Draft Total Maximum Daily Loads for the John Day River Basin

Water Quality Management Plan

Temperature

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State of Oregon
DEQ Department of Environmental Quality

This document was prepared by:
Trea Nance and Karissa Willits

Oregon Department of Environmental Quality
Watersheds Section
700 NE Multnomah Street, Suite 600
Portland Oregon, 97232

Contact: Steve Mrazik
Phone: 503-229-5379
www.oregon.gov/deq

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1 Introduction

DEQ provides this Water Quality Management Plan to guide implementation of the temperature Total Maximum Daily Load developed for the John Day River Basin (Figure 1, TMDL Figure 2-1). A WQMP is an element of a TMDL, as described by Oregon Administrative Rule 340-042-0040(4)(l), to guide implementation of management strategies to attain and maintain water quality standards. Each WQMP will guide the preparation of detailed TMDL implementation plans prepared by responsible persons including Designated Management Agencies.

This John Day temperature WQMP will be proposed for adoption by Oregon's Environmental Quality Commission, by reference, into rule as OAR 340-042-0090(6)(b). This WQMP is intended to provide comprehensive information for implementation of the temperature TMDL, and will be amended, as needed, upon issuance of any future TMDLs within the John Day River Basin. Any subsequently amended or renumbered rules cited in this document are intended to apply.

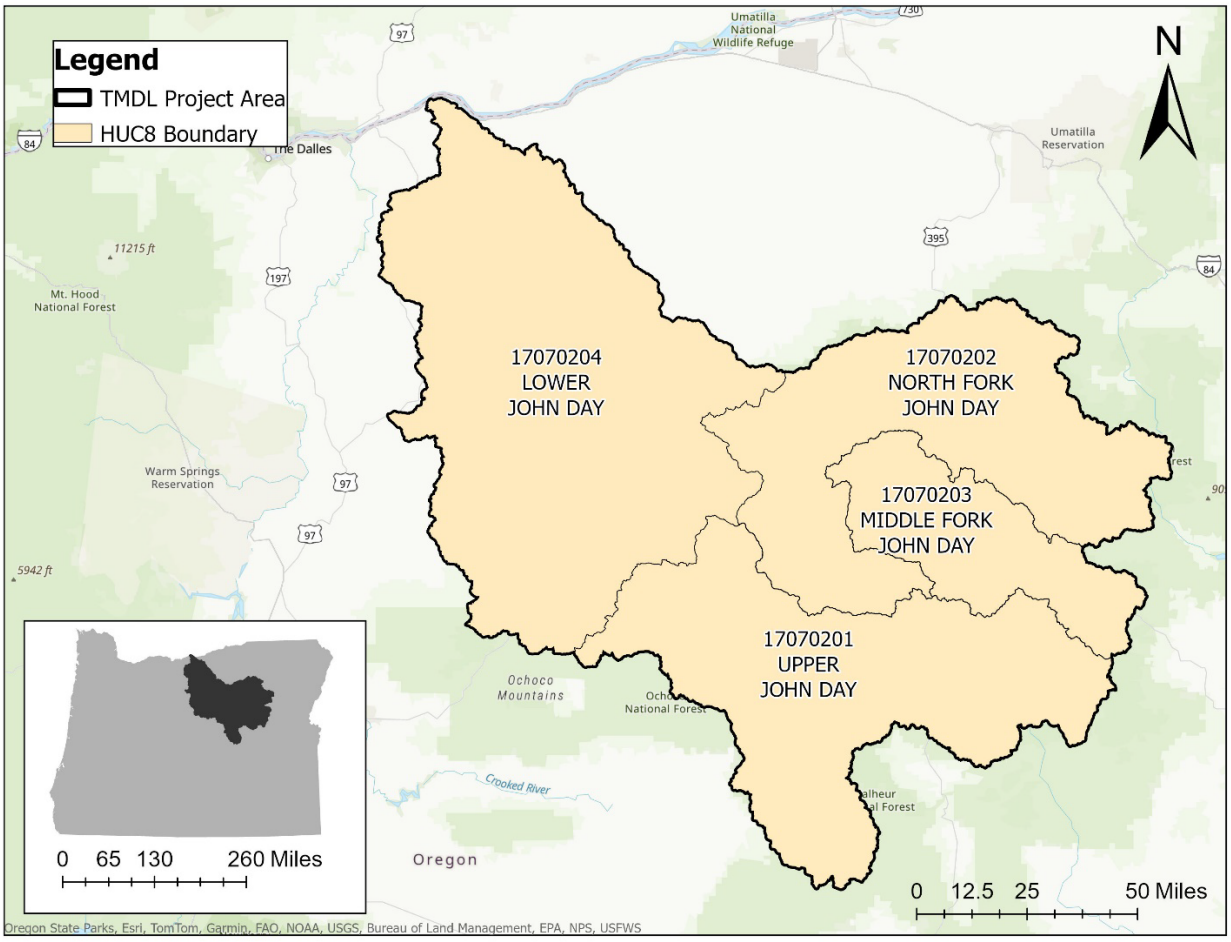

Figure 1 Map of John Day HUC8 subbasins.

The John Day River Basin encompasses four subbasins. EPA previously approved the John Day Basin temperature TMDL. However, in 2013, EPA disapproved the Natural Conditions Criterion contained in Oregon's water quality standard for temperature due to the 2012 U.S. District Court decision for Northwest Environmental Advocates v. EPA. On October 4, 2019, the U.S. District Court issued a judgment in the lawsuit requiring EPA and DEQ to reissue 15 Oregon temperature TMDLs that were based on the Natural Conditions Criterion, including the John Day Basin.

This TMDL replaces the temperature portion of the 2010 John Day River Basin TMDL and WQMP (DEQ, 2010). TMDLs for Dissolved Oxygen, Bacteria, and Biocriteria remain in effect.

This TMDL applies to all waters of the state in the subbasins listed in Table 1. The subbasins and associated water bodies listed in Table 1 will hereafter be referred to as the "John Day Basin."

Table 1: Waterbodies included in John Day Basin TMDL.

Subbasin	Waterbodies included
Upper John Day (17070201)	All waters of the state.
North Fork John Day (17070202)	All waters of the state.
Middle Fork John Day (17070203)	All waters of the state.
Lower John Day (17070204)	All waters of the state.

Section 2 of the John Day Basin Temperature TMDL Rule contains a listing of all Category 5 temperature impairments from the 2022 Integrated Report (DEQ, 2022a). The TMDL contains a complete listing of all the Assessment Units included in this rulemaking (DEQ, 2026a).

1.1 Condition assessment and problem description

The first element of the WQMP according to OAR 340-042-0040(4)(l)(A) is an assessment of water quality conditions in the John Day Basin with a problem description. There are assessment units in the John Day Basin listed as impaired (category 5 or 4A) for temperature in Oregon's 2022 Integrated Report, which was approved by the U.S. Environmental Protection Agency on Sept. 1, 2022.

DEQ must develop TMDLs for pollutants causing temperature impairments of waters within the John Day Basin, as required by Section 303(d) of the federal Clean Water Act. These pollutants are solar radiation and heat from various sources and conditions that cause water temperatures to exceed criteria established to support aquatic life beneficial uses.

1.2 Goals and objectives

OAR 340-042-0040(4)(l)(B) requires identification of the goals and objectives of the WQMP. The goal of this WQMP is to provide an implementation framework for this John Day Basin temperature TMDL. Implementing the TMDL is designed to achieve and maintain the temperature water quality criteria, including narrative criteria, and meet antidegradation requirements in streams within the John Day Basin. The primary objectives of this WQMP are to describe responsibilities for implementing TMDL management strategies and actions necessary to reduce excess pollutant loads to meet all TMDL allocations, and to provide a strategy to evaluate progress towards attaining water quality standards throughout the John Day Basin.

2 Proposed management strategies

The following section presents proposed management strategies, by pollutant source and activity, that are designed to meet the load and wasteload allocations required by the John Day temperature TMDL, as required by OAR 340-042-0040(4)(l)(C).

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."

2.1 Nonpoint source management strategies

Rivers in the John Day Basin naturally warm during summer due to increased solar radiation and higher air temperatures. However, human activities and climate change have intensified this warming. Background sources, such as streambank and channel elevations, groundwater, precipitation, and cloudiness also contribute to increased thermal loading in streams. While these background sources occur naturally, human actions can alter them, making it essential to manage nonpoint sources to reduce temperature impacts and protect water quality.
Section 7 of the TMDL identifies nonpoint sources contributing to temperature impairments, including riparian habitat removal, flow alterations, channel modifications, and climate change.

To address these issues, the following subsections outline DEQ's proposed priority management strategies by source. This list is not comprehensive or mandatory, and entities are encouraged to propose additional strategies.

2.1.1 Streamside vegetation management strategies

DEQ's water quality analysis and modeling show that streamside vegetation planting and management are the strategies necessary to meet water quality standards in the temperature impaired sections of streams in the John Day Basin. Streamside overstory vegetation reduces solar radiation loads to streams by providing shade. Protecting and restoring streamside overstory vegetation is essential to achieving the TMDL surrogate measure of effective shade. More information about the physical and ecological factors affecting effective shade can be found in [Section XX of the TMDL Technical Support Document.]

The primary streamside vegetation planting and management strategies are summarized as follows:

1. **Vegetation planting and establishment**

   This strategy restores locations that have little or no shade producing overstory vegetation. These locations are important for streamside tree and shrub planting projects. These sites may currently be dominated by invasive species.

2. **Vegetation protection (enhancement, maintenance and growth)**

   This strategy addresses streamside areas that have existing vegetation that needs to be protected from removal to maintain current shade levels. In some cases, protection is needed because effective shade can only be achieved with additional growth. Protecting and maintaining existing vegetation ensures that it can grow and mature, enhances vegetation success and survival, and provides for optimal ecological conditions.

3. **Vegetation thinning and management**

   This strategy addresses streamside areas that might need vegetation density reduction to achieve optimal benefits of shade in the long term. Current site conditions at some riparian areas have been shown to be overly dense with trees or dominated by invasive species that inhibit a healthy streamside community, and thinning may be an option to promote development of a healthy mature streamside forest. However, it must be ensured that riparian thinning and management actions will result in limited (i.e., quantity, duration, and spatial extent) stream shade loss.

[TSD Appendix XX] presents material describing potential shade and temperature impacts resulting from riparian buffer management and actions to limit these effects.

2.1.2 Flow management strategies

DEQ's modeling and evaluation of water quality data and research (DEQ, 2026a) found that water withdrawals decrease the capacity of streams to assimilate pollutant loads. Because temperature is a flow-related parameter, water withdrawals can result in increased pollutant concentrations and warmer stream temperatures. In waterbodies where temperatures are already known to exceed standards, further withdrawals from the stream will reduce the stream's assimilative capacity and cause greater fluctuation in daytime and nighttime stream temperatures.

