity or install beaver dam analogs to ~~promote~~-increase 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~~ • Conduct gravel augmentation to promote hyporheic exchange and increase localized cooling
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 • Improve capacity for natural storage by enhancing infiltration potential in headwater zones and upland areas • Lease or transfer water rights to instream use during the critical period; • Participate in water rights review processes • Implement actions in Oregon's Integrated Water Resources Strategy to meet Oregon's instream needs. • Apply seasonal water use restrictions during low-flow conditions • Evaluate and support the stream-gage network to document flow conditions; maintain existing gages and add supplemental low-cost monitoring tools where needed.
Climate change	• Prioritize and protect climate-resilient sites such as cold-water refugia and groundwater-fed reaches • Use climate and streamflow projections when selecting and designing watershed restoration projects • Restore and reconnect riparian, upland, and floodplain habitats to increase natural water storage and drought resilience • Apply climate-adapted planting approaches, ~~including assisted migration where appropriate~~

Source	Management Strategies
	• Increase floodplain resilience through reconnection and land-use practices that reduce vulnerability to extreme events • Support long-term temperature and flow monitoring networks to track climate impacts • Conduct selective thinning and prescribed fire to reduce hazard fuels and lower wildfire risk • Plant mixed stand species to increase resilience to forest disease and climate changes

4.2.1 Dam and reservoir operation management strategies

Surface water impoundments can 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, **Section 7.1.4 and Table 26 and** 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~~**time of year, thermal stratification, dam size, and dam operations.**

The TMDL ~~allocates a portion of the human use allowance~~**provides in-stream temperature as a surrogate measure to represent the thermal load allocation for** dam and reservoir operations~~in some locations. It also assigns dam and reservoir operations a assigns a portion of the human use allocation~~ (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.).~~ Proposed management strategies include modifying outlet structures for selective withdrawal of cooler water, adjusting release timing and volume to avoid warming, and ~~coordinating~~**modifying** operations ~~with~~**to optimize** 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** - High stand density, competing vegetation, and invasive species can limit crown development and reduce long-term shade. Thin or **actively** manage vegetation as needed to promote a 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- **to streamside shade.**

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 Channel modification can increase stream temperatures by widening** or ~~incised~~ **simplifying** channels ~~are often wider and shallower~~, increasing the surface area exposed to ~~sunlight~~ **solar radiation**, and reducing ~~opportunities for~~ hyporheic exchange ~~which elevates thermal loading (Larson and Larson, 1996).~~ **(Poole and Berman, 2001).** These physical changes ~~limit~~ **also reduce** the effectiveness of riparian and flow restoration efforts- **by limiting the streams' ability to moderate stream temperatures.** 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** channel depth and increasing solar exposure. Loss of riparian vegetation ~~also diminishes~~ **further reduces** shade, **while loss of floodplain connection limits groundwater recharge and summer base flows, both of which contribute to higher stream temperatures 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~~ **Management strategies** include reconnecting incised streams with floodplains, stabilizing eroding banks with bioengineering, placing large wood to increase habitat complexity, **and** restoring side channels ~~or~~ **and** off-channel habitats. ~~Management of hydromodification activities may also include BMPs such as~~, riparian restoration, livestock fencing, flow augmentation, ~~reservoir operations,~~ and **other** site-specific channel restoration ~~projects.~~ **practices.**

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, **Section 7.1.7 and** 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 **thermal loading from** flow modifications in some locations (~~water management and withdrawals in~~ TMDL, Tables 30 - 33). **Improving** ~~Strategies to improve~~ baseflow, ~~reduce~~ **reducing** seasonal withdrawals, and ~~restore~~ **restoring** hydrologic function ~~in critical conditions are needed~~ **can improve stream**

~~temperature throughout the basin to support temperature criteria and, where applicable, meet allocations.~~ **by increasing streamflow during the critical period.**

~~Restoring baseflows, altering seasonal withdrawals, and improving hydrologic function are strategies to meet load allocations. Priority actions~~ **Flow management strategies** include improving irrigation efficiency, protecting instream flows, reconnecting wetlands and floodplains, modifying infrastructure, ~~and~~ coordinating with water providers, ~~promoting~~ **Management strategies also include** water conservation and, where appropriate, establishing instream water rights. Although DEQ does not regulate water rights, ~~these strategies~~ **flow restoration** can ~~improve stream conditions,~~ support ~~load allocations,~~ **temperature improvements** and ~~strengthen~~ **complement** riparian and channel restoration efforts.

4.2.5 Background **sources and climate**-~~related strategies~~ **change**

“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~~ **associated with** landscape, ~~hydrology~~ **hydrologic**, and ~~meteorology~~ **meteorological factors not otherwise quantified in the models.** TMDL Table 28 shows that background sources ~~can~~ alone **can** cause temperature criteria exceedances.

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,~~ **conditions** already affect the Umpqua River Basin and are expected to ~~increase in the future~~ **intensify**.

This WQMP emphasizes long-term restoration that supports natural watershed processes. Achieving TMDL goals depends on coordinated action from local, state, federal, and private partners. Collaboration across adjacent jurisdictions, ~~together along~~ with flexible funding and creative project design, can ~~support~~ **expand** restoration across multiple land uses, ~~with local restoration. T-partnerships targeting restoration and target projects~~ where ~~it~~ **they will most provide the greatest temperature benefit.** ~~effectively reduces stream temperatures.~~ Riparian planting, channel restoration, and flow protection can increase effective shade, improve hydrologic and channel function, and ~~help buffer streams against~~ **strengthen watershed resilience to** future warming.

4.2.6 Management strategies implemented since 2006

Responsible persons and restoration partners have implemented management strategies in the Umpqua River Basin for decades, including before adoption of the original temperature TMDL. These efforts continue today and contribute to improving stream temperature and aquatic habitat.

The Oregon Watershed Enhancement Board's [Oregon Watershed Restoration Inventory](#) documents many of these restoration activities that were conducted with support from grant funding, including riparian fencing, channel modification, voluntary riparian tree retention, and other restoration practices. In the Umpqua Basin, OWRI shows 18.6 miles of riparian area planted, 1.54 miles of instream channel restoration through large wood placement, boulder placement, and other methods, and the installation of 51 off channel watering sites between 2006 and 2024. Federal funding partners have also supported a variety of restoration actions on public and private lands in the basin. Many private landowners have also funded restoration actions on their own properties that are often not captured in state restoration databases.

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 TMDL wasteload allocations 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~~ achieving appropriate incremental and measurable water quality targets

~~Nonpoint source implementation plans establish timelines for implementing management strategies based on site conditions, project readiness, permitting requirements, and restoration opportunities.~~

DEQ measures progress through incremental water quality targets and measurable milestones. ~~DEQ expects~~ **Responsible persons should begin implementing** priority control actions, such as streamside vegetation planting, ~~to begin~~ as soon as feasible following WQMP adoption. 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~~

This benchmark 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. ~~It~~**The benchmark** applies at the basin scale to evaluate overall progress and is not an individual performance requirement. **Where effective shade is not the**

primary contributor of nonpoint source thermal loading, implementation plans should identify appropriate incremental and measurable targets.

~~Achieving this level of basin-wide improvement requires coordinated implementation across responsible persons and over time. DEQ expects implementation to be focused in priority areas identified through streamside evaluations (Section) and, where available, shade gap analyses, and implemented over successive planning periods to support steady, incremental progress. This approach allows responsible persons to focus their efforts where they will have the greatest effect while contributing to basin-wide improvement over the long-term implementation timeline.~~

DEQ reviews basin-wide progress every five years and uses this information to inform adaptive management ~~(Section)~~. Annual reports describe progress toward incremental targets. ~~For strategies where shade targets do not apply, DEQ expects implementation plans to include appropriate incremental and measurable targets relevant to those actions.~~

Full attainment of surrogate targets may not be feasible in all locations ~~due to~~**because of** physical, legal, or regulatory constraints. ~~Timelines may also be influenced by factors such as restoration~~**Restoration** site availability, land ownership patterns, climate change impacts, invasive species, or natural disturbances **may also affect implementation timelines**. Where such constraints affect progress, schedules may be adjusted to reflect site conditions and available opportunities.

5.3 Schedule for implementing control actions

Nonpoint source implementation plans establish schedules for implementing control actions, achieving measurable milestones, and tracking progress toward water quality targets based on site conditions, project readiness, permitting requirements, and restoration opportunities.

Achieving this level of basin-wide improvement requires coordinated implementation across responsible persons and over time. DEQ expects implementation to focus on priority areas identified through streamside evaluations (Section 9.4.1) and, where available, shade gap analyses. Responsible persons should implement these actions over successive planning periods to support steady, incremental progress. This approach allows responsible persons to focus their efforts where they will have the greatest effect while contributing to basin-wide improvement over the long-term implementation timeline.

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. **DEQ will consider the effects of natural disturbances when evaluating progress during its periodic reviews.**

5.4 Schedule for completing other measurable milestones

Other measurable milestones, such as monitoring deliverables or site-specific performance targets, must follow the schedule identified in Error! Reference source not found. or those established in coordination with DEQ. These timelines support evaluation across sectors and transparent tracking of implementation progress.

16 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.

1.16.1 How management strategies support attainment of water quality standards

Management strategies proposed in [Section 4](#) can 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.

Implementation plans must include management strategies to meet load allocations and surrogate measure targets. Because loss of streamside vegetation is the primary driver of excess thermal loading from human-caused nonpoint sources, riparian restoration is the **primary priority** management strategy for attaining surrogate shade targets. ~~In addition to riparian shading, channel restoration, flow enhancement, and dam and reservoir management can provide measurable temperature benefits.~~ While individual actions may not immediately change stream temperatures, cumulative implementation of **vegetation** management strategies will **increase effective shade and** reduce solar loading ~~and improve temperature conditions~~ over time. ~~When~~ **Channel restoration, flow enhancement, and dam and reservoir management strategies are implemented as described can also provide measurable temperature benefits. DEQ expects that implementation of management strategies identified** in DEQ-approved implementation plans, ~~they support progress toward will achieve the TMDL load allocations and needed to attain~~ temperature criteria ~~over time.~~

Implementation success depends on ~~the achievement of~~ **achieving** load allocations as demonstrated by meeting surrogate measure targets, ~~not solely on~~ **rather than immediate changes in** measured ~~in-stream~~ temperatures. ~~DEQ tracks progress using annual reports and monitoring data.~~ For large dams and reservoirs, DEQ evaluates load allocations primarily based on in-stream temperature surrogate measure targets.

Modeled shade gap data (TMDL, Section 9.1.5.1.1) reflects conditions ~~from past data sets used to develop the 2006 Temperature TMDL. The~~ results may not reflect more recent ~~vegetation~~

changes **in vegetation resulting** from wildfire, restoration, land use change, or updated management objectives. ~~For that reason~~ **Therefore**, implementation ~~also relies~~ **plans must rely** on streamside evaluations and, **where applicable**, shade gap analysis (1) to ~~identify~~ **characterize** current conditions, prioritize protection and restoration actions, and evaluate progress toward surrogate shade targets. **Annual reports and five-year reviews may use these** ~~These~~ assessments ~~also support ongoing to track~~ implementation and **inform** adaptive management ~~through annual reports and five-year reviews~~.

Responsible persons remain in compliance while ~~adhering to~~ **implementing** DEQ-approved implementation plans, even ~~if~~ **when** full attainment **of load allocation requires** ~~may take~~ decades.

1.26.2 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.

Stream temperature response may lag implementation by decades, particularly where attainment depends on establishment and maturation of streamside vegetation.

Effective shade surrogate measure targets are the primary measure of progress towards meeting load allocations. DEQ uses a basin-wide 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 **depends on the** ~~varies with~~ site conditions, land use, restoration actions, **restoration actions and opportunities, stream size, vegetation potential**, and natural disturbances such as wildfire. ~~Recovery rates vary by stream size, vegetation potential, disturbance history, and restoration opportunity.~~ These estimates reflect the expected pace of implementation and progress toward attaining load allocations and water quality standards.

DEQ will establish timelines for dam and reservoir operators on a case-by-case basis ~~based on~~ **considering** site-specific conditions, operational constraints, and existing state and federal authorizations.

This WQMP does not assign a fixed deadline to meet load allocations. Instead, it emphasizes consistent implementation of temperature control measures **in priority areas**, 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~~ **attainment of** surrogate measure targets demonstrates compliance **with load allocations**.

27 Identification of responsible persons

OAR 340-042-0040(4)(I)(G) requires each WQMP to identify the persons, including designated management agencies, responsible for implementing management strategies and preparing

implementation plans. Under OAR 340-042-0025(2), these responsible sources must meet TMDL allocations either through discharge permits or through strategies developed in implementation plans.

As defined in OAR 340-042-0030(2), **DMAs** **Designated Management Agencies** are federal, state, or local agencies with **legal** authority over ~~pollutant~~ **sectors or** sources **contributing pollutants** and ~~designated~~ **identified as such** by DEQ in a TMDL.

For this WQMP, a “responsible person” is any entity accountable for pollution sources addressed by the 2025 Umpqua Basin Temperature TMDL, **except for sovereign nations**. Responsible persons include DMAs and other entities with authority over land or water management activities that affect **stream** temperature. ~~Other responsible persons include, including~~ utilities, dam and reservoir operators, and special districts ~~that impact water quality~~ that do not meet the definition of a DMA.

DEQ identified responsible persons by analyzing GIS-based jurisdictional data, reviewing responsible persons ~~listed~~ **identified** in other temperature-related WQMPs, and discussing operations and authorities with identified entities. **Appendix A describes the land ownership and jurisdiction mapping methods.** ~~GIS data are available upon request.~~

~~Appendix A lists all~~ The responsible persons, **implementation plan requirements, and monitoring and assessment expectations** identified in this WQMP. ~~This reflect the best information available during WQMP development. As new information becomes available regarding jurisdiction, management authority, pollutant sources, or implementation responsibilities, DEQ may modify these determinations as appropriate.~~

Appendix B and Appendix C list ~~does not~~ the responsible persons identified in this WQMP. They do not include every individual or entity that ~~bears responsibility for TMDL implementation.~~ **contributes thermal loading in the Umpqua Basin** Because broad participation ~~across the basin~~ **beyond the identified responsible persons** is necessary to meet ~~standards~~ **temperature criteria** and protect beneficial uses.