Water conservation is a best management practice that directly links the relationship between water quantity and water quality. Leaving water instream functions as a method to protect water quality from flow-related parameters of concern, such as temperature. Under state law, the first person to file for and obtain a water right on a stream is the last person to be denied water in times of low stream flows. Therefore, restoration of stream flows may require establishing instream water rights. One way this can be accomplished is by donating or purchasing out-of-stream rights and converting these rights to instream uses.

2.1.3 Channel modification management strategies

Channel modifications, such as widening and straightening, increase solar exposure and raise stream temperatures. Wide, shallow streams with high width-to-depth ratios absorb more solar radiation, exacerbating thermal loading (Larson and Larson, 1996). Uncontrolled livestock access can also contribute to bank erosion, making streams shallower and hotter. Additionally, urban development and road construction often lead to channelization, which disconnects streams from their floodplains and disrupts natural processes that help regulate temperature, such as slowing floodwaters and recharging groundwater (EPA, 2017).

The following strategies can help manage channel modifications and support temperature improvements:

1. **Restore natural channel features**: Implement restoration activities that reintroduce natural channel complexity, reduce channel width, and improve habitat for aquatic species. As riparian vegetation matures, channel width should naturally decrease, improving shading and cooling effects.
2. **Stabilize streambanks and reconnect floodplains**: Use bioengineering techniques to stabilize streambanks, prevent erosion, and enhance floodplain connectivity. Reconnecting floodplains improves groundwater recharge, supports riparian wetlands, and restores natural processes that regulate temperature.
3. **Reduce sediment runoff and erosion**: Implement erosion control measures, such as reducing upland and channel erosion, to prevent sediment from reaching streams. Reducing sediment runoff helps maintain channel depth and minimizes the warming effects of shallow, sediment-laden water.
4. **Promote hyporheic exchange and groundwater recharge**: Increase hyporheic exchange by restoring floodplains and groundwater-surface water interactions. Enhancing groundwater recharge improves temperature stability by buffering against extreme temperature fluctuations.
5. **Manage livestock access**: Control livestock access to streams to prevent bank erosion and habitat degradation. Encourage riparian fencing and controlled watering points to protect streambanks and improve water quality.
6. **Encourage ecosystem-based solutions**: Implement nature-based solutions, such as beaver reintroduction and wetland restoration, to support natural hydrology and temperature regulation.

2.1.4 Dam owners and reservoir management

There are approximately 32 reservoirs located within the John Day Basin temperature TMDL project area that are large enough to require evaluation for dam safety. DEQ compiled this basic list of 32 dams from the U.S. Army Corps of Engineers (USACE) National Inventory of Dams

(NID) database and a similar database maintained by the Oregon Water Resources Department (OWRD), dam safety program (see Appendix D). The OWRD prescribes dam safety rules that apply to dams 10 feet or higher, or store 9.2 acre-feet or more (OAR 690-020-0000). "Dam" means a hydraulic structure built above the natural ground line that is used to impound water. Dams include all appurtenant structures and together are sometimes referred to as "the works". Dams include wastewater lagoons and other hydraulic structures that store water, attenuate floods, and divert water into canals. Where possible, DEQ removed reservoirs from this list that were not relevant to the TMDL, such as treatment lagoons or reservoirs not connected to a waterbody.

Dams of all sizes can increase stream temperatures, depending on factors that include dam and stream characteristics, location, and density of dams in a watershed. Olive and Magone Lakes are larger once-natural lakes in the basin both on USFS property (Umatilla and Malheur National Forests, respectively). Olive Lake was deepened with the addition of a hydropower dam for mining activity (DEQ, 2010). Bates Pond is a smaller reservoir in the upper Middle Fork watershed and is an impoundment on Bridge Creek. It is a former Mill Pond, now owned by the Oregon Parks and Recreation Department. Other small reservoirs, ponds, or impoundments in the basin are primarily used for irrigation, recreation, and livestock operations. DEQ expects all dam owners to manage their reservoirs to meet water quality standards, including standards for temperature.

2.1.5 Climate change

Climate change is a contributing factor to rising stream temperatures. Key impacts include higher air temperatures, reduced snowpack, earlier runoff, and increased wildfire activity, all of which worsen thermal pollution. While the TMDL does not provide a site-specific analysis of climate change effects on the John Day Basin, extensive scientific evidence underscores the need for adaptive strategies.

Implementing a wide range of priority management practices, such as providing and maintaining shade, narrowing channel widths, and enhancing summer base flows, can help build resilience. Early and sustained implementation of the measures above is crucial to mitigate climate change impacts on stream temperatures and support compliance with temperature standards. While these actions may not fully meet numeric temperature criteria in all areas or years, they are essential for reducing background thermal pollution and improving overall watershed health. Coordination among local, state, and federal levels is necessary to align local efforts with broader climate initiatives.

2.2 Summary of nonpoint source priority management strategies

Table 2 includes proven strategies (and practices within the strategies) summarized by pollutant source. These strategies and practices are adapted from published sources. DEQ used the categories and terminology from Oregon Watershed Enhancement Board's Oregon Aquatic Habitat Restoration and Enhancement Guide and Oregon Watershed Restoration Inventory Online List of Treatments. Additional strategies included in Table 2 are supported by Oregon Department of Agriculture, the U.S. Department of Agriculture Natural Resources Conservation Service, Oregon State University Extension Service, Oregon Plan for Salmon and Watersheds, and other available published sources. DEQ identified the strategies in Table 2 as appropriate for the conditions and sources within the subbasins. These are considered priority strategies and practices that should receive special focus during TMDL implementation plan development.

DEQ expects that entities identified in Section 5.1 will include strategies and practices listed in Table 2 that are applicable to their jurisdiction in their implementation plans. Implementation plans must include specifics on where and when priority and other strategies and practices will be applied. Implementation plans must also include measurable objectives and milestones to document efficacy of each strategy and practice. See Section 5.2.4.1 for methods for determining where land conditions require restoration, protection, and enhancement.

Table 2: Priority temperature management strategies by source.

Source or activity	Management strategies
Insufficient riparian vegetation height, density or width	The primary goal is to increase site effective shade (combination of vegetation height, buffer width and canopy density) through streamside vegetation management strategies using regulatory programs and voluntary activities, including incentive-based projects. Streamside tree planting (conifer and hardwood); streamside vegetation planting (shrub or herbaceous cover); streamside vegetation management (invasive thinning, removal or other treatment); voluntary streamside tree retention; streamside invasive plant control; streamside fencing or other livestock streamside exclusion methods; identify and protect cold water refuges Maintain plants until free to grow; monitor survival rates. Develop, update and/or enforce streamside code/ordinance to ensure streamside native vegetation and intact bank conditions are protected or restored following site development; purchase, acquire, designate conservation easements along streamside areas.
Water withdrawals, flow alteration	Pursue instream water right transfers and leases; water right application reviews; irrigation conservation and management; repair or replace leaking pipes and infrastructure; provide incentives for water conservation.
Channel modification and hydromodification	Conduct whole channel restorations (e.g., enhance channel, wetlands, and floodplain interactions, reduce width-to-depth channel ratios, bank stabilization, large wood placement, create/connect side channels, etc.); streamside road re-construction/obliteration activities; streamside fencing or other livestock exclusion methods; protect and enhance cold water refuges; remove in-channel ponds or modify pond structures to reduce temperature increases downstream; and protect areas that don't require restoration actions

2.3 Point source priority management strategies

Point sources may be assigned wasteload allocations and/or other requirements under the TMDL. These point sources are required to have National Pollutant Discharge Elimination System (NPDES) permits for any wastewater discharges. Under federal rules, effluent limits within NPDES permits are required to be consistent with the assumptions and requirements of any available wasteload allocation.

The primary way DEQ addresses numeric wasteload allocations is by including effluent limits in permits (though different mechanisms may be used if they are consistent with the TMDL). There are many ways to achieve compliance with these limits and requirements, which can be incorporated into NPDES permits during renewal or issuance. These include, but are not limited to, immediate compliance with the limits, the use of compliance schedules, water quality trading, and other pathways allowed under state and federal rules.

2.4 Water quality trading opportunities

DEQ encourages John Day Basin DMAs to develop water quality credit trading plans that meet the TMDL allocations for the John Day Basin. Water quality trading is a well-established feature of TMDL implementation in Oregon that is designed to achieve water quality goals more efficiently and with enhanced outcomes. Trading is allowed statewide so long as the requirements of OAR 340-039 are met. Trading is based on a more holistic understanding that pollutant sources are distributed throughout a watershed, and that eliminating these pollutant sources benefits the entire watershed. Trading programs allow facilities to meet their regulatory obligations by exchanging environmentally equivalent (or greater) pollution reductions from sources elsewhere in a watershed. Trading in Oregon includes the use of green infrastructure, which has the additional benefits of enhancing the resilience of natural systems to the effects of climate change. Many trading plans can achieve the higher levels of heat load reduction at a lower cost. For more information, please refer to DEQ's web page on water quality credit trading.

3 Timelines for implementing strategies

OAR 340-042-0040(4)(l)(D) requires schedules for implementing management strategies. This WQMP establishes benchmarks and reporting expectations. Responsible persons, including DMAs, must include detailed timelines and milestones in their implementation plans. Timelines support accountability through annual reports and five-year reviews.

3.1 DEQ permit revisions

NPDES permits have five-year terms. DEQ incorporates any required TMDL wasteload allocations into NPDES permits when the permit is renewed. NPDES permittees with assigned wasteload allocations are available in the TMDL document (TMDL Rule, Section 9.1.2)

3.2 Management strategies implemented 2010- 2023 by responsible persons including DMAs

DEQ uses multiple sources to establish current conditions and track implementation progress in the John Day Basin project area. One of these sources is the Oregon Watershed Enhancement Board's Oregon Watershed Restoration Inventory which is a repository for watershed restoration activities. OWRI contains project level information from watershed councils, landowners and other groups who have implemented restoration projects to improve aquatic habitat and water quality conditions. Stream temperature projects in OWRI that have been

implemented in the John Day Basin include riparian fencing, channel modification, voluntary riparian tree retention, and others. The OWRI database reflects 109.3 total miles of riparian area planted in the John Day Basin between 2010 and 2023 including 48.33 miles of hardwood, 7.03 miles of conifer and hardwood, and 53.9 miles of riparian shrubs planted. The database also reflects 375.9 miles of other riparian improvements including the addition of Beaver Dam Analog (BDA) structures, riparian fencing, and treatments for non-native or noxious plant species.

DEQ also utilized effective shade gap modelling to assess current conditions within the project area. Where DEQ completed modeling for this TMDL, effective shade targets were calculated at 1000-meter node intervals (John Day River model area), 100-meter node intervals (North Fork John Day River model area), and 200-meter node intervals (Middle Fork John Day River model area) for each waterbody. A mean effective shade was then calculated for DMAs where this modeling occurred, and a shade gap assessment was completed. The shade gap results for the modeled areas include shade conditions that may have been impacted by streamside planting projects that were completed following the approval of the 2010 John Day TMDL.

3.3 Timeline for implementation of management strategies

Based on analyses (TSD REFERENCE), DEQ estimated timelines to attain excess pollutant load reductions. These are presented in Section 4.2 as the schedule for achieving appropriate incremental and measurable water quality targets. DEQ also estimated reasonable timelines for implementation of several priority management strategies specific to DMAs and RPs, shown in tables in subsections of Section 5.1. DEQ expects these entities to consider the timelines presented in Section 5.1 when establishing commitments for management strategies and actions in TMDL implementation plans.

As discussed in Section 6, DEQ evaluates completion of implementation schedules and measurable milestones during review of annual reports. DEQ periodically evaluates progress toward TMDL goals, typically in five-year increments, by evaluating all available monitoring data and other relevant information.

4 Attaining water quality standards

This chapter fulfills the elements in OAR 340-042-0040(4)(I)(E) and (F), which require a description of how implementing management strategies will result in attainment of water quality standards and the timelines for achieving those standards.

4.1 How management strategies support attainment of water quality standards

OAR 340-042-0040(4)(I)(E) requires an explanation of how implementing the management strategies will result in attainment of water quality standards.

Management strategies proposed in Section 2 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. The TMDL [REFERENCE] provides site-specific effective shade targets. Where site-specific targets are unavailable, the TMDL provides effective shade curves that describe the expected shade for a given stream width, orientation, and vegetation type.

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

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

Modeled shade gap data (TMDL [Figure X]) reflect conditions from 1999 – 2002. They may not reflect more recent vegetation changes from wildfire, restoration, land use change, or policy shifts. Monitoring of streamside conditions and shade assessments is necessary to identify protection and restoration priorities, evaluate progress towards surrogate measure targets, and refine management strategies. These evaluations provide the technical foundation for implementation planning, including streamside evaluations and shade gap analysis (see [TMDL Section XX]). They also support adaptive updates to implementation plans, basin-wide tracking, and compliance evaluations through annual reports and five-year reviews.

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

4.2 Timelines for attaining temperature water quality standards

OAR 340-042-0040(4)(l)(F) requires an estimated timeline for attaining water quality standards through implementation of the TMDL, WQMP and associated TMDL implementation plans.

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 across land uses and jurisdictions.

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

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

monitoring data. For nonpoint sources, meeting load allocations expressed through surrogate measure targets demonstrates compliance.

5 Implementation responsibilities and schedule

5.1 Identification of implementation responsibility

OARs 340-042-0040(4)(I)(G) and 340-042-0080(1) require identification of persons, including Designated Management Agencies, responsible for implementing management strategies and preparing and revising implementation plans.

OAR 340-042-0030(2) defines Designated Management Agency as a federal, state or local governmental agency that has legal authority over a sector or source contributing pollutants and is identified as such by DEQ in a TMDL.

The TMDL rule provides numerous mentions of the term 'responsible person' with associated requirements. OAR 340-042-0025(2) indicates that responsible sources must meet TMDL load allocations through strategies developed in implementation plans. OAR 340-042-0030(9) defines 'reasonable assurance' as a demonstration of TMDL implementation by governments or individuals. OARs 340-042-0040(4)(I)(G) requires identification of persons, including DMAs, responsible for developing and revising implementation plans. OAR 340-042-0040(4)(I)(I) requires a schedule for submittal and revision of implementation plans by responsible persons including DMAs. OAR 340-042-0080(4) reiterates the requirement for persons, including DMAs, responsible for development, submittal and revision of implementation plans, along with the required elements of those plans. For purposes of this John Day Basin WQMP, for implementation of the temperature TMDLs, 'responsible person' is defined as any entity responsible for any source of pollution addressed by the TMDL.

Responsible persons including DMAs are organized by DMA type in the following subsections. These persons are responsible for developing or revising implementation plans and implementing management strategies to achieve the TMDL allocations. A complete list of responsible persons including DMAs for the John Day Temperature TMDL is in Appendix A. There are 42 responsible persons including DMAs such as cities, counties, federal and state agencies, and other entities.

Appendix A is not an exhaustive list of every individual that bears responsibility for improving water quality in the John Day Basin. It may be necessary for all people that live, work, and recreate in the basin to take steps to reduce pollution and protect or restore water quality to attain standards and protect the designated beneficial uses.

As shown in Figure 2 and Figure 3, four DMAs manage or own the bulk of the land area referenced in the John Day Basin Temperature TMDL. Figure 2 illustrates the estimated land area owned or managed by these entities, and Figure 3 shows the percentage of estimated acres that are within 150 feet of typical streams, 300 feet from the North Fork confluence with the John Day River to Rock Creek and 850 feet from Rock Creek to the confluence with the Columbia River.

Jurisdictional authority within the Basin will vary based on land usage, specifically for ODF and ODA. Appendix A contains estimated jurisdictional acres associated with many DMAs, however, that information was not available for all responsible persons including DMAs. Appendix B and

Appendix C contain further information divided by subbasin and show jurisdictional area of each DMA by subbasin with streamside land ownership or jurisdiction.

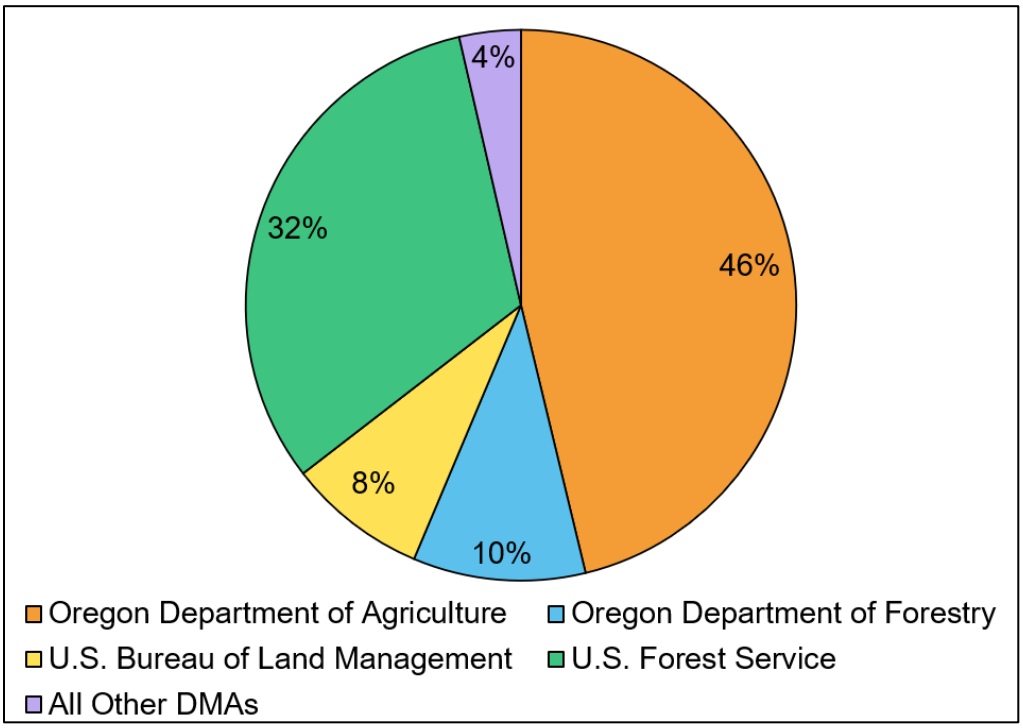

Figure 2: Percent estimated acres owned or managed by responsible persons including DMAs in John Day Basin TMDL

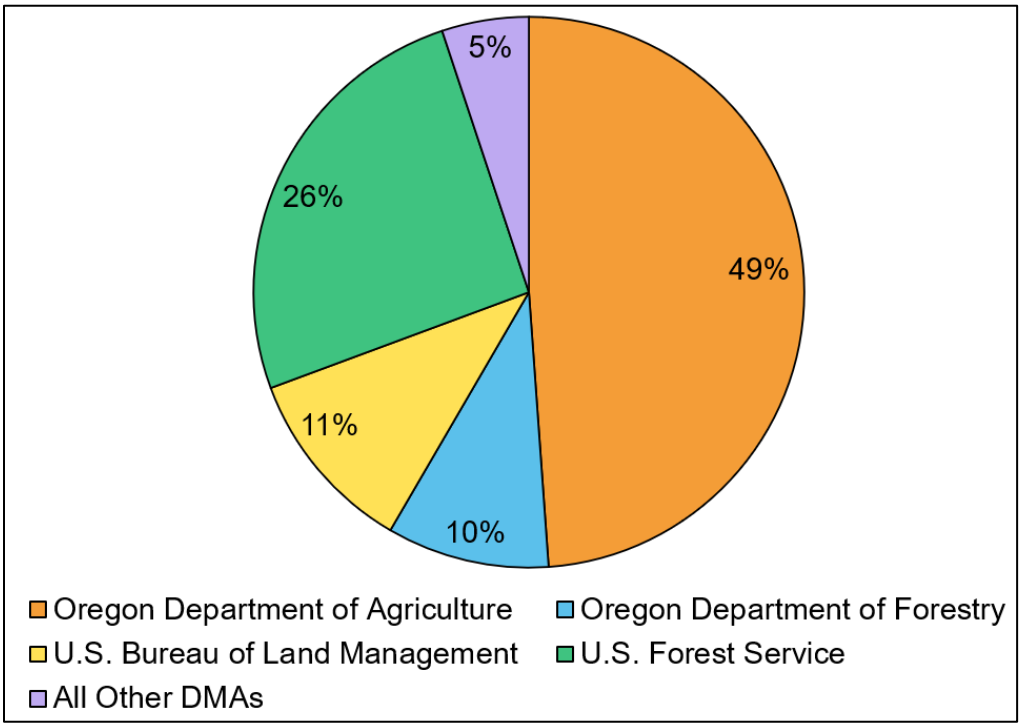

Figure 3: Percent estimated streamside acres owned or managed by responsible persons including DMAs

5.1.1 Responsible persons including DMAs required to develop a TMDL implementation plan

DEQ considered several factors to determine which responsible persons including DMAs must prepare TMDL implementation plans. Considerations included streamside jurisdictional area, existing implementation plans, population density (cities and counties), and capacity for implementing restoration activities. Based on these factors, DEQ identified seventeen responsible persons including DMAs with implementation responsibilities (Table 3).