7.1 Responsible persons not required to submit TMDL implementation plans

DEQ does not require all responsible persons to submit implementation plans. Table 3. Responsible persons **not required to develop** TMDL implementation plan **requirements** and **the criteria for exemption** ~~Table 3 identifies the subset of responsible persons with implementation plan responsibilities under this WQMP. The streamside evaluation and shade gap analyses are discussed in Section.~~ **lists the entities not required to prepare implementation plans and the exclusionary screening criteria.** ~~is discussed in Section.~~ DEQ expects all responsible persons to manage heat sources originating within their jurisdiction, regardless of their **assigned** implementation plan responsibilities.

Table 3. Responsible persons ~~with~~ not required to develop TMDL implementation plan ~~responsibilities~~ requirements and ~~their area of jurisdiction~~—the criteria for exemption

Screening Criteria	Responsible Persons
Have temperature implementation responsibilities addressed under another TMDL	Jackson County, Klamath County, Lane County
Have temperature implementation responsibilities addressed through existing permits or another implementation pathway	Oregon Department of Geology and Mineral Industries, Department of State Lands, National Park Service
Have limited authority or opportunity to implement management strategies listed in <u>Error! Not a valid result for table.</u>	Bonneville Power Administration, Central Oregon & Pacific Railroad, Coos Bay Rail Link, Highland Ditch Irrigation District, Jackson County, Klamath County, Lane County, Longview, Oregon Department of State Lands, Portland & Northern Railroad, Port of Umpqua, Sutherlin Water Control District, U.S. Department of Agriculture, Union Pacific Railroad, Winchester Water Control District

Screening Criteria	Responsible Persons
The responsible person is a dam or reservoir owner/operator that meets exclusionary screening criteria in Section Error! Reference source not found.	~~Area of jurisdiction~~ Dams owners listed in Appendix C : List of dams and reservoirs in the Umpqua Basin

7.2 Responsible persons required to submit TMDL implementation plans

[Table 4](#) identifies the responsible persons required to prepare implementation plans and summarizes their primary implementation responsibilities under this WQMP. With DEQ approval, responsible persons may choose to develop and operate under statewide implementation plans. Implementation responsibilities assigned to ODA and ODF are based on active land use and may overlap geographically with local government jurisdictions.

Table 4. Responsible persons with TMDL implementation plan responsibilities and their area of jurisdiction

Responsible person	Jurisdiction	Implementation plan	Streamside evaluation	Shade gap analysis
Oregon Department of Agriculture	Agricultural or private or state lands, both commercial and noncommercial including livestock, horses, pastures, hay, vineyards, field crops, hemp, etc. regardless of zoning.	yes	yes	yes

Responsible person	Jurisdiction	Implementation plan	Streamside evaluation	Shade gap analysis
Oregon Department of Forestry	Commercial ~~activities~~ operations involving the establishment, management, or harvesting of trees in Oregon's nonfederal forestlands, ~~state forest lands~~	yes	yes	yes
~~Oregon Department of State Lands~~	~~DSL managed lands and facilities~~	~~yes~~	~~yes~~	~~no~~
Oregon Parks and Recreation Department	OPRD managed lands and facilities	yes	yes	no
Oregon Department of Fish & Wildlife	ODFW managed lands and facilities, including the Rock Creek Hatchery	yes	yes	no
Oregon Department of Transportation	State highways, rights-of-way, and facilities	yes	yes	no
U.S. Bureau of Land Management	BLM and O&C managed lands, roads, and facilities	yes	yes	no
U.S. Forest Service	USFS managed lands, roads, and facilities	yes	yes	no

Responsible person	Jurisdiction	Implementation plan	Streamside evaluation	Shade gap analysis
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)	Yes, ~~no~~ . Plan for dam and reservoir operations is contingent on monitoring and assessment results (Section Error! Reference source not found.)	yes	no
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.	yes, ~~updated plans~~	yes	no

Responsible person	Jurisdiction	Implementation plan	Streamside evaluation	Shade gap analysis
PacifiCorp	Dams and appurtenant structures associated with the North Umpqua Hydroelectric Project	Plan for dam and reservoir operations is contingent on monitoring and assessment results (<u>Section Error! Reference source not found.</u>)	no	no

DEQ does not require all responsible persons named in Appendix A to submit implementation plans. DEQ applied the following screening criteria to identify which entities are current exempt from implementation plan requirements:

- Have responsibilities addressed under another TMDL.
- Have responsibilities addressed through existing permits or other implementation pathways.
- Do not have authority or jurisdiction to implement management strategies listed in.
- Have limited streamside area under its jurisdiction (generally less than 25 acres).
- Have limited ability or opportunity to implement management strategies due to physical or public safety constraints (e.g., railroads).

Appendix A lists the responsible persons DEQ currently exempt from submitting implementation plans including 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.

DEQ also excludes certain entities from implementation plan responsibilities based on jurisdiction. The National Park Service is not a responsible person because Crater Lake National Park falls under exclusive federal jurisdiction. The Cow Creek Band of Umpqua Tribe of Indians is also not listed as a responsible person because it is a federally recognized sovereign Tribal Nation with sovereign authority over its lands.

While these distinctions reflect modern landownership frameworks, the Umpqua Basin has been home to Tribal communities since time immemorial. Today, members of the Cow Creek Band of Umpqua Tribe of Indians, Coos Lower Umpqua and Siuslaw Tribe and the Confederated Tribes of the Grand Ronde continue to live, work, and maintain important connections to the basin.

18 Existing implementation plans

OAR 340-042-0040(4)(I)(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 486B.050.

This WQMP builds on existing implementation plans by establishing consistent temperature implementation expectations. Douglas County and the cities of Canyonville, Drain, Elkton, Glendale, Myrtle Creek, Oakland, Reedsport, Riddle, Roseburg, Sutherlin, Winston, and Yoncalla are existing DMAs operating under DEQ-approved implementation plans developed for previous TMDLs. **Responsible persons with existing implementation plans** must **update/evaluate the** temperature elements of **their implementation/those** plans **and update them, as necessary,** to comply with this WQMP.

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

~~This WQMP requires new and existing responsible persons named in , with the exception of those required to first prepare dam and reservoir monitoring and assessment plans, to submit TMDL implementation plans to DEQ for review and approval.~~

ODA, ODF, BLM, and USFS collectively ~~manage land use and land management activities~~ **enhave legal authority over** 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 achieving the~~ **surrogate shade targets.** ~~DEQ's evaluation that implement the basin's load allocations. The following sections evaluate the adequacy of the programs described below is based on the~~ **state and federal rules and management plans currently in effect used to achieve those allocations.** If any agency revises its rules or updates its management plans in the future, DEQ may revisit this adequacy analysis and adjust implementation plan expectations ~~to meet load allocations~~ **as needed.**

1.18.1 Oregon Department of Agriculture

The **Oregon Legislature passed the** Agricultural Water Quality Management ~~Program Act in 1993, which directed Oregon Department of Agriculture to adopt rules as necessary and to develop plans to prevent water pollution from agricultural activities~~ (ORS 568.900– to 568.933; **and** ORS 561.191; and OAR **chapter** 603, ~~divisions~~**division** 90 and 95) ~~provides the framework for protecting water quality from agricultural sources. Under this program).~~

Subsequently, ODA developed 38 watershed-based worked with Local Advisory Committees and Soil and Water Conservation Districts to develop Agricultural Water Quality Area Rules and Area Plans, ~~including for 38 watershed-based management areas across the state.~~

The Umpqua River basin includes the ODA Umpqua Basin Agricultural Water Quality Area Rules and Area Plan, established in 2001. OAR 340-042-0080(3) states that Management Area that has an Area Plan. DEQ participates in ODA's Area Plan review process by providing water quality status and trends for each management area, as well as assessments of land conditions, agricultural activities and implementation gaps that likely contribute to water quality impairments. The Area Plan management area plans and rules must be sufficient to meet ~~included in this TMDL load allocations.~~ **was reviewed by DEQ in 2020, 2023, and 2025, however not all reviews resulted in Area Plan revisions.**

~~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.~~

~~DEQ determined that ODA's Area Rules, Area Plan, and biennial reports do not provide reasonable assurance that TMDL load allocations will be achieved on streamside lands under ODA's jurisdiction.~~ **Umpqua River basin streams continue to be identified as impaired by Oregon's Section 303(d) list for a number of water quality parameters in part due to inadequate implementation of the protections provided in the Area Plans and Rules.** 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.

~~As stated in~~ **The additional measures will subsequently be incorporated into Area Plans or Area Rules affected by the MOU, TMDL. The approach will be decided as part of the TMDL process. In the case of the Umpqua River Basin TMDL, ODA has agreed to develop an 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. (or 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.

1.28.2 Oregon Department of Forestry

~~The Waterway protection measures were established in 1994 for state and private forest practices in Oregon, as codified in Oregon Revised Statutes 527.610 through 527.992, Oregon's Forest Practices Act (ORS 527.610–527.992; OAR 629-600– through 629-665) provides the framework for protecting water quality on state and private forestlands and Oregon's Plan for Salmon and Watersheds (Executive Order 99-01). As provided in ORS 527.770, forest operations conducted in compliance with the Forest Practices Act and other voluntary measures are generally sufficient to prevent violations of and are considered to be in compliance with water quality standards (ORS 527.770).~~ **However, as provided in OAR 340-**

042-0080(2) ~~allows DEQ to require rule~~), revisions to ~~site-specific~~**the** Forest Practices Act rules ~~if may be required when~~ DEQ determines that ~~the generally applicable~~**these** rules are not adequate to implement ~~TMDL~~ load allocations ~~in an approved TMDL~~.

Periodic revisions to the Forest Practices Act rules occurred between the 1990s through 2022. With the publication of the Private Forest Accord Report and subsequent passage of Senate Bill 1501, 1502, and HB 4055, Forest Practices Act rule revisions were adopted by the Board of Forestry ~~revised the rules in 2022 following the Private Forest Accord, which expanded in October 2022, with additional amendments in 2025~~. Implementation of these rules, including increased riparian ~~buffer~~**widths** and **additional** tree retention ~~to enhance aquatic habitat protections~~. ~~Post-disturbance harvest rules adopted in 2025 clarify how vegetation may be effective at meeting shade allocations~~. **The streamside vegetation retention prescriptions apply after catastrophic disturbances and support continued riparian protection under management area distances in the current Forest Practices Act are summarized in . There are multiple other requirements or exceptions found in the forest practices rules not included in the table (full list of ODF Forestry Regulations: Forest Practice Administrative Rules and the Oregon Forest Practices Act, March 2026**~~Act's water quality framework.-).~~

Table 5 ~~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.

. Summary of Western Oregon vegetation retention riparian management prescription in Forest Practices Act rules OAR 629-Division 643 Water Protection Rules: Vegetation along Streams.

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

ODF Stream Type *	Standard Practice Vegetation Retention (Feet)	Small Forestland Option Vegetation Retention (Feet)
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 1,150 feet (RH Max+) or the uppermost flow feature.	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.
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

“Small Forestland” means forestland that has an owner that owns or holds common ownership interest in less than 5,000 acres of forestland.

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

DEQ finds that no-harvest vegetation retention buffers of 100-110 feet (e.g. large SSBT, Large F, small and medium SSBT/F standard practice) may be sufficient to meet some shade targets, depending on density of residual trees, stream orientation, topography, and other site-specific factors (TMDL, Appendix C). However, based on the findings in TMDL Appendix C, it is possible that in some cases these buffers will not provide shade equivalent to a no-harvest buffer width that is equivalent to site potential tree height. Depending on site potential tree heights, smaller no-harvest buffers are less likely to meet shade targets and more likely to result in temperature increases beyond the

assigned TMDL load allocation (0.0°C) of the Human Use Allowance and equivalent shade surrogate measure for all fish-bearing and perennial non-fish-bearing streams. This is more pronounced for the Small Forestland Owner Minimum Option. Adoption of forest conversion tax credits on small forestlands to align protections with standard practice will increase the effectiveness. Overall, required riparian protections under the Forest Practices Act may not consistently meet shade targets and load allocations.

As agreed in the 2021 Memorandum of Understanding between DEQ and ODF, ODF or the Board of Forestry will be given an opportunity to either revise the FPA rules or develop a TMDL implementation plan that includes additional measures if necessary. In the case of the Umpqua River Basin temperature TMDL, ODF has agreed to develop a TMDL implementation plan to be submitted to DEQ for review and approval. DEQ will work with ODF to identify additional regulatory or non-regulatory measures that could be implemented by rule revisions, stewardship agreements, incentive programs or other means to provide reasonable assurance of achieving TMDL solar radiation load allocations. Collaboration on these additional measures may occur during development of ODF's implementation plan.

1.38.3 U.S. Bureau of Land Management

The Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO RMP; BLM, 2016a) and the Southwestern Oregon Record of Decision and Resource Management Plan (SWO RMP; BLM, 2016b) guide the Bureau of Land Management's **stewardship of** streamside vegetation on federal lands in the Umpqua River Basin. The NCO RMP applies to BLM-administered lands in the Coos Bay District, the Northwestern Oregon District, and the Swiftwater Field Office of the Roseburg District. The SWO RMP provides direction for lands managed by the South River Field Office **of the Roseburg District, the Medford District, and the Klamath Falls Field Office of the Lakeview District.**

The BLM defines the Riparian Reserve as **a** riparian management area based on three factors: physical features, site-potential tree height, and subwatershed class ([Table 6](#)). The Riparian Reserve protects shade-producing vegetation along streams, lakes, ponds, and wetlands. For fish-bearing and perennial streams and certain intermittent, non-fish-bearing streams, the Riparian Reserve extends upslope from the ordinary high-water line on both sides of the stream for a distance equal to one site-potential tree height. This height represents the average maximum height of the tallest dominant trees (200 years or older) for a given site class. The Umpqua River Basin site-potential tree heights range from 150 feet to 220 feet, depending on site productivity. Subwatershed classes reflect their importance to the conservation and recovery of ESA-listed fish:

- **Class I:** Includes both designated critical habitat and high-intrinsic potential streams.
- **Class II:** Includes either designated critical habitat or high-intrinsic potential streams, but not both.
- **Class III:** Includes neither designated critical habitat nor high-intrinsic potential streams

Table 6. BLM Riparian Reserve distance by water feature.