Table 3: List of Responsible Persons including Designated Management Agencies with TMDL implementation plan responsibilities

Responsible Persons including Designated Management Agencies	Area of jurisdiction
Oregon Department of Agriculture	Agricultural or farm-related activities, both commercial and noncommercial including livestock stable and pastures, both inside and outside of municipal boundaries
Oregon Department of Forestry	Commercial activities involving the establishment, management, or harvesting of trees in Oregon's nonfederal forestlands, state forest lands
Oregon Department of State Lands	DSL managed lands and facilities
Oregon Department of Transportation	State highways, rights-of-way, and facilities

Responsible Persons including Designated Management Agencies	Area of jurisdiction
Oregon Parks and Recreation Department	OPRD managed lands and facilities
Oregon Department of Fish and Wildlife	ODFW managed lands and facilities
U.S. Bureau of Land Management	BLM and O&C managed lands, roads, and facilities
U.S. Forest Service	USFS managed lands, roads, and facilities
U.S. National Park Service	NPS Managed Lands, John Day Fossil Beds National Monument
Counties - Gilliam, Grant, Jefferson, Sherman, Wasco, Wheeler	Urban, rural, and non-resource land use, including zoning, permitting and riparian protection; operation and maintenance of governmental facilities including transportation corridors
Municipalities – City of John Day, Prairie City	City land use, including zoning, permitting and riparian protection; operation and maintenance of governmental facilities including transportation corridors.

Some responsible persons including DMAs will not be required to submit implementation plans at this time for the following reasons:

1) Does not have ownership or jurisdiction over land management activities within the streamside area, so they are unable to implement actions identified in Table 2 in this WQMP.
2) Other implementation pathway:
    a. Area is managed by other authorities already required to develop a plan.
    b. Water protection actions are implemented through permits (e.g., DOGAMI).
3) Has limited ability or opportunity to conduct stream restoration activities (e.g., railroads).

    Has limited resources and/or expertise to conduct stream restoration activities (e.g. small cities).

DEQ may require implementation plans from these entities in the future if ownership or jurisdiction of streamside areas increases, or other data or information indicates a TMDL implementation plan is needed to achieve temperature allocations and shade targets identified in this TMDL. DEQ may revise the WQMP or issue individual orders to notify them of the required schedule for submitting an implementation plan.

5.2 Existing implementation plans

OAR 340-042-0040(4)(I)(H) requires identification of any source or sector-specific implementation plans available at the time of TMDL issuance. Following the issuance of the 2010 John Day Basin TMDL and WQMP, DEQ required responsible persons including DMAs to develop implementation plans that included specific management strategies and best management practices to meet load allocations for temperature. Reporting requirements for many of these entities included an annual progress report and a comprehensive assessment of activities every five years. For information on each DMA, including which DMAs are existing

DMAs, see Appendix A. DEQ notes that not all existing DMAs have DEQ-approved TMDL implementation plans. Existing DMAs will need to update the temperature portion of their current implementation plans to ensure any new requirements in this WQMP are met.

In addition, certain statewide rules, programs and management plans for forestry and agriculture are intended, in part, to reduce or control nonpoint sources of pollution. The programs described in OAR 340-042-0080(2) and (3), respectively, represent existing implementation plans for non-federal forest and agricultural lands, and their sufficiency is discussed below.

5.1.2 Oregon Department of Forestry: adequacy of Forest Practices Act to meet TMDL load allocations

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 (OAR 629-600 through 629-665) and Oregon's Plan for Salmon and Watersheds (Executive Order 99-01). As provided in ORS 527.770, forest operations conducted in accordance with the Forest Practices Act and other voluntary measures are generally considered to be in compliance with water quality standards. However, as provided in OAR 340-042-0080(2), revisions to the Forest Practices Act rules may be required when DEQ determines that these rules are not adequate to implement 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 in October 2022 and additional amendments were adopted in 2025. Implementation of these rules, including increased riparian widths and additional tree retention, may be effective at meeting shade allocations. The streamside vegetation retention and riparian management area distances in the current Forest Practices Act are summarized in Table 4 below. There are multiple other requirements or exceptions found in the forest practice rules not included in the table.

Table 4: Summary streamside vegetation retention riparian management area distances in Forest Practices Act rules OAR 629-643.

Stream Type	Practice Type	Inner (ft)	Outer (ft)	Notes
Large Type SSBT/F	Standard Practice	30	70	-
Large Type SSBT/F	Small Forestland	30	70	-
Medium Type SSBT/F	Standard Practice	30	70	-
Medium Type SSBT/F	Small Forestland	30	50	-
Small Type SSBT/F	Standard Practice	30	45	-
Small Type SSBT/F	Small Forestland	30	30	-
Large Type N	Standard Practice	30	45	-
Large Type N	Small Forestland	30	45	-

Stream Type	Practice Type	Inner (ft)	Outer (ft)	Notes
Medium Type N	Standard Practice	30	45	-
Medium Type N	Small Forestland	30	30	-
Small Type Np terminal flows into Type F/SSBT	Standard Practice	30	45	Upstream retention distance = shorter of RH Max or uppermost Flow Feature; RMA width = 30' inner + 30' outer for 500 ft
Small Type Np terminal into Type F/SSBT	Small Forestland	30	30	Upstream retention distance = shorter of RH Max or uppermost Flow Feature; RMA width = 20' inner + 20' outer for 500 ft
Small Type Np lateral into Type F/SSBT	Standard Practice	30	0	Upstream retention distance = shorter of RH Max or uppermost Flow Feature; RMA width = 30' inner only for 250 ft
Small Type Np lateral into Type F/SSBT	Small Forestland	20	0	Upstream retention distance = shorter of RH Max or uppermost Flow Feature; RMA width = 20' inner only for 250 ft
Small Type Ns into Type F/SSBT	Standard Practice	-	-	30' R-ELZ extending 750 ft upstream from confluence; ELZ applies on remainder of channel
Small Type Ns	Standard Practice	-	-	30' Equipment Limitation Zone (ELZ) from edge of inner zone

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

[2] "Small Forestland" means forestland that has an owner that owns or holds common ownership interest in less than 5,000 acres of forestland.

[3] "Inner" zone is the area immediately near the stream channel extending 30 feet out

[4]"Outer" zone is the area extending from the outside edge of the inner zone that extends to variable widths based on the stream's size and classification.

[5]"RH Max" means the maximum distance described for any particular small Type Np stream. Total RMA width is equal to the sum of the inner and outer zone widths.

DEQ finds the vegetation retention buffers of 100 (e.g. large SSBT, large F, 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 [see TSD Appendix XX]. However, based on the findings in [TSD Appendix], it is probable that in some cases these buffers will not provide shade equivalent to 120-foot no-harvest buffer. Smaller no-harvest buffers are progressively less likely to meet shade targets and more likely to result in temperature increases beyond the assigned TMDL human use allowance of (0.0°C) and equivalent load allocation for all fish-bearing and perennial non-fish-bearing streams. This is more pronounced for the Small Forestland Option. Adoption of forest conservation tax credits on

small forestlands to align protections with standard practice will increase the effectiveness. Overall, required riparian protections under the Forest Practices Act are unlikely to consistently meet shade targets and load allocations. For these reasons, ODF is required to develop a TMDL implementation plan to be submitted to DEQ for review and approval. See Table 8 for the schedule.

As agreed, in the 2021 Memorandum of Understanding between DEQ and ODF, 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.

5.1.3 Oregon Department of Agriculture: adequacy of agricultural water quality management programs in attaining TMDL load allocations and effective shade surrogate measures

The Oregon Legislature passed the Agricultural Water Quality Management 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 90 and 95). Subsequently, ODA worked with Local Advisory Committees and Soil and Water Conservation Districts to develop Agricultural Water Quality Area Rules and Area Plans for 38 watershed-based management areas across the state.

The John Day Basin TMDL includes four ODA Agricultural Water Quality Management Areas that each have 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 Plans for the four management areas included in this TMDL were reviewed by DEQ within the last two years, however not all reviews resulted in Area Plan revisions.

John Day Basin streams continue to be identified as impaired on Oregon's Section 303(d) list for temperature in part due to the lack of adequate streamside vegetation in agriculturally influenced streamside areas. DEQ's assessments of Area Plans identified protecting, maintaining and establishing streamside vegetation as a high priority to achieve TMDL load allocations. However, ODA's Area Plans in the John Day lack specific measurable goals related to improving streamside conditions that will achieve TMDL shade measures. Progress towards TMDL shade measures in the management areas has primarily been limited to Focus Areas and Strategic Implementation Areas which are further limited by landowner participation.

The agricultural Area Rules and Area Plans that regulate and guide streamside management in the John Day Basin TMDL project area do not identify quantitative targets for effective shade based on site specific factors, including stream width or orientation. DEQ also notes the disparity between ODA's implementation of their Area Rules for "site capable vegetation" in streamside areas and the streamside conditions needed to meet effective shade targets in this TMDL. ODA has not demonstrated that voluntary landowner implementation of Area Plans will bridge the gap between current conditions and what is needed to meet TMDL allocations.

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. DEQ has concluded that in the John Day Basin current ODA WQ program Area Rules combined with implementation of Area Plans' voluntary measures are not adequate in all locations to meet the streamside vegetation requirements

necessary to achieve TMDL effective shade targets, load allocations, and temperature water quality standards. Therefore, ODA is required to develop a separate TMDL implementation plan to be submitted to DEQ for review and approval. See Table 8 for schedule.

5.1.4 U.S. Bureau of Land Management: adequacy of streamside management strategies in attaining TMDL load allocations and effective shade surrogate measures

Streamside vegetation on BLM managed lands in the John Day Basin are currently managed based on BLM's John Day Basin Record of Decision and Resource Management Plan (BLM, 2015). BLM submitted an implementation plan to DEQ in December 2024 for the John Day Basin TMDL and WQMP (DEQ, 2010). This plan was informed by the John Day Basin Record of Decision and Resource Management Plan (BLM, 2015) as well as the Eastside Aquatic and Riparian Restoration Programmatic Environmental Assessment (BLM, 2024).

BLM defines Riparian Management Areas using slope distance from the flood-prone areas on each side of a stream. Slope distance is specific to different types of waterbodies as summarized in Table 5.

Timber harvest is permitted in Riparian Management Areas using protective logging techniques such as cable systems or aerial systems. Except at minimal crossings, construction of new facilities such as roads, trails, pipelines, and utility corridors are prohibited in Riparian Management Areas (BLM, 2015). Juniper and conifers are thinned when expanding into riparian areas where they would not naturally occur. This is intended to restore plant species composition and structure that occurs under natural fire regimes (BLM, 2024).

Table 5: Summary of BLM Riparian Management Area width for different waterbody features.

Feature	Riparian Management Area minimum widths measured as slope distance
Perennial and intermittent stream channels	300 feet on both sides of the flood-prone area
Lentic areas (still or slow moving water)	300 feet from the edge of wetland vegetation
Ephemeral draws* where average annual precipitation is less than 14 inches	25 feet on both sides
Ephemeral draws where average annual precipitation is greater than 14 inches	50 feet on both sides

* Ephemeral draws (streams that flow only in direct response to precipitation) are unlikely to flow during times that contribute to thermal loading.

The BLM Implementation Plan approved by DEQ in 2024 discusses continuing issues with livestock trespass in riparian areas resulting in degraded streambanks and decreased shade. The Plan also highlights a need for restoration on the majority of BLM managed streams in the basin emphasizing the need to increase channel complexity and shade. BLM also notes there is a need for additional temperature monitoring data in the basin. DEQ finds the strategies identified in the John Day RMP, the BLM Implementation Plan, and the Eastside Aquatic and Riparian Restoration Programmatic Environmental Assessment are adequate and will likely lead to achievement of the TMDL load allocation and effective shade targets. Given the continuing

issues identified above and the limited improvements made since the publication of the John Day RMP, there is a clear need for a more targeted approach informed by additional temperature monitoring, streamside evaluation, and shade gap analysis. The shade gap analysis is required on BLM land for the purpose of targeting restoration and livestock exclusion efforts.

For these reasons, BLM is required to revise their TMDL implementation plan incorporating the additional requirements outlined in this WQMP according to the agreed upon update schedule in the 2024 BLM Implementation Plan. See Table 8 for schedule.

5.1.5 U.S. Forest Service: adequacy of streamside management strategies in attaining TMDL load allocations and effective shade surrogate measures

Streamside vegetation on USFS lands in the John Day Basin is currently managed based on direction from Land Resource Management Plans for the Malheur (USDA 1990a), Umatilla (USDA, 1990b), Wallowa-Whitman (USDA, 1990c), and Ochoco (USDA, 1989) National Forests. Direction on management of riparian areas is further guided by the Interim Strategies for Managing Anadromous Fish-Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and portions of California, (PACFISH, USFS and BLM, 1995). The strategy provided standards and guidelines for land management activities and directed the Forests to designate and protect riparian habitat conservation areas (RHCAs).
USFS defines many of the RHCA distances using site-potential tree height. USFS states a site-potential tree height is the average maximum height of the tallest dominant trees for a given site class and is consistent with the BLM definition. The following text is a description of the RHCA distance for different types of waterbodies. The text was extracted from PACFISH (USDA and USDI 1995) Appendix C, pages C-8 – C9. These strategies are also proposed in the Preliminary Draft Proposed Malheur, Umatilla, and Wallowa-Whitman National Forest Land Management Plans but are designated as Riparian Management Areas (RMAs) instead of RHCAs (USFS, 2025).

> ***Category 1 - Fish-bearing streams****: Interim RHCAs consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest.*
>
> ***Category 2 - Permanently flowing non-fish-bearing streams****: Interim RHCAs consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the stream channel), whichever is greatest.*
>
> ***Category 3 – Ponds, lakes, reservoirs, and wetlands greater than 1 acre****: Interim RHCAs consist of the body of water or wetland and the area to the outer edges of the*
>
> *riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential*
>
> *tree, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs or from the edge of the wetland, pond or lake, whichever is greatest.*

Category 4 -Seasonally flowing or intermittent streams, wetlands less than 1 acre, landslides, and landslide-prone areas*: This category applies to features with high variability in size and site-specific characteristics. At a minimum, the interim RHCAs must include:*

a. *the extent of landslides and landslide-prone areas.*

b. *the intermittent stream channel and the area to the top of the inner gorge.*

c. *the intermittent stream channel or wetland and the area to the outer edges of the of the riparian vegetation.*

d. *for Key Watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest.*

e. *for watersheds not identified as Key Watersheds, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest.*

DEQ finds that USFS's streamside vegetation management strategies on fish-bearing streams, perennial streams, non-fish bearing streams, constructed ponds and reservoirs, lakes and natural ponds, and wetlands greater than 1-acre are adequate and will likely lead to achievement of the TMDL load allocation and effective shade targets. Vegetation management strategies on intermittent streams, and wetlands less than 1-acre may not be adequate to achieve the load allocation or effective shade targets (see summary in [TSD Appendix XX]). Streamside management on intermittent streams is a concern because they may contain residual pools that support aquatic life; or be flowing during periods when thermal loading is relevant and therefore the TMDL allocations apply. The classification and mapping of intermittent streams often do not account for these situations [TSD Appendix XX].

For these reasons, USFS is required to develop a TMDL implementation plan to be submitted to DEQ for review and approval. See Table 8 for schedule.

5.2 Implementation plan requirements

Appendix A lists the responsible persons including DMAs that are required to submit an implementation plan. As required in OAR 340-042-0080(4)(a), implementation plans must include:

- Management strategies that the entity will use to achieve load allocations and reduce pollutant loading;
- Timeline for strategy implementation and a schedule for completing measurable milestones;
- Performance monitoring and a plan for periodic review and revision of implementation plans;
- To the extent required by ORS 197.180 and OAR chapter 340, division 18, provide evidence of compliance with applicable statewide land use requirements; and,
- Any other analyses or information specified in this WQMP.

The following subsections provide detail on each component required by this WQMP that must be included in implementation plans. DEQ recognizes that the scale and scope of implementation will vary depending on each responsible person's jurisdictional contribution to heat sources and their capacity to implement effective strategies.

TMDL implementation plans and annual reports must be posted to each DMA's website for public transparency. If a DMA does not have a website, these documents must be made available to the public in another manner.

5.2.1 Management strategies

Responsible persons including DMAs in Appendix A that are required to develop a TMDL implementation plan must include applicable priority management strategies from Table 2. Other practices and actions appropriate for activities and landscape conditions specific to their pollutant sources or source sectors should also be included. Implementation plans must identify all streamside areas or streamside activities within a responsible person's including DMA's jurisdiction or responsibility.

5.2.2 Streamside evaluation

Responsible persons including DMAs that are required to submit an implementation plan must complete a streamside evaluation. The streamside evaluation will use a review of current conditions to support implementation measurable objectives and milestones. The streamside evaluation must be included in the TMDL implementation plan.

Entities that have a DEQ shade gap analysis, and entities that must complete a shade gap analysis (see Section 5.3.4), must include the shade gap analysis results in their streamside evaluation. The streamside evaluation may also include the following data and information:

- **a.** Quantify the streamside area in acres that needs enhancement (e.g., areas that do not currently meet shade targets, are comprised of non-native vegetation, need additional planting)
- **b.** Quantify the streamside area in acres that may not need action beyond protection.
- **c.** Quantify the streamside area in acres where physical constraints exist (e.g., buildings) that preclude implementation of vegetation management strategies that provide stream shade.
- **d.** Quantify the streamside area in acres where jurisdictional constraints (e.g., private ownership) limit implementation of vegetation management strategies that provide stream shade.
- **e.** Opportunities that may exist to address constraints to implementing vegetation management strategies that provide stream shade.
- **f.** Any areas within your jurisdiction where there is the potential to implement best management practices such as in-stream restoration, flow augmentation projects, experimental temperature management techniques, as well as enhancing and protecting cold water refuges where identified.
- **g.** An evaluation of the data from **a - f** to prioritize implementation. This evaluation must include a description of the rationale utilized to prioritize implementation in addition to a description of the data and analysis methods used to estimate quantities **a - d** and the reasoning specific areas will or will not be prioritized for implementation actions. It is

expected that DMAs prioritize areas with the greatest shade gaps for implementation of riparian restoration, unless physical, jurisdictional, or other identified constraints exist.

i. Entities that have a DEQ shade gap analysis, and entities that must complete a shade gap analysis (i.e. ODA, ODF, USFS and BLM), must include the shade gap analysis results in their streamside evaluation.

ii. DEQ expects entities that do not have a DEQ shade gap analysis to use other available data to estimate the quantities outlined in items **a - d** and address these data in their streamside evaluation.

DEQ recognizes that responsible persons including DMAs may not have adequate resources or expertise to perform all the actions listed in a – g. DEQ encourages responsible persons including DMAs reach out to and partner with local watershed groups and Soil and Water Conservation districts in the area to help evaluate areas within the DMAs jurisdiction and target locations for implementation activities. Additionally, DEQ will provide technical assistance to DMAs and may modify expectations to suit their abilities and capacity. DEQ recognizes that organizations working in the John Day Basin are under no obligation to collaborate with responsible parties or DMAs to meet implementation requirements. However, DEQ encourages DMAs to support these organizations—whether in existing projects or new initiatives—through direct funding or by partnering to seek external funding opportunities. Groups identified in Table 6 have played an important role in improving water quality in the John Day Basin.

Table 6. Groups with expertise in the John Day Basin that DEQ encourages collaboration with to meet TMDL load allocations

Subbasin (HUC)	Groups working in the subbasin
Upper John Day (17070201)	Grant SWCD, South Fork John Day Watershed Council
North Fork John Day (17070202)	North Fork John Day Watershed Council, Monument SWCD, Morrow SWCD, Umatilla SWCD
Middle Fork John Day (17070203)	North Fork John Day Watershed Council, Monument SWCD, Middle Fork Intensively Monitored Watershed
Lower John Day (17070204)	Mid John Day Watershed Council, Wheeler SWCD, Gilliam SWCD, Sherman County SWCD, Gilliam East John Day Watershed Council
Basin Wide	John Day Basin Partnership

DEQ acknowledges that factors such as climate change and local geology, geography, soils, climate, legacy impacts, wildfires and floods may hinder achieving the target effective shade. No enforcement action will be taken by DEQ for reductions in effective shade caused by natural disturbances. Where natural disturbances have occurred, DEQ expects responsible persons including DMAs to assess and prioritize these areas for streamside restoration following an event.

The streamside evaluation must be completed according to the timeline assigned in Table 7. The streamside evaluation will be utilized during the year five review (see Section 5.3.8.2) to help assess progress in meeting implementation timelines, milestones, and measurable goals in subsequent five-year implementation cycles.

5.2.3 120-foot slope streamside buffer as an alternative to a streamside shade gap analysis

The responsible persons including DMAs that are required to complete a shade gap analysis and those that choose not to use DEQ's shade gap analysis (where available) for their streamside evaluation (Section 5.2.2) may instead choose to establish and protect overstory, woody vegetation within a 120-foot slope buffer, as measured up-slope along the ground's contour from top of bank ([TSD Appendix XX]). The streamside buffer must be established through development of enforceable ordinances or regulations. The literature review presented in [TSD Appendix XX] indicates that potential stream shade loss associated with a 120-foot buffer will not cause stream temperature increases for most waterbodies. For this option, responsible persons including DMAs must ensure that any activity occurring within this 120-foot slope buffer would result in limited stream shade reduction and ensure that stream shade targets are still achieved at that location following management actions. Entities that choose this option must also complete a streamside evaluation but do not have to complete a shade gap analysis.

5.2.4 Streamside shade gap analysis

DEQ conducted a vegetation height and shade gap analysis within approximately 100 meters of modeled waterbodies in the John Day Basin (partial analysis completed) as detailed in [Tables X and X] in the TMDL Rule. DEQ did not complete a shade gap analysis for all responsible persons including DMAs.