Feature	Riparian Reserve distance measured as slope distance
Fish-bearing streams and perennial streams	One SPTH distance from the ordinary high water line 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 water line on each side of the stream Class III subwatersheds: 50 feet from the ordinary high water line on each side of a stream
Unstable areas that are above or adjacent to stream channels and are likely to deliver material such as sediment and logs to the stream if the unstable area fails	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 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 acre, and wetland >1 ~~acres~~ acre	100 feet extending from the ordinary high water line
Natural ponds < 1 acres, wetlands < 1 ~~acres~~ acre (including seeps and springs), and constructed water impoundments (e.g. canal ditches and pump chances) of any size	25 feet extending from the ordinary high water line

The BLM does not allow patch cutting or clearcutting in ~~the~~ Riparian Reserves. Thinning and individual tree removal may occur, but only when needed for public safety, operational reasons, or to meet specific management objectives. Across all subwatershed classes, thinning within 120 feet of fish-bearing and perennial streams is limited to activities that support restoration or habitat improvement. Thinning in ~~the~~ Riparian Reserves is also allowed along intermittent, non-fish-bearing streams in Class I and II subwatersheds, provided it meets established criteria including stand retention requirements.

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). TMDL allocations apply to intermittent streams with surface flow or residual pools during the critical period when streams may support aquatic life and contribute to downstream temperature conditions.

SPTH on BLM-administered lands within the Umpqua River Basin exceeds 120 feet. As a result, DEQ finds that Riparian Reserve widths for fish-bearing 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.

BLM's Riparian Reserve widths for intermittent, non-fish-bearing streams in Class III subwatersheds ~~are less than 120~~ **is 50** feet. ~~DEQ recognizes that~~ Effective shade **in these settings** reflects site ~~conditions,~~ **specific factors** including vegetation height, **and** density, canopy structure, topography, and stream characteristics such as channel width and aspect (TMDL, Appendix C). ~~Class III intermittent, non-fish-bearing streams on BLM-managed lands in the Umpqua Basin,~~ **these streams** are typically steep, narrow, hillslope-confined, ~~and located in forested headwaters that comprise less than 1 percent of the basin.~~ Topography, channel-adjacent shrubs, downed wood, and canopy cover within 50 feet **of the ordinary high-water line** can provide sufficient shade to these streams that have discontinuous flow or no surface flow during the critical period. ~~They also represent a small portion of the landscape (less than 1 percent of the basin). Therefore~~ **Given these characteristics**, DEQ considers a 50-foot Riparian Reserve for Class III intermittent, non-fish-bearing streams generally sufficient to limit solar loading ~~and are not expected to increase.~~ **These streams pose a low risk of measurably increasing** downstream stream temperature.

BLM's implementation plan should describe ~~how management strategies will attain load allocations in Class III intermittent, non-fish-bearing streams, lakes, natural ponds, and reservoirs and wetlands over an acre. Strategies should include evaluations of~~ **for evaluating** heat loading risk at the project or activity level, examining factors such as topography, vegetation, seasonality, and surface water connection. The **implementation** plan should also emphasize strategies to protect, maintain, and enhance existing streamside vegetation and restore shade lost to legacy land use practices and natural disturbances.

1.48.4 U.S. Forest Service

The [Northwest Forest Plan](#) (USFS and BLM, 1994) guides **U.S. Forest Service** management of streamside vegetation on federal lands in the Umpqua River Basin under ~~the~~ 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. USFS watershed assessments demonstrate that SPTH of US Forest Service lands in the Umpqua Basin generally ranges from 150-220 feet.

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** – Riparian 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 to a distance equal to the height of two site potential trees, or 300 feet slope distance on each side of the stream, whichever is greatest.

- **Perennial non-fish-bearing streams** – Riparian Reserves extend from the stream edge to the same physical features, or one site potential tree, or 150 feet slope distance, whichever is greatest.
- **Constructed ponds, reservoirs, and wetlands over 1 acre** – Riparian Reserves extend from the edge of the wetland or the maximum pool elevation of constructed ponds and reservoirs to the edge of riparian vegetation, seasonally saturated soils, unstable or potentially unstable areas, or to a distance equal to the height of one site potential tree, or 150 feet slope distance, whichever is greatest.
- **Lakes and natural ponds:** Riparian Reserves consist of the body of water and extend to the same physical features, or to a distance equal to two site-potential trees, or 300 feet slope distance (two SPTH), whichever is greatest.
- **Intermittent streams, wetlands under 1 acre, and unstable areas** – Riparian 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). One site potential tree height- in the Umpqua National Forest generally ranges from 150–200 feet, so minimum riparian reserve widths of all stream types are likely adequate to meet TMDL load allocations.

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

~~6 Streamside and shade analysis to inform implementation planning~~

~~Streamside evaluations and shade gap analyses provide the technical information needed to develop and update implementation plans under this WQMP. These analyses describe current streamside conditions, identify where protection or restoration is needed, and provide the basis for prioritizing management strategies to achieve load allocations over time.~~

~~Responsible persons listed in must complete streamside evaluations and, where required, shade gap analyses according to the schedule in . Results must reflect conditions within each~~

responsible person's jurisdiction and should be used to inform management strategies, timelines, and measurable milestones in implementation plans.

6.1—Surrogate shade measures

The TMDL uses effective shade as a surrogate measure for nonpoint source load allocations and establishes effective shade targets to evaluate progress toward attainment. It provides site-specific effective shade targets for some stream segments (TMDL, Section 9.1.5.1.1) and shade curves (TMDL, Section 9.1.5.1.2) where site-specific shade targets are not available.

Shade curves represent the mean effective shade target for different mapping units, stream aspects, and active channel widths. They allow users to identify target effective shade values based on stream characteristics. Appendix B provides Ecoregion 1a shade curves developed for the Coquille subbasin that also apply to the Umpqua Basin. Shade curves do not estimate current effective shade.

With DEQ approval, responsible persons may propose alternative approaches to assess effective shade or recommend effective shade targets.

6.2—Streamside evaluation

The streamside evaluation provides the foundation for implementation planning. It requires responsible persons to identify streamside areas within their jurisdiction and determine where protection, enhancement, or alternative strategies are appropriate. The final product must spatially prioritize restoration actions and inform implementation plan milestones and measurable objectives.

Some responsible persons' jurisdictions in are based on land use. Multiple land uses can occur in the same streamside area, so jurisdictions may overlap. Responsible persons must identify, map, and characterize all streamside areas that could fall within their jurisdiction.

The evaluation should classify streamside areas into the following categories:

- **Needs protection**—Areas that meet or are trending toward effective shade targets. Actions focus on maintaining or enhancing existing canopy and streamside conditions.
- **Needs enhancement**—Areas that do not meet effective shade targets and require active intervention, including sites with insufficient canopy, degraded vegetation, or dominance by non-native species. Actions focus on restoring shade through planting, vegetation management, and other practices.
- **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 must use those results to inform their streamside evaluation.

The evaluation must quantify the extent of each category and identify priority areas for protection or restoration. It must Describe the data sources, indicators, methods, and assumptions used. Priority should be given to areas with the greatest shade gaps, unless identified constraints exist. It must also identify opportunities to implement alternative best management practices such as in-stream restoration and flow augmentation projects. The final product must present the streamside lands within the responsible person's jurisdiction in a format (e.g. map, table, or other product) that clearly shows the categories, constraints, and priority areas.

- Areas recovering from disturbance may be designated for passive restoration where natural regrowth is expected to restore shade. Where recovery is unlikely, responsible persons should identify and prioritize opportunities for active restoration.

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.

DEQ will review streamside evaluations as part of the five-year review to assess whether the evaluation and associated strategies align with load allocations as measured through effective shade targets.

6.3 Shade gap analysis

A shade gap analysis compares current effective shade along a stream to applicable effective shade targets. The resulting shade gap quantifies how much additional shade is needed to meet effective shade targets and helps identify where additional actions may be needed.

EPA modeled shade gaps and effective shade targets for a limited number of stream segments (TMDL, Section 9.1.5). TMDL Table 37 reports percent shade gap averaged across modeled waterbodies within each responsible person's jurisdiction, and TMDL Table 38 provides results for individual stream reaches. These results do not represent all stream segments within each jurisdiction, and some responsible persons have no modeled reaches. Site-specific results are available upon request.

DEQ determined that existing management under ODA and ODF does not provide reasonable assurance that effective shade targets will be achieved (Section). Therefore, DEQ requires these agencies to conduct shade gap analyses for streamside areas within their jurisdiction where the TMDL did not provide modeled results. Analyses must include intermittent streams be used to inform streamside evaluations. ODA and ODF must submit project plans to DEQ for review and approval according to the schedule in.

For segments without TMDL shade gap results, responsible persons may, but are not required to, complete a shade gap analysis using DEQ-approved methods to assess current effective shade and progress toward applicable shade targets. Any shade gap analyses conducted to evaluate current effective shade and attainment of effective shade targets must use DEQ-approved methods. Responsible persons must document methods, data sources, and the overall approach in a project plan for DEQ approval.

Riparian buffer alternative DEQ does not require responsible persons to adopt a 120-foot riparian buffer. As an alternative to completing a shade gap analysis, ODA and ODF may apply a 120-foot slope distance buffer measured up slope along the grounds contour from the top of bank. A buffer used in this manner 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.

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.

6.4—Schedule for required monitoring, assessment and deliverables

Streamside evaluations, shade gap analyses, and related technical materials must be completed according to the schedule in . These deliverables provide the information needed to develop and update implementation plans. Alternative schedules must be approved by DEQ.

Table . Schedule for implementation plans and additional information and analysis

Requirement	Submission date or timeframe
Shade gap analysis project plan	18 months after EQC adoption of this WQMP
Streamside evaluation	Three years after EQC adoption of this WQMP
Shade gap analysis results OR documented adoption of a 120-foot streamside buffer	Four years after EQC adoption of this WQMP

29 Implementation plan requirements

Responsible persons identified in [Table 4](#), with the exception of those ~~required to first~~ **required to** prepare dam and reservoir monitoring and assessment plans ([Section 9.4.2.](#)), must ~~prepare and submit implementation plans to DEQ for approval (Section 10.)~~. 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~~**milestones**.
- Provide 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 management strategies to meet-~~ **applicable** load allocations and- surrogate measure targets, ~~including where actions will occur and how they will be implemented over time.~~ **DEQ's. The following sections describe the required plan components.** **DEQ's** expectations may vary based on ~~the~~**each** responsible ~~person's~~**person's** contribution to heat sources and ~~their~~ capacity to implement **management** strategies.

~~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.

~~2.19.1~~ **Management strategies**

Each implementation plan must include the management strategies needed to achieve load allocations. Plans must: ~~identify priority areas for implementation based on streamside evaluation results (Section) and, where available, shade gap analyses. They must also identify~~

- **Identify the** nonpoint sources and activities ~~originating~~ within the responsible person's jurisdiction-, **with an emphasis on streamside areas** that ~~influence streamside vegetation and effective shade. Plans must include~~**affect shade.**
- **Identify the lands, facilities, or activities over which the responsible person has legal authority.**
- **Identify the** applicable **management** strategies from
- needed to address identified sources and local conditions.

More than one responsible person may have legal authority over the same geographic area or pollution source. Effective implementation requires each responsible person to identify the areas and activities within their jurisdiction and implement the management strategies needed to achieve the applicable load allocations.

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

~~6.5~~ **Timeline and measurable milestones**

~~Responsible persons must meet requirements for implementation plan submittal, revisions. Implementation plans must include timelines for implementing management strategies and measurable milestones.~~

6.5.1 Implementation plan submission and revisions

~~OAR 340-042-0040(4)(l)(l) 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.~~

~~Some responsible persons listed in must submit an implementation plan, or plan update, to DEQ for approval within 18 months of Environmental Quality Commission adoption of this WQMP. Responsible persons can update their existing DEQ-approved temperature implementation plans to meet these WQMP requirements, supplemented as necessary to address any gaps.~~

~~Depending on the monitoring and assessment results in Section, 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 follow the timelines and measurable milestones established in the implementation 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.~~

2.29.2 Timelines for implementing management strategies and measurable milestones

Each implementation plan must provide a timeline for implementing management strategies and a schedule for completing measurable milestones. Timelines and milestones must reflect site-specific conditions and selected management strategies. **PlansImplementation schedules** must support the basin-wide target of 10 percent cumulative improvement in effective shade per decade by identifying priority areas and implementing management strategies over successive five-year planning periods. **PlansSchedules and measurable milestones** should also reflect ~~the monitoring and assessments requirements in~~ **priority protection and restoration areas identified through streamside evaluations and shade gap analyses (Section 9.4.1-).**

~~Strategies and milestones~~**Responsible persons** should use the SMART framework—Specific, Measurable, Achievable, Relevant, and Time-bound (Doran, 1981)—**when developing implementation schedules and measurable milestones.** ~~to show progress during DEQ's five-year review.~~

6.6 Performance monitoring, review, and revision

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

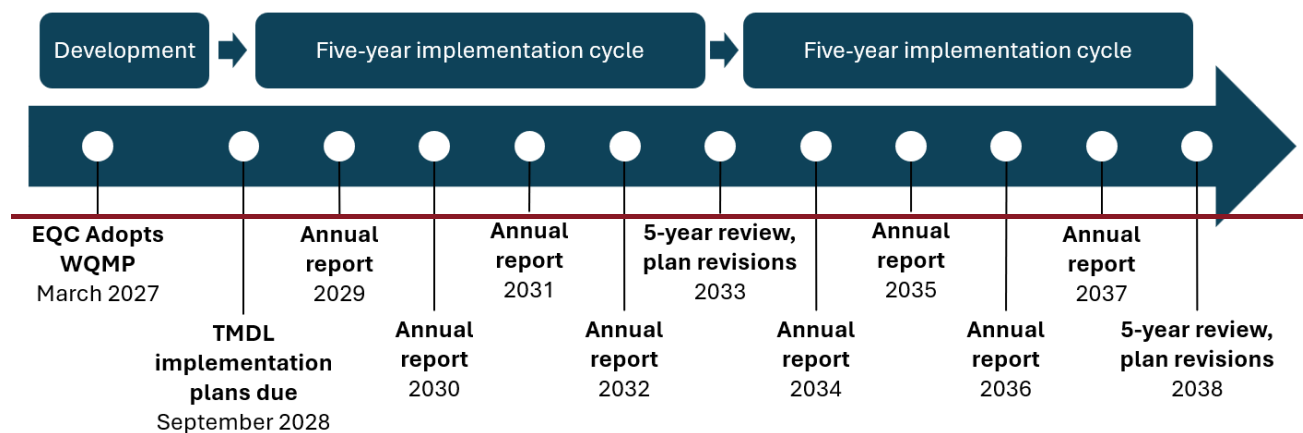
2.39.3 Implementation plan performance monitoring and periodic review

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 **management strategy** effectiveness.