The shade gap analysis calculates the difference between current effective shade (i.e., assessed) versus the target effective shade. Where DEQ calculated a shade gap, DEQ averaged the percent shade gap across all waterbodies within a DMA's jurisdiction. DEQ will provide the site-specific shade gap results upon request.

5.2.4.1 Streamside shade gap analysis methods for responsible persons including DMAs

If DEQ did not provide a shade gap analysis for a jurisdiction then that DMA is not required to complete a shade gap analysis unless they are named in Section 5.2.4.2. If DEQ has provided a shade gap analysis for a jurisdiction, then DMAs are encouraged use DEQ's analysis to inform their streamside evaluation (Sec. 5.2.2), or other methods, for example on the ground measurements and remote sensing, to assess the current effective shade within their jurisdiction and whether effective shade allocations along John Day Basin assessment units are met. These methods are described below.

1. Measure current effective shade at the stream surface using monitoring equipment, such as the Solar Pathfinder™, or using a hemispherical camera system and imagery analysis software.
    a. Determine general vegetation category, canopy density, stream width and stream orientation.
    b. Compare current effective shade results to either target effective shade from DEQ's shade gap analysis, or to the target percent effective shade values derived from the shade curves in the TMDL to assess the percent effective shade gap.
    c. Entities choosing to use this methodology must submit their assessment strategy to DEQ for approval. Assessments should conform to guidelines outlined in OWEB's Addendum to Water Quality Monitoring Technical Guide Book, Ch. 14: (OWEB, 1999).
2. Conduct modeling using the Heat Source model (as used in the TMDL).

3. Another method approved by DEQ through the TMDL implementation plan approval process.

A project plan which includes a description of the assessment methodology must be submitted to DEQ for review and approval according to the timeline assigned in Table 7. Please see the Method documentation for Solar Pathfinder™ for more information.

5.2.4.2 Shade gap analysis requirements for ODF, ODA, BLM and USFS

Together, the ODF, ODA, BLM, and USFS either manage or regulate approximately 95 percent of the land area within 150 feet of streams within the John Day project area (Figure 3). Increasing shade on streams within the extensive areas within their jurisdictions is important to achieving the surrogate shade measures of this TMDL. Therefore, ODF, ODA, BLM, and USFS must complete a streamside evaluation (Section 5.2.2) as well as a shade assessment for streamside areas within their jurisdiction. The assessment must use methods outlined in Section 5.2.4.1 for determining whether effective shade allocations along the John Day Basin assessment units are met. A shade assessment is not needed for those streamside areas where DEQ has completed a shade gap analysis, or for streamside areas where DEQ has determined the streamside buffers are sufficient (Section 5.1). The shade gap analysis requirement includes intermittent streams as defined in the TMDL. For more information on intermittent streams and which are included in temperature TMDLs see [TSD Section XX]. A project plan, which includes a description of the shade gap assessment methodology including any methodology that proposes target effective shade values different from shade curves developed by DEQ, must be submitted to DEQ for review and approval according to the timeline assigned in Table 7.

5.2.5 Target effective shade values and shade curves

Shade curves, which are charts that represent the mean effective shade target for different mapping units, stream aspects, and active channel widths ([TMDL Section XX]), were developed ([Figures X – X] in the TMDL Rule) to allow users to find target percent effective shade values for streams based on several stream characteristics. Unlike the site-specific shade targets and shade gap analysis ([TMDL Section X]), shade curves do not calculate current effective shade. Any responsible person including DMAs can use DEQ shade curves, site-specific shade targets or other DEQ- approved method to assess and recommend an effective shade target for their jurisdiction.

TMDL implementation plans must include the mean effective shade targets calculated by DEQ, if available, ([Table X through Table X] in the TMDL Rule document), or any updated effective shade target assessment approved or performed by DEQ in the future.

5.2.6 Timeline and schedule

Each implementation plan must include a commitment to enact specific management strategies on a reasonable timeline, including a schedule for meeting measurable milestones to demonstrate progress. To meet the intent of this requirement and be useful for the requirement to track and report progress, entities should develop management strategies using the SMART elements: Specific, Measurable, Achievable, Relevant, Time-bound (Doran, 1981).

Timelines and milestone schedules should be informed by the Streamside Evaluation, as described in Section 5.3.2 above, and each entity should consider all factors relevant to their situation. The due dates and timelines for specific information and analyses discussed in Sections 5.2.2 and 5.2.4 are shown in Table 7 below. DMA timelines in TMDL implementation plans that differ from timelines stated below must be approved by DEQ.

Table 7: Due dates for implementation plans, information, and analyses. See sections 5.2.1 through 5.2.6 for more details.

Requirement	Due Date / Timeframe
New TMDL implementation plan (Appendix A)	18 months after EQC adoption of John Day Basin TMDL
Updated TMDL implementation plan (Appendix A)	At the agreed upon revision date in TMDL implementation plan approval letter
Streamside Evaluation (Sec. 5.3.2)	Three years after EQC adoption of John Day Basin TMDL
Project plan and description of the assessment methodology to be used to complete a shade gap analysis (Sec. 5.3.4)	18 months after EQC adoption of John Day Basin TMDL
Streamside shade gap analysis (Sec. 5.3.4) and updated streamside evaluation OR 120 ft. streamside buffer that establishes and protects overstory, woody vegetation (sec. 5.3.3)	Four years after implementation plan submission deadline

5.2.7 Reporting of performance monitoring and plan review and revision

5.2.7.1 Reporting on performance monitoring

Each implementation plan must include a commitment to prepare annual reports on performance monitoring and specify a day of the year they will be submitted to DEQ. These reports must include implementation tracking for each of the identified management strategies, progress toward timelines and measurable milestones specified in the implementation plan, and evaluation of the effectiveness of each strategy.

DMAs should track and report implementation actions including the number, type and location of projects, best management practices, education activities, or other actions taken to improve or protect water quality. Most DMAs will track implementation actions they are directly responsible for completing, and some may need to track and report on actions that they implement through their support of other land managers, e.g., private landowners.

5.2.7.1.1 Oregon Watershed Restoration Inventory reporting requirement

Projects designed to control thermal pollution that use practices listed in OWEB's Oregon Watershed Restoration Inventory (OWRI) Online List of Treatments must be reported by responsible persons including DMAs to the OWRI database (OWEB 2025) upon project completion. DEQ utilizes OWRI's database to track implementation activities statewide and within watersheds for various reporting metrics. Responsible persons including DMAs must also report BMP implementation annually to DEQ to document progress and track actions over time.

Other publicly accessible databases may be used to document restoration activities when approved by DEQ.

5.2.7.1.2 Adaptive management

Implementation plans must include a commitment to use adaptive management to evaluate the effectiveness of implementation activities in improving streamside conditions including stream shade. Annual reports must summarize the status and results of these evaluations on the relevant time scale. At a minimum, reports in year five must summarize implementation and effectiveness over the preceding five years.

5.2.7.2 Implementation plan review and revision

Implementation plans must be reviewed by each responsible person including DMAs, revised to incorporate lessons learned, and approved by DEQ every five years. At a minimum, plans must be revised to reflect updated timelines for the continuation of implementation activities for the next five years. DEQ will use implementation and effectiveness evaluations from annual reports for this review. If implementation plan revisions are needed to correct deficiencies or otherwise ensure the plan is effective following the year five review, DEQ will identify a date for submission of the revised plan for DEQ approval.

5.2.8 Public involvement

As required in OAR 340-042-0040(4)(l)(L), implementation plans prepared by designated management agencies must include a plan to involve the public in implementation of management strategies. Public engagement and education must be included to meet this requirement.

5.2.9 Maintenance of strategies over time

As required in OAR 340-042-0040(4)(l)(M), implementation plans prepared by responsible persons including DMAs should include discussion of planned efforts to maintain management strategies over time.

5.2.10 Implementation costs and funding

As required in OAR 340-042-0040(4)(l)(N), this section provides a general discussion of costs and funding for implementing management strategies. Implementation of management strategies to reduce or prevent pollution into waters of the state may incur financial capital or operating costs. These costs vary in relation to pollutant sources and loading, proximity to waterways and type or extent of preventative controls already in place. Certain management practices, such as preventative infrastructure maintenance, may result in long-term cost savings to responsible persons including DMAs, or landowners.

OAR 340-042-0040(4)(l)(N) also indicates that sector-specific or source-specific implementation plans may provide more detailed analyses of costs and funding for specific management strategies in the plan. DEQ requires each DMA to provide a fiscal analysis of the resources needed to develop, execute and maintain the programs and projects described in implementation plans to the extent that these costs can be accounted for or estimated. DEQ recommends that all responsible persons including DMAs prepare the following level of economic analysis:

- Staff salaries, supplies, volunteer coordination and regulatory fees
- Installation, operation and maintenance of management measures
- Monitoring, data analysis and plan revisions

- Public education and outreach efforts
- Ordinance development (if needed to implement a management strategy)

This analysis should be in five-year increments to estimate costs, demonstrate sufficient funding is available to begin implementation and identify potential future funding sources to sustain management strategy implementation. DMAs may include actual costs spent on implementation activities as part of annual TMDL reporting. This information may help DEQ estimate actual costs associated with implementing current and future temperature TMDLs.

There are multiple sources of local, state, and federal funds available for implementation of pollutant management strategies and control practices. Table 8 provides a partial list of financial incentives, technical assistance programs, grant funding and low interest loans for public entities and with principal forgiveness available in Oregon that may be used to support implementation of assessment, pollution controls and watershed restoration actions or land condition improvements that improve water quality in the John Day Basin. Soil and water conservation districts and watershed councils are additional resources that may support responsible persons including DMAs in implementation of pollutant management strategies and control practices through the programs listed in Table 8.

Table 8. Partial list of funding programs available in the John Day Basin.

Program	General Description	Contact
Clean Water State Revolving Fund	Loan program for below-market rate loans for planning, design, and construction of various water pollution control activities.	DEQ
Conservation Reserve Enhancement Program (CREP)	Provides annual rent to landowners who enroll agricultural lands along streams. Also cost-shares conservation practices such as riparian tree planting, livestock watering facilities, and riparian fencing.	NRCS
Conservation Reserve Program (CRP)	Competitive CRP provides annual rent to landowners who enroll highly erodible lands. Continuous CRP provides annual rent to landowners who enroll agricultural lands along seasonal or perennial streams. Also cost-shares conservation practices such as riparian plantings.	NRCS
Conservation Stewardship Program (CSP)	Provides cost-share and incentive payments to landowners who have attained a certain level of stewardship and are willing to implement additional conservation practices.	NRCS
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
Emergency Watershed Protection Program (EWP)	Available through the USDA-Natural Resources Conservation Service. Provides federal funds for emergency protection measures to safeguard lives and property from floods and the products of	NRCS

Program	General Description	Contact
	erosion created by natural disasters that cause a sudden impairment to a watershed.	
Emergency Forest Restoration Program (EFRP)	Available through the USDA-Natural Resources Conservation Service. Helps owners of non-industrial private forests restore forest health damaged by natural disasters.	USDA
Oregon 319 Nonpoint Source Implementation Grants	Fund projects that reduce nonpoint source pollution, improve watershed functions and protect the quality of surface and groundwater, including restoration and education projects.	DEQ
Environmental Quality Incentives Program (EQIP)	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 (ACEP)	Provides financial and technical assistance to help conserve agricultural lands and wetlands and their related benefits.	NRCS
Farm and Ranchland Protection Program (FRPP)	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 (GRP)	Provides incentives to landowners to protect and restore pastureland, rangeland, and certain other grasslands.	NRCS
Landowner Incentive Program (LIP)	Provides funds to enhance existing incentive programs for fish and wildlife habitat improvements.	U.S. Fish and Wildlife Service
Oregon Watershed Enhancement Board (OWEB)	Provides grants for a variety of restoration, assessment, monitoring, and education projects, as well as watershed council staff support. 25 percent local match requirement on all grants.	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

Program	General Description	Contact
Public Law 566 Watershed Program	Program available to state agencies and other eligible organizations for planning and implementing watershed improvement and management projects. Projects should reduce erosion, siltation, and flooding; provide for agricultural water management; or improve fish and wildlife resources.	NRCS
Resource Conservation & Development (RC & D) Grants	Provides assistance to organizations within RC & D areas in accessing and managing grants.	Resource Conservation and Development
ODF Small Forestland Investment in Stream Habitat (SFISH) 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 (WRP)	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

5.3 Schedule for implementation plan submittal

OAR 340-042-0040(4)(l)(I) specifies that the WQMP contain a schedule for submittal of implementation plans. As stated in OAR 340-042-0080(4)(a), entities identified in the WQMP

with responsibility for developing implementation plans are required to prepare and submit an implementation plan for DEQ approval according to the schedule in the WQMP.

Within 18 months of EQC adoption of the John Day Basin TMDL persons, including DMAs, responsible for developing implementation plans must submit implementation plans to DEQ for review and approval (See Table 7).

OAR 340-012-0055(2)(e) identifies failure to timely submit or implement a TMDL implementation plan, as required by DEQ order or rule, as a Class II violation. OAR 340-012-0053(1) identifies failure to report by the reporting deadline, as required by DEQ order or rule, as a Class I violation.

Should a sector or sector-wide DMA fail to submit an approvable TMDL implementation plan or fail to timely implement the plan, DEQ may pursue enforcement under OAR 340-012-0055(2)(e). DEQ may revise the WQMP or issue individual orders to identify additional responsible persons including DMAs and notify them of the required schedule for submitting source-specific implementation plans.

Following the issuance of this TMDL and WQMP, DEQ may determine that nonpoint source implementation plans are not necessary for certain entities identified in the WQMP based on available information or new information provided by those entities. For these entities, DEQ will provide a written determination for why a plan is not required. This determination could be based on a variety of factors, such as inaccurate identification within the geographic scope of the TMDLs, or documentation that an entity is not a source of pollution or does not discharge pollutants to a waterbody within the geographic scope of a TMDL.

Once approved, DEQ expects implementation plans to be fully implemented according to the timelines and schedules for achieving measurable milestones specified within the plans. Implementation plans must be reviewed and revised as appropriate for DEQ approval every five years and submitted on the date specified in DEQ's approval letter for an implementation plan.

6 Monitoring and evaluation of progress

OAR 340-042-0040(4)(l)(K) requires that the WQMP include a plan to monitor and evaluate progress toward achieving the TMDL allocations and associated water quality standards for the impairments addressed in the TMDL. Additional objectives of monitoring efforts are to assess progress towards reducing excess pollutant loads and to better understand variability associated with environmental or anthropogenic factors. This section summarizes DEQ's approach, including the required elements of identification of monitoring responsibilities and the plan and schedule for reviewing monitoring information to make TMDL revisions, as appropriate.

There are two fundamental components to DEQ's approach to monitoring and evaluating TMDL progress:

1. Tracking the implementation and effectiveness of activities committed to by responsible persons including DMAs in DEQ-approved implementation plans, and

2. Periodically monitoring the physical, chemical and biological parameters necessary to assess water quality status and trends for the impairments that constitute the basis for this TMDL.

All responsible persons including DMAs are responsible for tracking the implementation and effectiveness of their actions and meeting milestones where established. The streamside evaluation (Section 5.2.2) will provide a baseline for DMA implementation plans against which DMA progress will be assessed. DEQ acknowledges that it will take decades for restored streamside areas to provide mature, overstory woody vegetation that shades streams, so DEQ will rely on tracking implementation compliance through DEQ approved implementation plans, annual reports, and comprehensive year five reviews (Sections 5.2.6 and 5.2.7) in the coming years.

DEQ effective shade targets are regulatory and can be used to assess implementation progress in the future. In areas where stream temperature criteria are not met, DEQ will assess the status of current conditions and effective shade targets as part of the adaptive management process. DEQ will also evaluate other restoration efforts that have been implemented to improve stream temperature, for example channel morphology and stream flow restoration, protection and enhancement of cold-water refuges, etc. In cases where DEQ determines implementation actions are not making sufficient progress, DEQ will rely on the adaptive management process and our enforcement authority to assess compliance with the load allocations.

Although DEQ encourages responsible persons including DMAs to conduct physical, chemical or biological monitoring to better evaluate how implementation actions may impact water quality conditions, DEQ is only requiring the DMAs listed under section 6.1 to conduct water column monitoring associated with this TMDL.

6.1 Persons responsible for water quality monitoring

Section 5.1 identifies responsible persons including DMAs that are responsible for developing TMDL implementation plans and implementing the management strategies described on the timelines committed to in approved plans. Section 5.3 details the content required in implementation plans and annual reports, as well as the schedules for their submittal.

DEQ is requiring ODA, ODF, BLM, and USFS to undertake temperature monitoring actions in areas within their jurisdiction or ownership to help determine the status of instream water quality and landscape conditions associated with water quality. Existing monitoring activities may be sufficient to achieve the goals of this monitoring requirement. These four agencies have jurisdiction over approximately 95 percent of streamside areas in the John Day Basin TMDL. For this reason, DEQ considers it appropriate for these large agencies to collaborate with DEQ and other basin partners to ensure data are collected in strategic locations to support TMDL implementation and adaptive management.

The objectives for monitoring and assessment will be described in DMA implementation plans and will include, but are not limited to:

1. Provide information necessary to determine locations for applying management strategies or to assess the effectiveness of those strategies.
2. Refine information on source-specific or sector-specific pollutant loading.
3. Provide information necessary to demonstrate progress towards meeting load allocations.

4. Provide information used to identify roles and participate in collaborative effort among responsible persons including DMAs to characterize water quality status and trends.
5. Provide information integral to an adaptive management approach to inform and adjust management strategies over time.

Some DMAs may also perform certain types of monitoring for administration of a regulatory or voluntary program, separately from activities conducted under elements of a TMDL implementation plan. These DMAs should provide information from those activities in their annual reporting to DEQ that is relevant to the above objectives.

Environmental media and water column monitoring activities conducted by ODA, ODF, BLM, USFS, or other DMAs to meet TMDL objectives, data collection and management must be performed in adherence to Quality Control procedures and Quality Assurance protocols established by DEQ, U.S. EPA or other appropriate organizations. This requirement will be met through developing or adapting Quality Assurance Project Plans or project-specific Sampling and Analysis Plans, and submitting to DEQ for review and approval based on a schedule determined by DEQ once development of the Monitoring Strategy has been initiated. ODA, ODF, BLM, USFS or other DMAs can also agree to participate in a collaborative monitoring plan under an umbrella QAPP. DEQ staff will coordinate QAPP development with ODA, ODF, BLM, and USFS upon request in advance of submission. Resources for developing quality assurance project plans and sampling and analysis plans are available on DEQ's water quality monitoring website (DEQ, 2023).

At a minimum, ODA, ODF, BLM, and USFS must acknowledge in their implementation plans their responsibility in collaborating with DEQ and other basin partners to determine where data gaps exist. DEQ encourages these agencies to begin evaluating their existing temperature monitoring networks, if any, and explore opportunities to establish future long-term monitoring sites. Data collected by DMAs to monitor TMDL implementation activity effectiveness must be in a format accessible to DEQ.

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

DEQ recognizes that it will take time before management practices identified in a WQMP are fully implemented and effective in reducing and controlling pollution. DEQ also recognizes that despite best efforts, natural events beyond the control of humans may interfere with or delay attainment of the TMDL. Such events include, but are not limited to, floods, fire, insect infestations and drought. In addition, DEQ recognizes that technology and practices for controlling nonpoint source pollution will continue to develop and improve over time. DEQ will use adaptive management to refine implementation as technology, and knowledge about these approaches progress.

Adaptive management is a process that acknowledges and incorporates improved technologies and practices over time to refine implementation. A conceptual representation of the TMDL adaptive management process is presented in Figure 5.

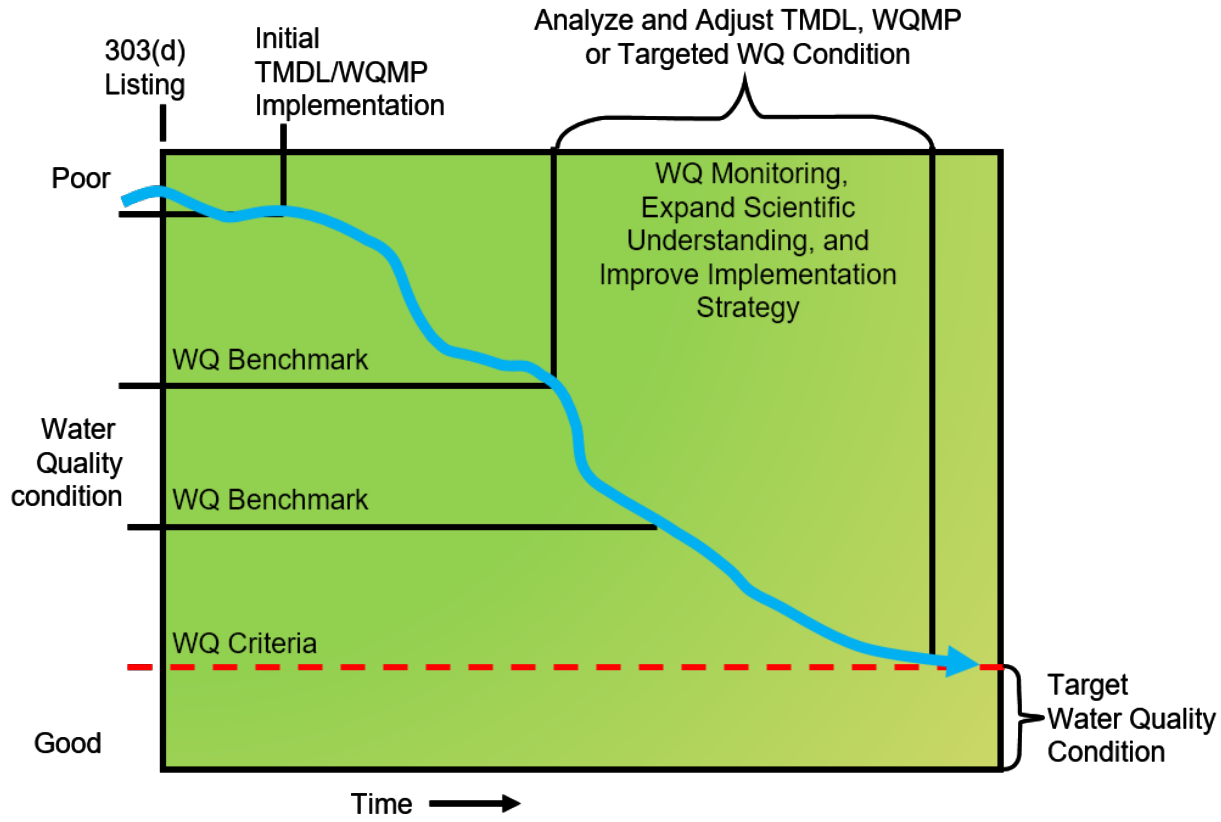

Figure 4: Conceptual representation of adaptive management.