Responsible persons must submit annual reports to DEQ ~~on~~**according to a specified date. DEQ-approved schedule.** Annual reports must describe the management strategies ~~they~~ implemented, **and** progress toward timelines and **measurable** milestones, ~~monitoring results, coordination with partners, and any significant changes that influence implementation.~~ Reports ~~may~~**should** 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~~**implemented** 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 requirement is in addition to~~**separate from the** annual reports ~~submitted to DEQ. DEQ uses OWRI and other DEQ-approved publicly accessible databases to track implementation activities and support statewide reporting.~~

~~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 . Five-year nonpoint source TMDL implementation plan schedule~~

6.6.1 ~~Adaptive management and periodic review~~

Implementation plans must ~~commit to~~ **also describe how monitoring and evaluation results will inform** adaptive management. ~~and future implementation. Every five years,~~ responsible

persons ~~should describe~~ **must conduct a cumulative review of implementation progress and management strategy** effectiveness ~~monitoring methods in their~~ **over the past four years to inform continued** implementation ~~plans and summarize results in five-year reviews. plan~~ **revisions.**

DEQ may require responsible persons to revisit or update ~~the streamside~~ **evaluation in the future evaluations** 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.~~ **toward applicable surrogate measure targets.**

2.49.4 Additional analysis and information to support implementation ~~plan~~ **planning elements**

~~In addition to rule required elements above, implementation plans must include public involvement, strategy maintenance, and expected costs.~~

Consistent with OAR 340-042-0080(4)(a)(E), this WQMP requires additional analyses and information to support implementation planning.

2.4.19.4.1 ~~Shade~~ **monitoring and assessment**

Streamside evaluations and shade gap analyses provide the technical information needed to develop and update implementation plans ~~under this WQMP. These analyses.~~ **They** describe current streamside conditions, identify **priority areas** where **shade** protection or restoration is needed, and ~~provide the basis for prioritizing management strategies to achieve load allocations over time~~ **support tracking progress towards effective shade targets and recovery from natural disturbances.**

Table 4 identifies the responsible persons ~~listed in who~~ **must complete streamside evaluations and, where required,** shade gap analyses according to the schedule in . Results must reflect **current** conditions within each responsible person's jurisdiction and ~~should be used to inform implementation plan~~ **management strategies, timelines, and measurable milestones in implementation plans.**

Table 7. Schedule for additional information and analysis

Requirement	Submission date or timeframe
Shade gap analysis project plan	18 months after EQC adoption of this WQMP
Shade gap analysis results OR documented adoption of a 120-foot streamside buffer	Year four annual report ~~Four years after EQC adoption~~

Requirement	Submission date or timeframe
Streamside evaluation	~~Year four annual report~~ ~~Three years after EQC adoption~~

~~2.4.1.19.4.1.1~~ Surrogate shade measures

The TMDL ~~uses~~ **provides** effective shade as a surrogate measure ~~for~~ **to express** nonpoint source load allocations and establishes effective shade targets to evaluate progress toward attainment. It provides site-specific **modeled** effective shade targets for some stream segments (~~TMDL, Section 9.1.5.1.1~~) and **generalized effective** shade curves (TMDL, Section 9.1.5.1.1 and **Section 9.1.5.1.2**) ~~where site-specific shade targets are not available.~~

Shade curves represent the mean effective shade target for different mapping units, stream aspects, and active channel widths. They allow users to identify target effective shade values based on stream characteristics. [Appendix BD](#) provides Ecoregion 1a shade curves developed for the Coquille Subbasin that also apply to the Umpqua Basin. ~~Shade curves do not estimate current effective shade.~~

~~With DEQ approval, responsible persons may propose alternative approaches to assess effective shade or recommend effective shade targets.~~

~~2.4.1.29.4.1.2~~ Streamside evaluation

The streamside evaluation ~~provides the foundation for implementation planning. It requires responsible persons to identify streamside areas within their jurisdiction and determine~~ **identifies** where protection, enhancement, or alternative strategies are appropriate. ~~The final product must spatially prioritize restoration actions within each responsible person's jurisdiction and inform~~ **provides the basis for** implementation ~~plan milestones and measurable objectives~~ **planning**.

~~Some responsible persons' jurisdictions in are based on land use. Multiple land uses can occur in the same streamside area, so jurisdictions may overlap. Responsible persons must identify, map, and characterize all streamside areas that could fall within their jurisdiction.~~

The evaluation should classify streamside areas into the following categories:

- **Needs protection** – Areas that meet or are trending toward effective shade targets. ~~Actions focus on, Protect, maintaining, or, and enhancing~~ **enhance** existing canopy and streamside conditions **to sustain long-term shade.**
- **Needs enhancement** – Areas ~~that do not meet effective shade targets and require active intervention, including sites with insufficient~~ **with inadequate** canopy **cover**, degraded vegetation, or dominance by non-native species. ~~Actions focus on restoring shade through planting~~ **Plant and establish shade-capable streamside vegetation to move conditions toward effective shade targets.**

- **Vegetation management**, ~~and~~ – ~~Areas where selective thinning or~~ **Areas where selective thinning or** other ~~practices~~ **active management will improve long-term canopy development and maintain healthy stands capable of providing effective shade.**
- **Constraint-limited** – Areas where ~~achieving~~ effective shade targets ~~is not feasible due~~ **cannot reasonably be achieved because of** ~~to~~ physical barriers (e.g., infrastructure, buildings) or jurisdictional limitations (e.g., private ownership without cooperative agreements). ~~Focus is on documenting~~ **Document** these constraints and ~~identifying~~ **identify** 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.

Multiple responsible persons ~~with modeled~~ **may have legal authority over the same streamside area. Each responsible person must identify, map, and characterize all streamside areas within its jurisdiction, even where responsibilities overlap.**

Responsible persons required to complete a shade ~~gaps for their jurisdictions~~ **gap analysis** must use those results to inform their streamside **evaluations. Responsible persons not required to complete a shade gap analysis may instead use TMDL shade gap results or other DEQ-approved sources to inform their evaluations.**

The streamside evaluation, ~~must~~:

- ~~The evaluation must quantify~~ **Summarize** the extent of each category ~~and using~~ **acres, stream length, percentages, or another appropriate metric subject to DEQ approval.**
- Identify priority areas for protection or restoration ~~It must describe the data sources, indicators, methods based on shade gap magnitude, potential to reduce thermal loading, and assumptions used feasibility.~~ Priority should be given to areas with the greatest shade gaps, unless identified constraints exist. ~~It must also identify opportunities to implement alternative best management practices such as in-stream restoration and flow augmentation projects. The final product must present the streamside lands within the responsible person's jurisdiction in a format (e.g. map, table, or other product) that clearly shows the categories, constraints, and priority areas.~~
- Areas recovering from disturbance may be designated for passive restoration where natural regrowth is expected to restore shade. Where recovery is unlikely, responsible persons should identify and prioritize opportunities for active restoration.
- **Identify opportunities for alternative best management practices, such as in-stream restoration and flow augmentation projects.**
- **Describe the data sources, indicators, methods, and assumptions used. Acceptable methods include field observations, remote sensing, vegetation surveys, professional judgment, or other approaches appropriate to available resources. With DEQ approval, responsible persons may use existing programs or**

recently completed analyses to satisfy this requirement if they provide sufficient information to prioritize streamside protection and restoration actions and support implementation planning.

The final product must present streamside lands within the responsible person's jurisdiction in a format that clearly identifies evaluation categories, constraints, and priority areas. 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 **implementation** progress.

~~DEQ will review streamside evaluations as part of the five-year review to assess whether the evaluation and associated strategies align with load allocations as measured through effective shade targets.~~

~~2.4.1.3~~ 4.1.3 Shade gap analysis

~~A~~The shade gap analysis compares current effective shade ~~along a stream~~ to applicable effective shade targets. The resulting shade gap quantifies how much additional shade is needed to meet effective shade targets and helps **responsible persons** identify **where additional actions may be needed** priority areas for implementation.

EPA modeled shade gaps and effective shade targets for a limited number of stream segments (TMDL, Section 9.1.5). TMDL Table 37 reports percent shade gaps averaged across modeled waterbodies within ~~each responsible person's jurisdiction, and~~ **some jurisdictions**. TMDL Table 38 provides ~~results~~ **average percent shade gaps** for ~~individual stream reaches~~ **each modeled assessment unit**. These results do not represent all stream segments within each jurisdiction, and some responsible persons have no modeled reaches. **DEQ will provide** site-specific results ~~are available~~ upon request.

Table 4 identifies ODA and ODF as responsible for completing a shade gap analysis. These analyses must assess perennial and intermittent streamside areas that may fall within their jurisdictions, where the TMDL does not provide modeled shade gap results, and DEQ has determined ~~that~~ existing management ~~under ODA and ODF does not provide reasonable assurance that effective shade targets will~~ may not be ~~achieved~~ adequate to meet load allocations (Section 0). In lieu of conducting additional shade gap analyses, ODA and ODF may elect to use the 120-foot riparian buffer option described in Section Error! Reference source not found. ~~Therefore, DEQ requires these agencies to conduct shade gap analyses for streamside areas within their jurisdiction where the TMDL did not provide modeled results. Analyses must include intermittent streams be used to inform streamside evaluations.~~

Responsible persons not subject to shade gap requirements may choose to conduct a shade gap analysis to propose alternative effective shade targets, support implementation planning, refine restoration priorities, or evaluate progress toward effective shade targets. Shade gap analyses used for TMDL implementation purposes should use the methods described below.

9.4.1.3.1 Approved methods

Those required to conduct a shade gap analysis must use DEQ-approved methods and document the data sources, assumptions, and overall approach in a project plan submitted to DEQ for review and approval according to the schedule in .

Responsible persons may use DEQ-approved methods to assess and recommend alternative effective shade targets for their jurisdiction. DEQ must approve alternative effective shade targets before they may be used for TMDL implementation purposes.

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.

9.4.1.3.2 120-foot riparian buffer option

DEQ does not require responsible persons to adopt a 120-foot riparian buffer. As an alternative to completing the required shade gap analysis, ODA and ODF may choose to apply a 120-foot slope-distance buffer measured up-slope along ground contour from top of bank.

TMDL Appendix C evaluates the relationship between riparian vegetation, buffer width, and stream temperature. The literature review concludes that a 120-foot slope distance buffer is generally sufficient to maintain stream shade, and that shade loss beyond this distance is unlikely to cause stream temperature increases for most waterbodies.

~~DEQ does not require responsible persons to adopt a 120-foot riparian buffer. As an alternative to completing a shade gap analysis, ODA and ODF may apply a 120-foot slope-distance buffer measured up-slope along the grounds contour from the top of bank.~~ A buffer used in this manner must protect overstory and woody vegetation and ~~must~~ be established through enforceable ~~through~~ ordinance or regulations. Management activities within the buffer must result in ~~only~~ limited shade reduction and ~~meet support attainment of~~ applicable surrogate shade targets.

Streamside evaluations are still required to identify ~~locations where~~ priority areas for 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.~~ management.

2.4.29.4.2 Dam and reservoir monitoring and assessment requirements

The TMDL establishes a surrogate measure ~~to implement for implementing dams and reservoir~~ load allocations ~~for dams and reservoirs~~ (TMDL, Section 9.1.5). ~~Dam and reservoir operations must meet~~ The surrogate measure ~~of is a~~ no net warming ~~of downstream outflow temperatures above upstream inflow temperatures, expressed as the target evaluated by comparing~~ seven-day average daily maximum (7DADM), ~~plus~~ **temperatures immediately upstream of** the ~~assigned Human Use Allowance above the applicable criteria in~~ reservoir to those just downstream ~~waters (of the dam. The TMDL also assigns dam and reservoir operations a portion of the Human Use Allowance (TMDL, Tables 30-33).)~~ and the equivalent load allocations.

DEQ requires monitoring and assessment to determine whether dam and reservoir operations ~~comply with~~ **attain** this surrogate measure **and the assigned human use allowance**. To identify which operators **must be required to** conduct monitoring, DEQ used ~~data from~~ the Oregon Water Resources Department and the National Inventory of Dams ([Appendix C](#): List of dams and reservoirs in the Umpqua Basin(~~Appendix C~~)), and applied the following **exclusionary screening criteria**:

- Dams/reservoirs that are off-channel.
- Facilities that do not discharge during the TMDL critical period (e.g., Cooper Creek and Plat I).
- 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 (TMDL, 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 locations within the project that may affect the project's compliance with the surrogate measure.

~~Depending on the~~ Monitoring and assessment results, ~~DEQ may require PacifiCorp and Douglas County to develop~~ **will determine whether additional** implementation **is necessary** ([Section Error! Reference source not found.](#) ~~plans that address warming from dam and reservoir operations.~~). If ~~DEQ determines~~ an implementation plan is required, ~~it~~ **DEQ** will coordinate with the operator to establish a reasonable timeline and reporting expectations.

Other dams and reservoirs listed in [Appendix C: List of dams and reservoirs in the Umpqua Basin](#) may also influence downstream temperatures; however, DEQ is not prioritizing these facilities for monitoring at this time. If new information becomes available indicating that additional operations are causing significant downstream warming, DEQ may require monitoring, assessment, or implementation actions in the future.

~~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.~~

~~2.4.2.19.4.2.1~~ **Monitoring and assessment requirements**

~~The temperature monitoring and assessment 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 if stratified reservoirs are subject to mixing at depths of the reservoir outlet.~~

Douglas County and PacifiCorp must submit temperature monitoring and assessment plans for DEQ approval according to the schedule outlined in [Table 8](#). ~~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~~ **used** to evaluate ~~compliance~~ **attainment** with the surrogate measure ~~and assigned HUA~~ during the critical period (May 1 through October 31). ~~Continuous upstream and~~ **Monitoring and assessment plans should also describe any current operational strategies used to limit downstream temperature monitoring data are required to evaluate whether operations meet the surrogate measure and HUA.** **warming.**

Table 8. Schedule for dam and reservoir monitoring and assessment

Requirement	Submission date or timeframe
Dam and reservoir monitoring and assessment plan	18 months after EQC adoption of this WQMP
Dam and reservoir modeling and cumulative effects analysis and/or implementation plan updates	To be determined in consultation with DEQ following completion of monitoring and analysis

The TMDL defines the dam and reservoir surrogate measure as the 7DADM temperature immediately upstream of the reservoir (TMDL Section 9.1.5). Attainment is evaluated by comparing the 7DADM temperature immediately upstream of the reservoir to the downstream 7DADM temperature measured immediately below the dam or where impounded water is returned to the free-flowing stream.

Each monitoring and assessment plan must include continuous ~~24-hour~~ upstream and downstream temperature monitoring for at least four consecutive years ~~of a sufficient frequency to calculate the 7-day average of the daily maximum (7DADM) temperature~~ during the critical

period (May 1 through October 31). Monitoring must be conducted at ~~regular intervals, not to exceed 1 hour, with 30-minute intervals recommended.~~ **a frequency sufficient to calculate the 7DADM temperature and assess daily surrogate measure attainment.**

If multiple streams flow into a reservoir, operators may ~~combine~~ **calculate** inflow temperatures as a flow-weighted mean. Operators may use previously collected continuous temperature records ~~collected~~ within the last ten years if ~~it reflects~~ **they reflect** current operations. ~~The plan must include a schedule to submit annual reports for each monitoring year and a year-five evaluation report that summarizes all data, evaluates operational effectiveness, and identifies needed adaptations.~~

~~Monitoring data used to meet TMDL objectives must follow established quality control and assurance protocols consistent with , , or other recognized standards. Operators must submit monitoring data to DEQ on the schedule specified in the monitoring and assessment plan, in electronic format using DEQ approved templates or in a publicly accessible database approved by DEQ. The timeline to complete reservoir modeling and cumulative effects analysis may be set through a mutually agreed-upon schedule.~~

~~Operators may propose a mechanistic model or empirical model to evaluate temperature dynamics and estimate “free-flowing” conditions.~~ **Operators may calculate estimated “free-flowing” conditions using mechanistic or empirical models** to account for any warming or cooling that would occur through the reservoir reaches absent the dam and reservoir operations. With DEQ approval, ~~operators may use modeled upstream conditions to define the~~ **the results may be applied as the temperature surrogate measure or to adjust the 7DADM temperatures monitored immediately upstream of the reservoirs (TMDL, Section 9.1.5).**

Dam and reservoir operators ~~may also propose~~ **should collect** additional monitoring ~~to inform assessment models or decisions about management changes, such as collecting reservoir data (e.g., temperature profiles or measuring reservoir, water levels and, or outflow rates), as necessary, to support modeling or interpret~~ **interpretation of temperature dynamics and, modeling, evaluation of operational influences, or other technical analyses.**

The timeline to complete reservoir modeling and cumulative effects analysis may be set through a mutually agreed-upon schedule. ~~Monitoring and assessment plans should also outline any current operational strategies~~ **data used to assess attainment of TMDL load allocations must follow quality control and assurance protocols consistent with DEQ, EPA limit downstream warming, or other recognized standards. Operators must submit monitoring data according to a DEQ-approved reporting schedule. They must submit data electronically using DEQ approved templates or a publicly accessible database approved by DEQ.**

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 and whether additional TMDL implementation actions are necessary.

2.4.2.29.4.2.2 Implementation Attainment pathways

DEQ will ~~use the~~ review monitoring and assessment results and any supporting documentation submitted by operators to determine ~~which~~ whether additional TMDL implementation ~~pathway applies~~ is necessary. Operators must demonstrate attainment of load allocations using one of the following pathways:

1. ~~No temperature increases and/or attains~~ Demonstrate attainment with the surrogate measure

The surrogate measures are expected to attain the assigned human use allowance - and load allocation because it targets 7DADM temperatures no warmer than those upstream of the reservoir. If DEQ determines that monitoring ~~data is sufficient to show no measurable temperature increase between the inflow and outflow above the assigned HUA, an~~ assessment results demonstrate attainment with the surrogate measure target, a TMDL implementation plan for structural or operational temperature management measures may not be required. ~~However, reservoir operators remain responsible for ensuring ongoing compliance with the surrogate measure and HUA.~~

- ~~1. Temperature increases above the surrogate measure target~~ - If monitoring shows operations increase downstream temperatures, ~~Where the operator must take one of the following actions on a timeline developed in consultation with DEQ:-~~
2. If the protecting cold water criteria ~~Protecting Cold Water criterion~~ does not apply, ~~conduct~~ demonstrate through a cumulative effects analysis ~~demonstrating, approved by DEQ,~~ that dam release water temperatures warmer than the surrogate measure will result in attainment of the dam and reservoir assigned HUA above the applicable criteria in downstream waters. ~~This option applies only where the TMDL did~~

Operators of facilities not ~~evaluate the facility or document downstream temperature~~ evaluated through TMDL modeling may submit a cumulative effects. This analysis ~~requires~~ for DEQ approval. The analysis must be supported by a DEQ-approved Quality Assurance Project Plan. ~~If DEQ approves the analysis, an implementation plan for structural or operational temperature management measures may not be required.~~

3. ~~Submit an~~ Develop or update a TMDL implementation plan

- a. ~~Develop or update a TMDL~~ implementation plan for DEQ approval that includes structural and/or operational management strategies designed to mitigate reservoir warming.

If operations are governed by an existing federal or state authorization, DEQ will evaluate whether the operational requirements in that authorization are sufficient to satisfy applicable TMDL obligations.

~~If a cumulative effects analysis demonstrates that dam or reservoir operations contribute to downstream warming, 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).~~

~~2.4.2.39.4.2.3~~ **Protecting Cold Water Criterion**

The Protecting Cold Water criterion (OAR 340-041-0028(11)) applies to waters **of the State** 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~~**With some exceptions, these waters** may not ~~exceed~~**be warmed by more than** 0.3°C (0.5 °F) above the colder ~~upstream~~**water** ambient temperature. **This provision applies to all sources taken together** 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 (**Section 4.1.6**, Table 16) ~~notes that~~**identifies** the ~~Protecting Cold Water criterion potentially applies in following~~ upstream waters entering the ~~reservoirs of the~~North Umpqua ~~Hydro~~**Hydroelectric** Project: **reservoirs as candidate waters where the PCW criterion may apply:**

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

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

These findings are preliminary, based on available temperature data and the presence of salmonid species, and the list may be refined through additional monitoring and updated assessments. Where the PCW criterion applies, reservoir operations cannot warm downstream water temperatures above upstream ambient temperatures.

If monitoring and assessment results demonstrate that stream temperature does not increase from upstream of dam to downstream of dam, DEQ may determine that a TMDL implementation plan for structural or operational temperature management measures may not be required.

9.5 Education and outreach

Implementation plans must describe how responsible persons use education and outreach to ~~build understanding~~ **inform affected communities and encourage participation in**, and support for, management strategies. ~~Plans~~ **Outreach descriptions** should identify ~~outreach~~ methods **used** (e.g., meetings, mailings, online tools), **the** target audiences, ~~identify~~ opportunities for **public** input, and ~~describe~~ how **that input feedback** will inform ~~actions~~ **implementation**.

~~2.4.39.5.1~~ 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~~ **Describe the** ~~should specify~~ maintenance actions (e.g., inspections, repairs, updates), assign responsibilities, and ~~set~~ **establish** review schedules.

~~2.4.49.5.2~~ 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~~ **Cost** estimates ~~of~~ **should include** major ~~costs~~ **expenses** such as staffing, materials, operations, monitoring, outreach, ~~and other relevant expenses~~. ~~Plans should also~~ **identify funding sources, and describe any funding gaps**.

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

10 Implementation plan ~~submission~~ submittal and revisions

OAR 340-042-0040(4)(I)(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.~~

10.1 Implementation plan submission

Responsible persons listed in [Table 4](#), **except those required to first prepare dam and reservoir monitoring and assessment plans**, must submit an implementation plan, ~~or plan update~~, to DEQ for approval within 18 months of Environmental Quality Commission adoption of this WQMP. ~~Responsible persons can update their~~ Existing DEQ-approved

~~temperature implementation plans to meet these WQMP requirements,~~ may be updated or supplemented as necessary to ~~address any gaps~~ **meet requirements of this WQMP.**

Depending on the monitoring and assessment results **described** in **Section 9.4.2**, 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~~ **establish** a reasonable timeline for plan submittal.

Once approved, responsible persons must ~~follow~~ **implement their plans according to** the timelines and measurable milestones established in the **approved** implementation plan.

10.2 Implementation plan revisions

Responsible persons must ~~review and revise their~~ **submit revised** implementation plans ~~every five years and submit them~~ to DEQ for approval every five years. **At a minimum**, revisions must update timelines **and measurable milestones** for ~~continued~~ **the next five-year** implementation ~~and should~~ **period. Revised implementation plans must reflect the periodic review and adaptive management process described in Section 9.3.**

DEQ may require implementation plan revisions more frequently if monitoring and ~~evaluation. If DEQ identifies deficiencies~~ **assessment results, changes in applicable requirements, or other information indicates** that ~~prevent the acceptance of the implementation plan~~ **revisions are needed. When DEQ requires a plan revision, it will set establish** a deadline for submitting a revised **implementation** plan for approval.

311 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 **as needed**.

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~~ **the Temperature** TMDL.

Together, these monitoring activities ~~support adaptive management by tracking~~ **allow DEQ to evaluate** implementation, ~~assessing effectiveness, and evaluating~~ **progress**, environmental conditions ~~relevant to meeting~~, **and progress toward** load allocations, surrogate ~~measures~~ **measure** targets, and water quality standards. ~~Surrogate measure targets serve as regulatory benchmarks for evaluating interim progress.~~

DEQ acknowledges that restored streamside areas ~~will~~ **may** 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.-

3.11.1 Monitoring responsibilities

All responsible persons identified in [Table 4](#) must track the implementation and effectiveness of their strategies according to their implementation plans ~~(Section)~~ and conduct applicable monitoring and assessments consistent with [Section Error! Reference source not found.Sections](#). **Monitoring requirements depend on the strategies and commitments in each plan, and may include evaluations of streamside conditions, tracking of restoration projects, or other methods appropriate to local circumstances.**

ODA, ODF, BLM, and USFS combined ~~manage~~**have legal authority over** 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~~**If DEQ determines additional coordination or monitoring is needed, it** may work with partners to develop a basinwide Umpqua temperature monitoring strategy~~and may require~~. **The strategy would provide a coordinated framework for long-term stream temperature monitoring and evaluation of watershed conditions needed to assess water quality status and trends addressed by this TMDL. It would include sampling and analysis plans developed in collaboration with basin partners, coordinated monitoring responsibilities for ODA, ODF, BLM, or USFS to participate. This strategy is intended to, and other responsible persons, and build on existing monitoring programs, not rather than 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~~**They** must ~~be submitted~~**submit data** 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.

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

~~This section outlines DEQ's plan and schedule for reviewing monitoring information and revising the TMDL.~~ Monitoring and reporting provide the feedback necessary for DEQ and responsible persons to adjust strategies and guide adaptive management. Surrogate measure targets- serve

as regulatory benchmarks for tracking implementation progress over time. **Figure 2** illustrates how monitoring results and periodic reviews guide adjustments to the TMDL and, WQMP over time, ensuring implementation remains effective and water quality continues to improve, or targeted condition.

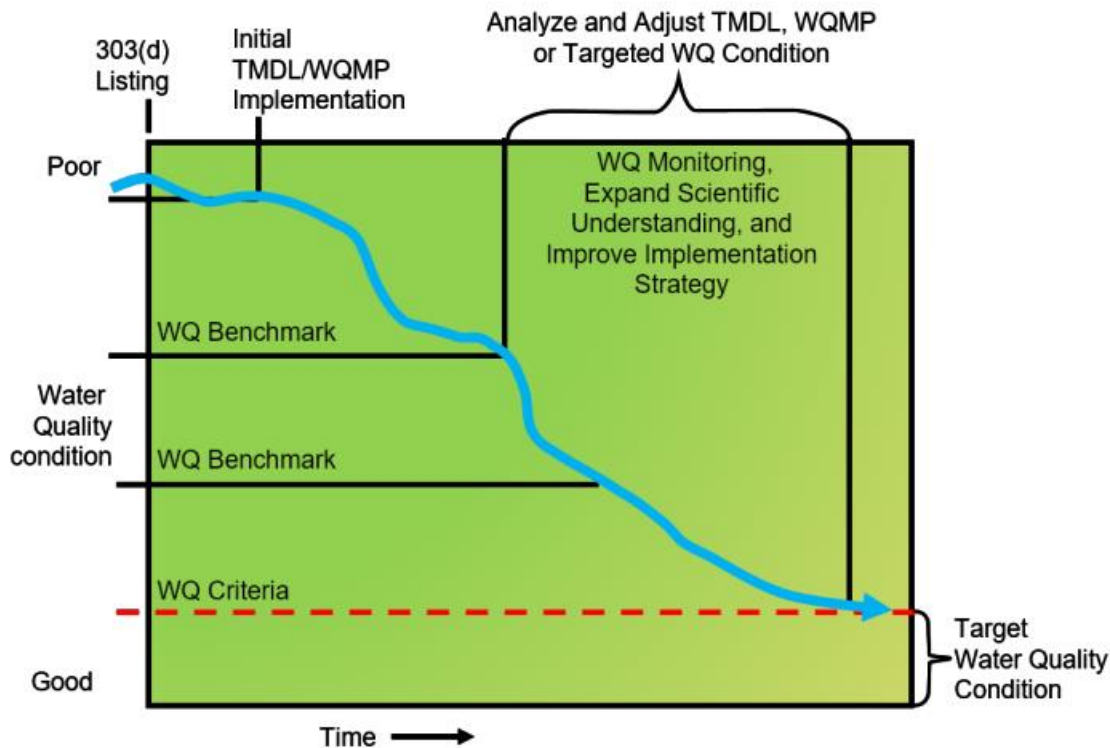
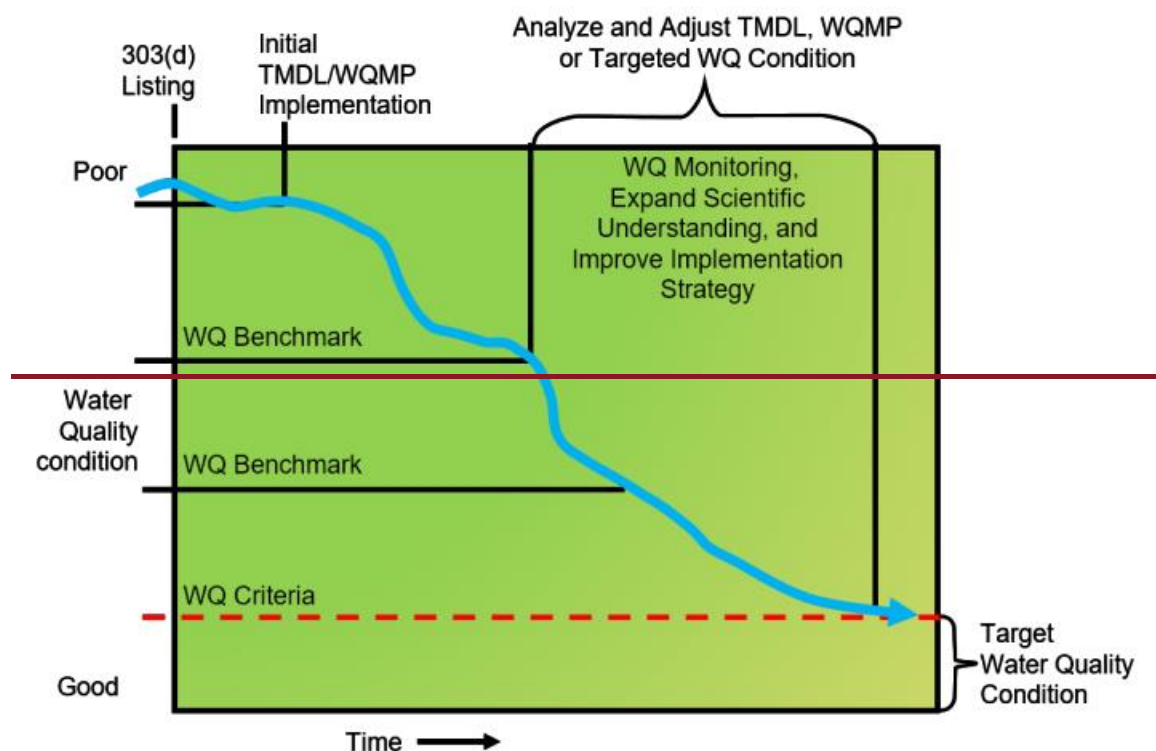


Figure 2. Conceptual representation of adaptive management.

The annual review evaluates whether responsible persons are implementing actions as committed to DEQ-approved implementation plans. **DEQ uses** annual reports ~~summarize actions taken, monitoring results, and observations.~~ **DEQ and responsible persons use this information to verify implementation, progress and** identify ~~needed adjustments, and consider other restoration efforts~~ **issues** that may ~~improve stream temperature, such as channel morphology and streamflow restoration~~ **warrant additional coordination or adaptive management.**

~~The~~**Every** five-year review years, **DEQ** evaluates whether implemented actions are effectively advancing basin-wide progress toward surrogate measure targets, load allocations, and water quality standards. DEQ compiles cumulative monitoring results, annual reports, **streamside evaluations**, and other relevant information to assess basin-wide progress, determine whether strategies remain effective, and identify updates to implementation plans, monitoring approaches, or other elements of the WQMP **or TMDL that** are needed. If DEQ finds implementation plans ~~ineffective~~ **are not effectively advancing TMDL implementation**, it may require **plan** revisions. The review incorporates new science, improved practices, and changing basin conditions over time.

Based on these reviews, if DEQ determines monitoring data indicate 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 . Conceptual representation of adaptive management.~~

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

OARs 340-042-0040(4)(I)(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.

4.112.1 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 **for public involvement** throughout TMDL implementation-~~Updates and will be provided during major WQMP revisions and five year reviews.~~**make** summaries of implementation progress ~~will be~~ available to the public.

4.212.2 Maintenance of management strategies

~~DEQ ensures strategies remain effective and enforceable~~ **DEQ maintains accountability** 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.

4.312.3 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~~ **can** reduce long-term costs through preventive maintenance or operational efficiencies **while also improving** ~~, and~~ water quality **improvements benefiting aquatic habitat, fisheries, and local communities.** ~~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 E:** List of funding and technical assistance resources for TMDL implementation ~~Appendix B~~ lists funding opportunities and grant programs that can support implementation of the Umpqua River Basin temperature TMDL.

513 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-~~ **OAR 340-042-0040(4)(I)(J)** requires **each WQMP to include** a description of reasonable assurance that ~~those~~ **management** strategies and **sector-specific or source-specific implementation** plans will ~~proceed.~~

be carried out through regulatory or voluntary actions. Under OAR 340-042-0030(9) ~~defines~~, reasonable assurance ~~as a demonstration~~ **means demonstrating** that a TMDL will be implemented **by federal, state or local governments or individuals** 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.~~ management strategies or other controls.

The TMDL Reasonable Assurance section (Section 12) demonstrates reasonable assurance that the TMDL's load and wasteload allocations will be achieved. This WQMP describes the management strategies, oversight, and accountability mechanisms DEQ uses to achieve those allocations through regulatory and voluntary actions, consistent with Oregon's antidegradation policy (OAR 340-041-0004) and EPA guidance for reviewing reasonable assurance demonstrations (EPA 1991, 2002, 2012).

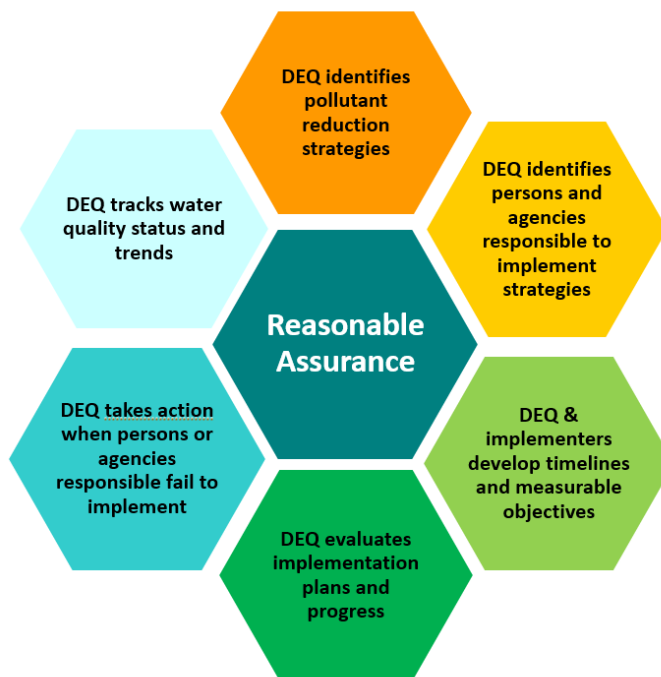


Figure 3 ~~EPA guidance (1991 and 2012) emphasizes that reasonable assurance must connect enforceable mechanisms, monitoring, and adaptive management to demonstrate that practices exist, are feasible, and will be implemented. The Clean Water Act Section 303(d) further requires that a TMDL be established 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.~~

~~6.7 Implementation mechanisms~~

~~. DEQ reasonable assurance accountability framework~~

illustrates DEQ's **reasonable assurance** accountability framework. **Similar to EPA's accountability framework for the Chesapeake Bay TMDL (EPA, 2010) the framework shows how management strategies are implemented, evaluated, and adjusted over time.**

It ~~links~~ **begins with the** pollutant reduction strategies **identified in Section 4**~~to~~, **which** 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.~~ **implement to attain TMDL allocations.** The ~~core of reasonable assurance comes from~~ **following** enforceable requirements: **provide the foundation for DEQ's reasonable assurance:**

- **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 water quality-based effluent limits in permits to 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~~ **by requiring responsible persons to develop and carry out** 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~~ **These** 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~~ **They** are an enforceable mechanism for managing temperature-related impacts from dam operations.

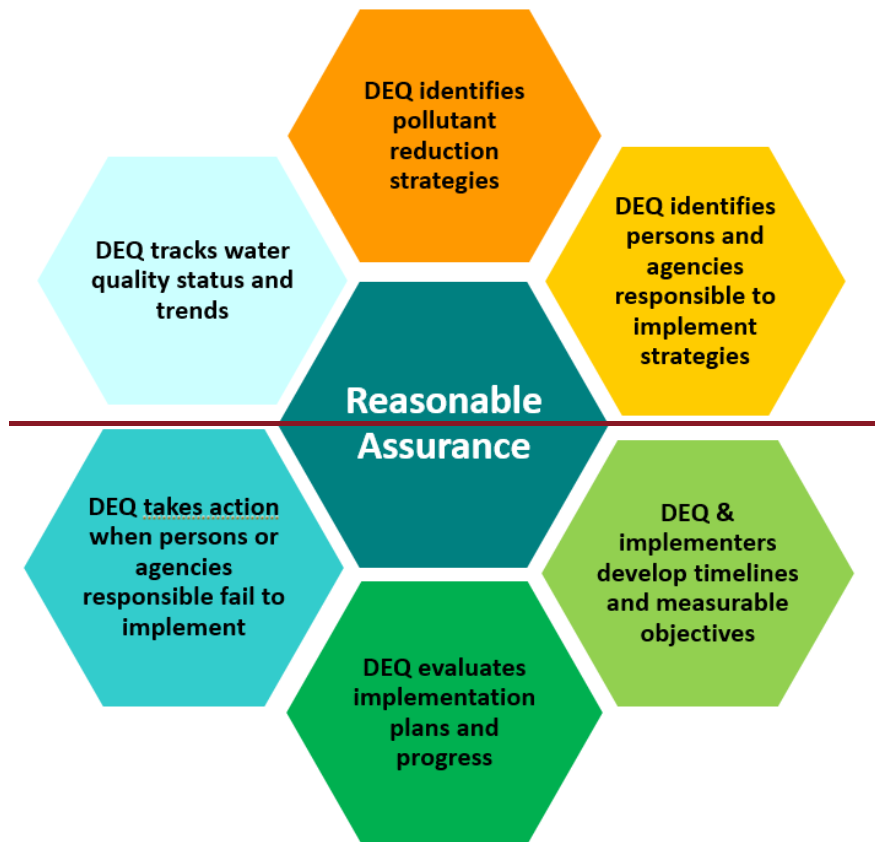


Figure . DEQ reasonable assurance accountability framework

Voluntary and collaborative efforts also strengthen basin--wide implementation **capacity efforts and support reasonable assurance**, including:

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

Appendix A: Land ownership and jurisdiction mapping 7 identifies 38 responsible persons and Table 4 assigns implementation responsibilities to 21 of them. This WQMP requires ODA, ODF, BLM, and USFS to prepare implementation plans. Together, these four agencies have implementation responsibility for approximately 93 percent of the basin's streamside lands (Section 0), bringing most streamside lands under a common implementation planning framework.

Responsible persons carry out their implementation responsibilities through DEQ-approved implementation plans that identify management strategies to achieve

applicable load allocations and surrogate measure targets. The plans include implementation schedules, measurable milestones, performance monitoring, and other analyses necessary to guide implementation ([Section 9](#)). Additional monitoring and analyses help responsible persons evaluate current conditions, determine whether additional implementation is necessary, and prioritize implementation actions where they will be most effective ([Section Error! Reference source not found.](#)).

Responsible persons must track implementation and management strategy effectiveness, submit annual reports, and conduct five-year reviews ([Section 9.3](#)). DEQ evaluates annual reports and five-year reviews against established timelines and milestones to confirm that strategies remain on track. ~~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 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 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.~~

6.8 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.~~

These reviews provide the basis for implementation plan revisions and adaptive management decisions, as needed.

If responsible persons fail to develop, implement, or revise implementation plans, or fail to make reasonable progress toward established timelines and measurable milestones, DEQ may require implementation plan revisions or additional implementation actions. DEQ may also require revised management strategies, additional analyses or monitoring, updates to streamside evaluations, or other measures necessary to improve implementation.

DEQ addresses implementation issues through technical assistance, voluntary engagement, or formal enforcement. Failure to submit, implement, or revise an implementation plan as required is a Class II violation under OAR 340-012-0055(2)(e). Failure to submit required annual reports is a Class I violation under OAR 340-012-0053(1). DEQ may also refer implementation issues to the Environmental Quality Commission as provided in OAR 340-042-0080.

DEQ tracks water quality status and trends through performance reporting, demonstration of management strategy effectiveness ([Section 11.7](#)), progress toward ~~Oregon's~~**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~~**implementation priorities** and **future** plan revisions.

~~DEQ approves~~**Together, these** 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, monitoring, reporting, and~~ 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)~~**requirements provide** reasonable assurance that ~~nonpoint source controls~~**the management strategies identified in**

this WQMP 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 **to achieve established TMDL load and wasteload** 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.~~

614 Legal authorities

As required by OAR 340-042-0040(4)(I)(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.

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.

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.

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.

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.

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.

Coastal Zone Reauthorization Act

Section 6217 of the Coastal Zone Amendments Reauthorization Act requires that all states and territories with federally approved coastal management programs develop Coastal Nonpoint Pollution Control Programs to reduce impact from polluted runoff on coastal waters. These programs must implement management measures to control runoff from forestry, agriculture, urban areas, marinas, hydromodification, and management measures for wetlands, vegetated shorelines, and riparian areas.

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.

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.

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.

715References

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816 Appendices

The WQMP includes the following list of appendices.

Appendix A: Land ownership and jurisdiction mapping

Appendix B: **List of responsible persons, including DMAs**

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

Appendix D:

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

Appendix A: Land ownership and jurisdiction mapping ~~List of responsible persons, including DMAs~~

Land ownership and jurisdiction was mapped in order to identify potential Designated Management Agencies and other responsible persons that may have vegetation management or other TMDL implementation responsibilities.

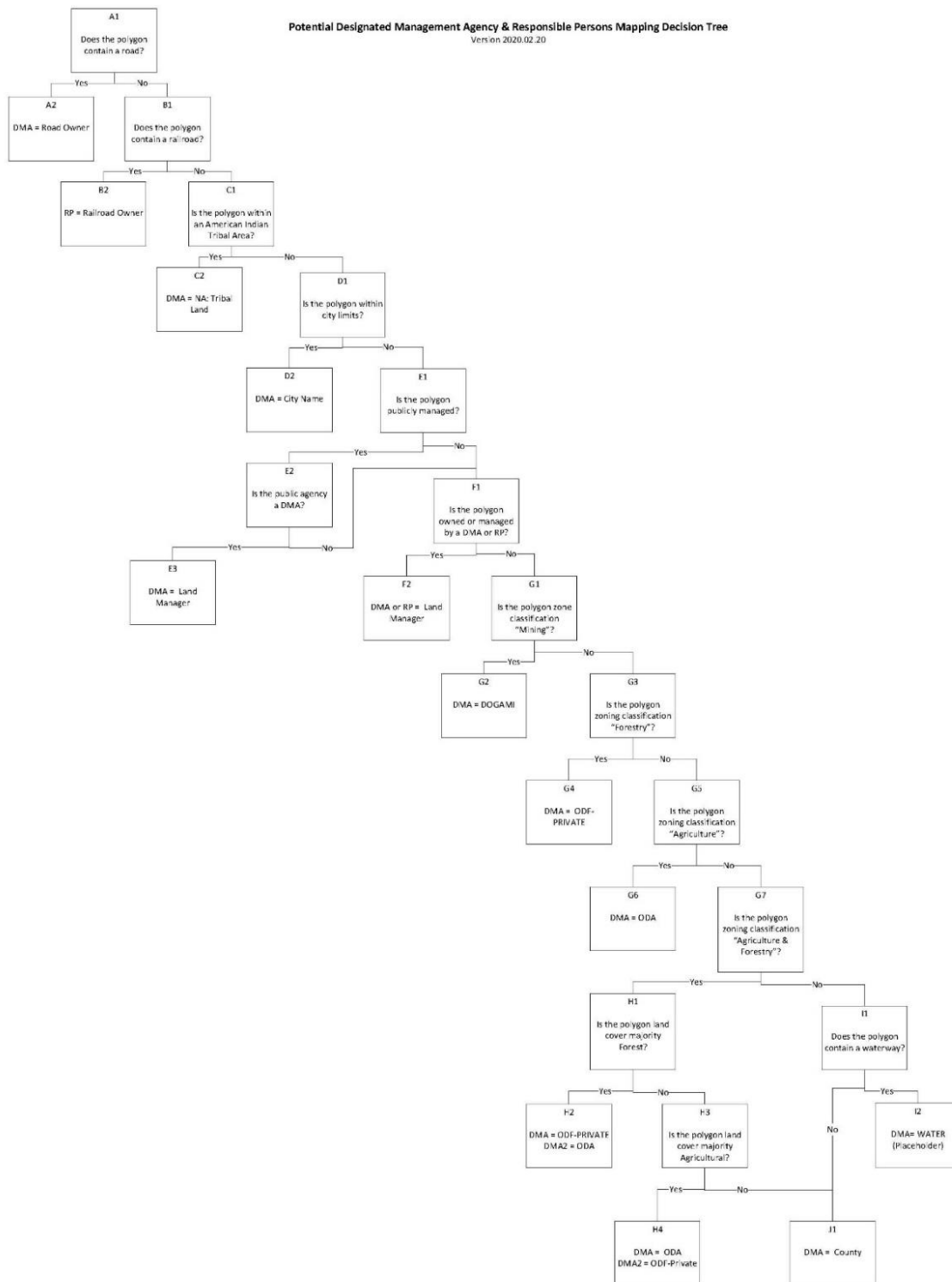
DEQ determined land ownership and jurisdiction by reviewing geospatial datasets of ownership, land use, zoning, and jurisdictional boundaries, such as city limits or a county boundary. Cadastral boundaries and ownership information were acquired from county tax assessors. Ownership information provided by a county tax assessor was assumed to be the most accurate information.

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.

The table below describes the sources of the geospatial features. The decision tree shows the twelve-step decision hierarchy to assign a potential DMA or other responsible person to a tax lot. DEQ implemented the decision hierarchy using an R script with all the geospatial data feeding into the decision tree.

Geospatial data	Feature Name	Data Source
Tax Lot Ownership	Cadastral Survey	Oregon Geospatial Enterprise, Douglas County
County Boundaries	Boundary Counties OR (Polygons)	Bureau of Land Management
Public Land Management	Oregon Land Management (2015 and 2019)	Bureau of Land Management
City Limits	Oregon City Limits (2018)	Oregon Department of Transportation
Tribal Governments	Tribal Areas	Confederated Tribes of Warm Springs, Oregon, Department of Forestry, U.S. Census Bureau (2000 Census)
Roads	Oregon Transportation Network (2017)	Oregon Department of Transportation
Railroads	Oregon Railroads (2017)	Oregon Department of Transportation

Geospatial data	Feature Name	Data Source
Land use/Land cover	2016 NLCD	U.S. Geological Survey, Dewitz (2019)
Zoning	Oregon Zoning (2017)	Oregon Department of Land Conservation and Development



Appendix B: List of responsible persons, including DMAs ~~Shade curves for Ecoregion 1a.~~

DEQ estimated acreages and identified primary implementation responsibilities for each mapped area using the best available information and the methods described in [Appendix A: Land ownership and jurisdiction mapping](#). The full list of responsible persons also includes dam and reservoir operators included in [Appendix C: List of dams and reservoirs in the Umpqua Basin](#)~~large~~. TMDL implementation responsibilities may overlap and may change as new information becomes available.

#	Name	Type	Total Acres in the TMDL project area	Streamside Acres	Status	TMDL plan needed?	Rational for why plan not needed
1	Bonneville Power Administration	Federal	31	14	New	No	d
2	Central Oregon & Pacific Railroad	Railroad	1,889	1,012	New	No	e
3	City of Canyonville	Municipality	504	149	Existing	Yes, plan update	
4	City of Drain	Municipality	296	121	Existing	Yes, plan update	
5	City of Elkton	Municipality	84	42	Existing	Yes, plan update	
6	City of Glendale	Municipality	171	45	Existing	Yes, plan update	
7	City of Myrtle Creek	Municipality	1,341	391	Existing	Yes, plan update	
8	City of Oakland	Municipality	394	112	Existing	Yes, plan update	
9	City of Reedsport	Municipality	1,030	453	Existing	Yes, plan update	
10	City of Riddle	Municipality	319	75	Existing	Yes, plan update	
11	City of Roseburg	Municipality	5,696	835	Existing	Yes, plan update	
12	City of Sutherlin	Municipality	3,718	775	Existing	Yes, plan update	
13	City of Winston	Municipality	1,531	295	Existing	Yes, plan update	
14	City of Yoncalla	Municipality	345	100	Existing	Yes, plan update	
15	Coos Bay Rail Link	Railroad	61	55	New	No, plan update	
16	Douglas County	County	147,328	47,653	Existing	Yes, plan update dam/reservoir contingent on monitoring and assessment	
17	Highland Ditch Irrigation District	Special District	Not assessed	Not assessed	New	No	d
18	Jackson County	County	3	0	New	No	a, d

#	Name	Type	Total Acres in the TMDL project area	Streamside Acres	Status	TMDL plan needed?	Rational for why plan not needed
19	Klamath County	County	14	0	New	No	a,d
20	Lane County	County	164	51	New	No	a
21	Longview, Portland & Northern Railroad	Railroad	24	22	New	No	d,e
22	Oregon Department of Agriculture	State Agency	318,868	107,035	Existing	Yes, new plan	
23	Oregon Department of Fish & Wildlife	State Agency	57	49	New	Yes, new plan	
24	Oregon Department of Forestry	State Agency	987,301	344,155	Existing	Yes, new plan	
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, new plan	
27	Oregon Parks and Recreation Department	State Agency	627	249	New	Yes, new plan	
	Oregon Department of Geology and Mineral Industries	State Agency	Not assessed	Not assessed	Existing	No	
28	PacifiCorp	Private Utility	Not assessed	Not assessed	Existing	Contingent on monitoring and assessment	
29	Port of Umpqua	Special District	950	943	New	No	e
30	Sutherlin Water Control District	Special District	Not assessed	Not assessed	New	No	d
31	U.S. Bureau of Land Management	Federal Agency	623,880	212,962	Existing	Yes, new plan	
32	U.S. Forest Service	Federal Agency	934,111	191,131	Existing	Yes, new plan	
33	Union Pacific Railroad	Railroad	2	1	New	No	d,e
34	Winchester Water Control District	Special District	Not assessed	Not assessed	New	No	e
35	U.S. Department of Agriculture	Federal Agency	2.7	0.0	NA	No	d
36	U.S. Government	Federal Agency	205	74	NA	No	unknown ownership
37	State of Oregon	State Agency	560	296	NA	No	b
38	U.S. National Park Service	Federal Agency	17,354	517	New	No	b
39	Cow Creek Band of Umpqua Indians	Sovereign Tribal Nation	586	33	Not a responsible person	No	b

~~a) Have responsibilities addressed under another TMDL.~~

- ~~b) Have responsibilities addressed through existing permits or other implementation pathways.~~
- ~~c) Do not have authority or jurisdiction to implement management strategies listed in Table 2~~
- ~~d) Have limited streamside area under its jurisdiction (generally less than 25 acres).~~
- ~~e) Have limited ability or opportunity to implement management strategies due to physical or public safety constraints (e.g., railroads).~~

Appendix C: List of 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, and amended the list based on RAC feedback. ~~Of the identified dam owners,~~ DEQ requires Douglas County and PacifiCorp to prepare monitoring and assessment plans 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	Not available	Not available	Not available	0
4	Buell, Stanford	OR00969	Not available	Not available	Not available	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	Clearwater No 2 Diversion Dam	n/a	PacifiCorp	Public Utility	Hydroelectric	
9	Cooper Creek (Sutherlin)	OR00463	Sutherlin Water Control District	Local Government	Recreation	5,200
10	Corder Log Pond	OR00215	Herbert Lumber Company	Private	Other	56
11	Creekside Development Dam No. 1	OR03902	BIA	Federal	Not available	Not available

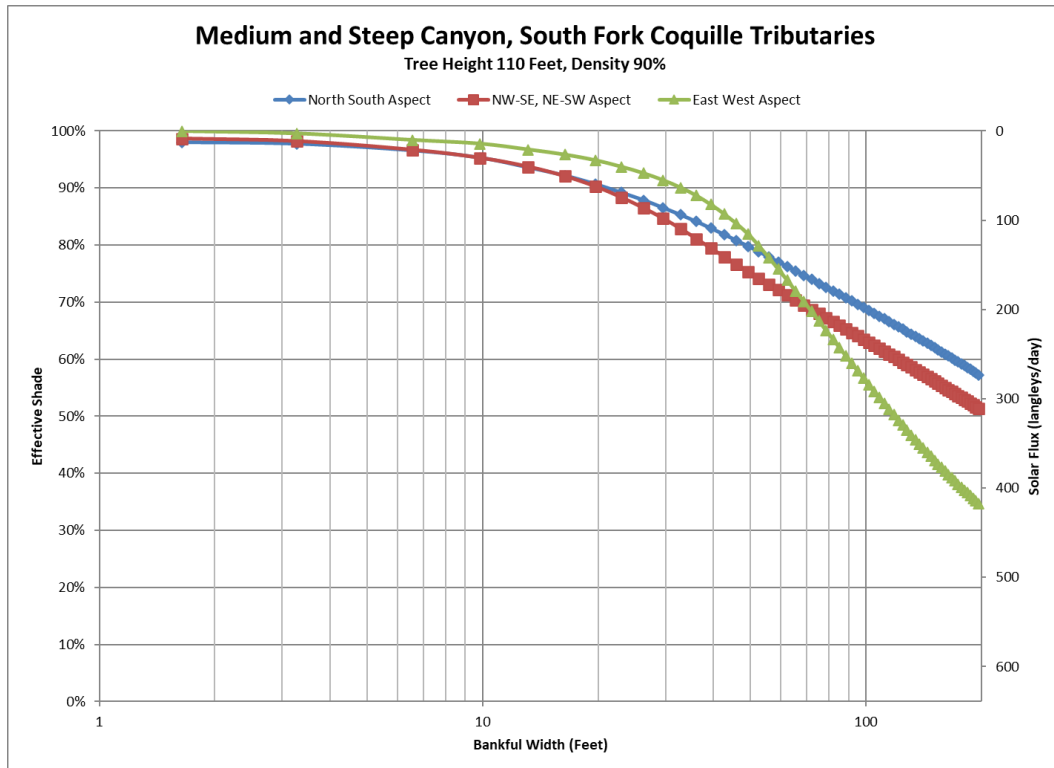
No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
12	Creekside Development Dam No. 3	OR03903	BIA	Federal	Not available	Not available
13	Denley Brothers Dam	OR00334	Carissa and Shane Spontini	Private	Irrigation	120
14	Dillard Lumber Co Dike	OR00155	Roseburg Forest Products Co	Private	Other	285
15	Dixonville Log Pond	OR00409	Ford, Allyn C. TR.	Private	Other	1,163
16	Dollar Mill Pond	OR00296	Swanson Group	Private	Other	150
17	Drain Plywood Log Pond	OR00299	Bohemia, Inc.	Private	Other	176
18	Drain Sewage Lagoon	OR01573	City of Drain	Local Government	Water Supply	40
19	Eleanor	OR01648				0
20	Fish Creek Diversion Dam	OR00562	PacifiCorp	Public Utility	Hydroelectric	71
21	Fish Creek Forebay	OR03707	PacifiCorp	Public Utility	Hydroelectric	110
22	Galesville	OR00748	Douglas County	Local Government	Irrigation	117,000
23	Gardiner	OR03727	Rome Creek Timber	Private	Fish and Wildlife Pond	0
24	Georgia Pacific Log Pond	OR00165	DCIDB	Private	Other	237
25	Hayhurst Road (Drain Municipal Res.)	OR01892	City of Drain	Local Government	Water Supply	70
26	Iverson Reservoir (Douglas)	OR00526	First Interstate Bank	Private	Recreation	51

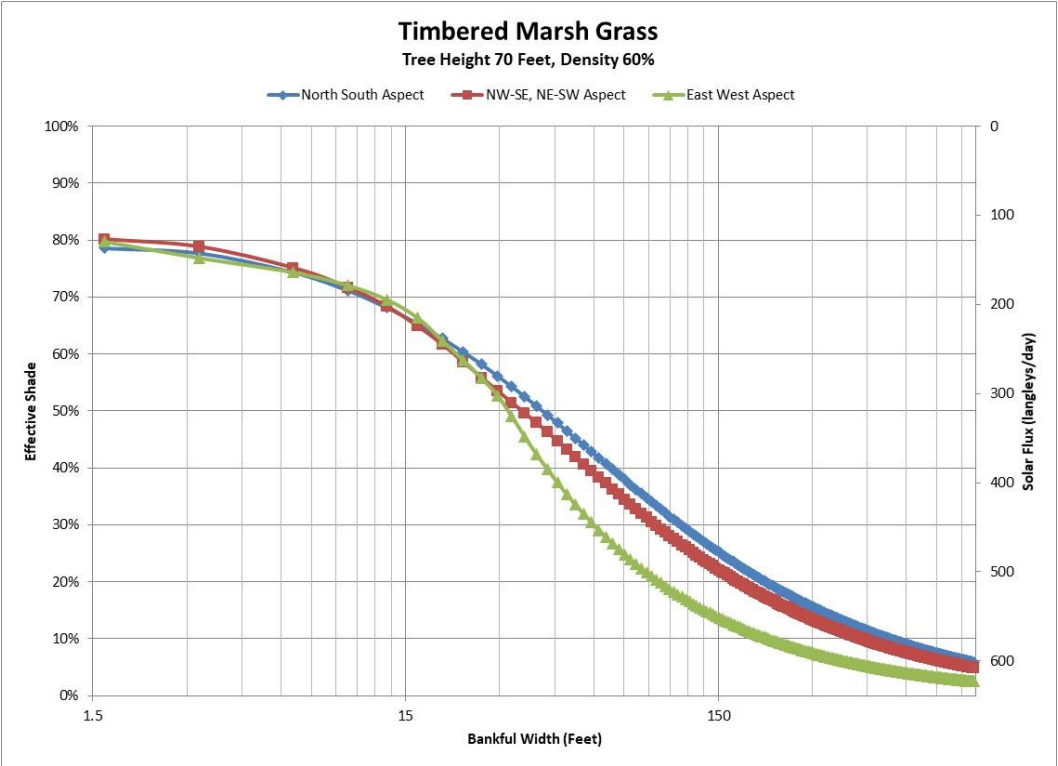
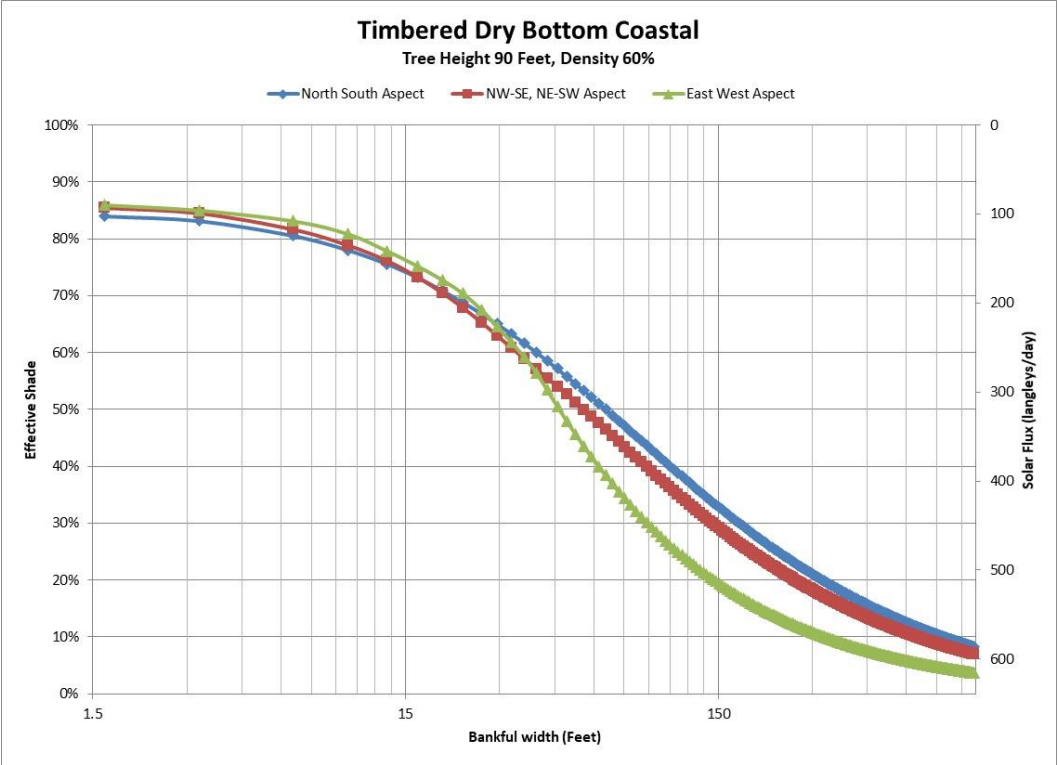
No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
27	Lemolo	OR00556	PacifiCorp	Public Utility	Hydroelectric	19,000
28	Lemolo No 2 Forebay	OR00564	PacifiCorp	Public Utility	Hydroelectric	265
29	Lemolo No. 1 Forebay	OR04091	PacifiCorp	Public Utility	Hydroelectric	65
30	Lemolo No. 2 Diversion dam		PacifiCorp	Public Utility	Hydroelectric	
31	McComas Dam	OR02355	Not available	Not available	Not available	0
32	Paris	OR00320	Gary Hendy	Private	Hydroelectric	130
33	Paris, E.L.	OR03385	Not available	Not available	Not available	0
34	Plat I	OR00443	Sutherlin Water Control District	Local Government	Flood Risk Reduction	2,760
35	Rock Creek Hatchery	OR03979	Blogett, Sharon M. Trs of the	Private	Irrigation	1,500
36	Serafin Reservoir	OR03008	Not available	Not available	Not available	0
37	Skookum Pond Dam	OR03876	USDA FS	Federal	Fire Protection, Stock, Or Small Fish Pond	80
38	Slide Creek	OR00561	PacifiCorp	Public Utility	Hydroelectric	43
39	Smelt Dam	OR03756	Not available	Not available	Not available	0
40	Soda Springs	OR00555	PacifiCorp	Public Utility	Hydroelectric	512
41	Stump Lake Dam (Clearwater Diversion Dam #1)	OR00565	PacifiCorp	Public Utility	Hydroelectric	152
42	Sun Studs Log Pond	OR00197	Swanson Group	Private	Other	80
43	Sutherlin Log Pond	OR00333	Murphy Company	Private	Other	170

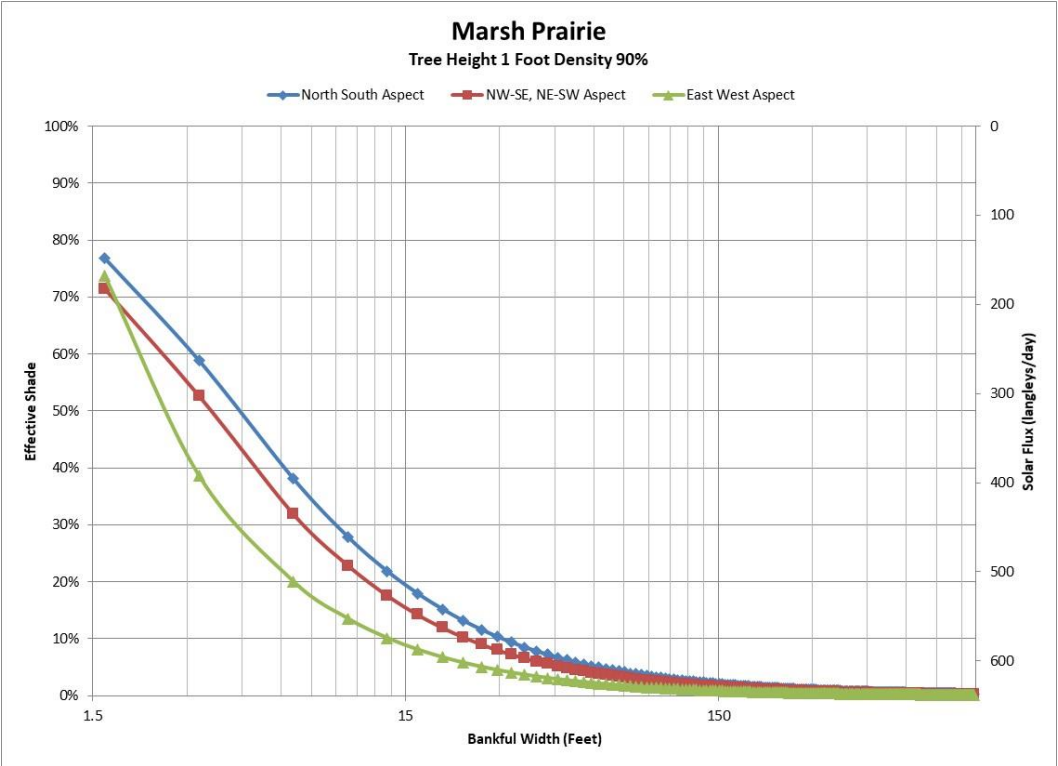
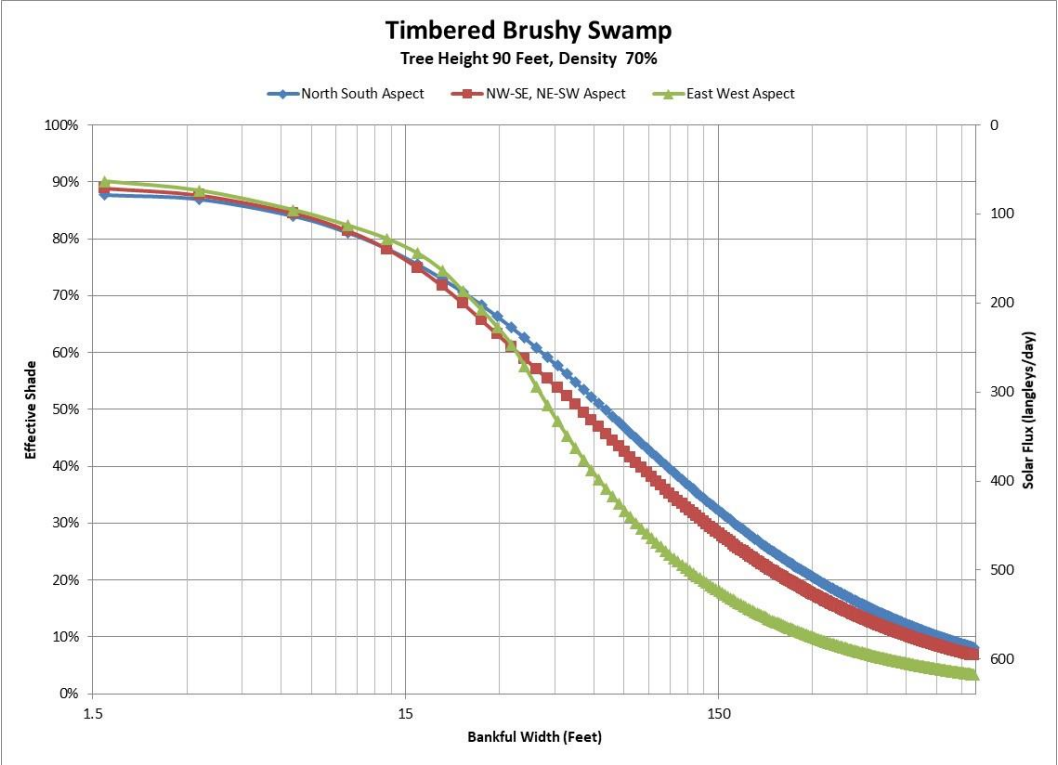
No.	Reservoir Name	DAM ID	Owner Name	Owner Types	Primary purpose	Maximum reservoir storage (Acre-Feet)
44	Sutherlin Mill (Fords Pond)	OR00274	City of Sutherlin	Private	Other	1,040
45	Toketee	OR00554	PacifiCorp	Public Utility	Hydroelectric	880
46	Updegrave	OR00491	Woods, Bill	Private	Irrigation	172
47	Wageman	OR00496	Carol Buchheim	Private	Irrigation	70
48	Weaver Reservoir (Thurman-Weaver)	OR00447	Kay, Thomas W. and Zelma F.	Private	Irrigation	55
49	Wheeler Canyon Reservoir	OR03550	Not available	Not available	Not available	0
50	Whistlers Bend	OR00365	Gilbreath, William C. & EL	Private	Other	500
51	Winchester	OR00263	Winchester Water Control District	Public Utility	Recreation	700
52	Yoncalla Reservoir	OR00682	City of Yoncalla	Local Government	Water Supply	112

Appendix D: **Shade curves for Ecoregion 1a. ~~List of funding and technical assistance resources for TMDL implementation~~**

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







Appendix E: 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

Program	General Description	Contact
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
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

Program	General Description	Contact
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. Situations include brush and pasture conversions, fire damage areas, and insect and disease areas.	ODF
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