DEQ considers entities complying with DEQ-approved TMDL implementation plans to be in compliance with their respective requirements contained in the TMDLs. The annual reports and Year Five Reviews submitted to DEQ by each of the responsible persons including DMAs in the John Day Basin will be evaluated individually and collectively. DEQ will use this information to determine whether management actions are supporting progress towards TMDL objectives, or if changes in management actions and/or TMDLs are needed.

DEQ will review annual reports, participate with responsible persons including DMAs in review of monitoring information, and participate in implementing the John Day Basin Monitoring Strategy.

Every five years, DEQ will collectively evaluate annual reports and all available monitoring data and information to assess progress on meeting the goals of the TMDLs and WQMP.

- DEQ will require responsible persons including DMAs to revise their implementation plans to address deficiencies where DEQ determines that implementation plans or effectiveness of management strategies are inadequate.
- DEQ and partners will revise sampling and analysis plans or other aspects of the Monitoring Strategy where progress toward meeting Monitoring Strategy objectives is not being made.
- DEQ will consider TMDL revisions if DEQ's evaluation of water monitoring data and supporting information indicate that the TMDL load allocations for a given pollutant-impairment are insufficient to meet state numeric criteria or narrative criteria, or insufficient to protect the designated beneficial uses.

- 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).

7 Reasonable assurance of implementation

OAR 340-042-0030(9) defines Reasonable Assurance as “a demonstration that a TMDL will be implemented by federal, state or local governments or individuals through regulatory or voluntary actions including management strategies or other controls.” OAR 340-042-0040(4)(l)(J) requires a description of reasonable assurance that management strategies and sector-specific or source-specific implementation plans will be carried out through regulatory or voluntary actions. As a factor in consideration of allocation distribution among sources, OAR 340-042-0040(6)(g) states that “to establish reasonable assurance that the TMDL’s load allocations will be achieved requires determination that practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) have a high likelihood of implementation.” This three-point test is consistent with EPA past practice on determining reasonable assurance in the Chesapeake Bay TMDL (EPA, 2010) and supports federal antidegradation rules and Oregon’s antidegradation policy (OAR 340-041-0004).

The Clean Water Act section 303(d) requires that a TMDL be “established at a level necessary to implement the applicable water quality standard.” Federal regulations define a TMDL as “the sum of the individual wasteload allocations for point sources and load allocations for nonpoint sources and natural background” [40 CFR 130.2(i)]. For TMDL approval, EPA guidance documents and memos on the TMDL process requires determinations that allocations are appropriate to implement water quality standards and reasonable assurance that nonpoint source controls will achieve load reductions, when WLAs are based on an assumption that nonpoint source load reductions will occur (EPA, 1991, 2002 and 2012).

Although TMDL implementation is anticipated to improve rather than lower water quality, federal antidegradation rules at 40 CFR 131.12(a)(2), require states to “assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and cost-effective and reasonable best management practices for nonpoint source control,” when allowing any lowering of water quality.

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

Where a TMDL is developed for waters impaired by both point and nonpoint sources, it is the state’s best professional judgment as to the three-point test in OAR 340-042-0040(6)(g) on reasonable assurance that the TMDL’s load allocations will be achieved.

Where there is a demonstration that nonpoint source load reductions can and will be achieved; a determination that reasonable assurance exists and allocation of greater loads to point

sources is appropriate. Without a demonstration of reasonable assurance that relied-upon nonpoint source reductions will occur, reductions to point sources wasteload allocations are needed.

The John Day Basin TMDL was developed to address both point and nonpoint sources with load reduction allocations proportional to estimated source contributions and in consideration of opportunities for effective measures to reduce those contributions. There are several elements that combine to provide the reasonable assurance to meet federal and state requirements, including for antidegradation. Education, outreach, technical and financial assistance, permit administration, permit enforcement, responsible persons' including DMAs' implementation and DEQ enforcement of TMDL implementation plans will all be used to ensure that the goals of this TMDL are met.

7.1 Accountability framework

Reasonable assurance that needed load reductions will be achieved for nonpoint sources and antidegradation requirements and narrative water quality criteria will be met is based primarily on an accountability framework incorporated into the WQMP, together with the implementation plans of persons responsible for implementation. This approach is similar to the accountability framework adopted by EPA for the Chesapeake Bay TMDL, which was adopted in 2010 (EPA, 2010). Figure 6 presents the accountability framework elements, which are intended to work in concert to demonstrate reasonable assurance of implementation.

Figure 5: Representation of the reasonable assurance accountability framework led by DEQ.

Pollutant reduction strategies are identified in Section 2 and more specific strategies, practices and actions will be detailed in each required implementation plan, to be submitted per the timelines in Section 5.2. These strategies and actions are comprehensively implemented through a variety of regulatory and non-regulatory programs. Many of these are existing strategies and actions that are already being implemented within the watershed and demonstrate reduced pollutant loading. These strategies are technically feasible at an appropriate scale to meet the allocations. A high likelihood of implementation is demonstrated because DEQ reviews the individual implementation plans and proposed actions for adequacy and establishes a monitoring and reporting system to track implementation and respond to any inadequacies.

In Oregon, forestry and agricultural related nonpoint source best management strategies are implemented through the state Forest Practices Act and agricultural Water Quality Management Area Plans and Rules. In Sections 5.1.2 and 5.1.3, DEQ determined that ODF and ODA must also develop and implement TMDL implementation plans that describe strategies specific to the John Day River Subbasins. This adds to the accountability for implementation of cost-effective and reasonable best management and further assures that antidegradation requirements and narrative criteria will be met.

Approximately 17 responsible persons including DMAs in Appendix A are responsible for implementation of pollutant reduction strategies. General timelines, milestones and measurable objectives are identified in Sections 3 and 4.2, respectively. More specific timelines, milestones

and measurable objectives will be specified in each required implementation plan. Attaining the relevant water quality criteria are provided in Sections 3 and 4.2, respectively. These elements support timely action by both DEQ and other entities responsible for implementation so that enforcement and adaptive management actions can be triggered and evaluation of attainment of TMDL goals occurs.

DEQ periodically reviews reporting by persons and agencies responsible for implementing pollutant reduction strategies to track the management strategies being implemented and evaluate achievements against established timelines and milestones.

Following up on reviews to track progress of implementation plans, DEQ will take appropriate action if responsible persons including DMAs fail to develop or effectively implement their implementation plan or fulfill milestones. DEQ's actions can include enforcement or engagement in voluntary initiatives. DEQ uses both, as appropriate within the process, to achieve optimal pollutant reductions. In some cases, DEQ will also take enforcement actions where necessary based on authorities listed in Section 8 or raise the issue to the Environmental Quality Commission as provided in OAR 340-042-0080.

DEQ tracks water quality status and trends concurrently with implementation of management strategies. DEQ relies on a system of interconnected evaluations, which include DMAs meeting measurable objectives, effectiveness demonstration of pollutant management strategies, accountability of implementation, periodically assessing progress on Oregon's Nonpoint Source Program Five-Year Plan Goals (approved by EPA), discharge monitoring and instream monitoring. DEQ also periodically evaluates water quality data collected through ambient and specific monitoring programs. DEQ regularly prepares Status and Trends reports and conducts water quality assessments on status of all waterways in Oregon every two years, as required by the Clean Water Act for submittal to EPA for approval as DEQ's Integrated Report. Together, these data and evaluations allow refinement of focus on specific geographic areas or discharges and appropriate implementation of adaptive management actions to attain, over time, the objectives of the TMDL.

7.2 Reasonable assurance conclusions

DEQ's implementation approach is multi-faceted and requires many targeted management practices across the entire basin to reduce anthropogenic pollutants, regardless of source origination.

The management strategies and practices that must be employed to reduce excess solar radiation loading are spatially distributed and involve multiple responsible persons including DMAs. Also, highly variable lag times are anticipated following the establishment of shade-producing vegetation to decrease solar radiation reaching streams. For these reasons, there is some uncertainty about the pace of achieving the needed reductions necessary in the John Day Basin to attain water quality criteria. DEQ's WQMP addresses this uncertainty by including an extensive monitoring, reporting, and adaptive component that is designed to match the accountability framework used by EPA in its Chesapeake Bay TMDL (2010).

The rationale described in this document stems from robust evaluations, implements an accountability framework and provides opportunities for adaptive management to maximize pollutant reductions. In addition, DMAs and other groups have been continuing to implement on-the-ground actions since the establishment of the 2010 John Day Basin TMDL. Together this approach provides reasonable assurance to meet state and federal requirements, including for antidegradation, and attain the goals of the TMDL.

8 Legal authorities

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

Clean Water Act, Section 303(d)

The DEQ is the Oregon state agency responsible for implementing the Clean Water Act in Oregon. Section 303(d) of the 1972 Federal Clean Water Act as amended requires states to develop a list of rivers, streams and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. These waters are referred to as “water quality limited.” Water quality limited waterbodies must be identified by the EPA or by a state agency which has this authority. In Oregon, the responsibility to delegate water quality limited waterbodies rests with DEQ and DEQ’s list of water quality limited waters is updated every two years. The list is referred to as the 303(d) list. Section 303 of the Clean Water Act further requires that TMDLs be developed for all waters on the 303(d) list. The Oregon Environmental Quality Commission granted DEQ authority to implement TMDLs through OAR 340-042, with special provisions for agricultural lands and nonfederal forestland as governed by the Agriculture Water Quality Management Act and the Forest Practices Act, respectively. The EPA has the authority under the Clean Water Act to approve or disapprove TMDLs that states submit. When a TMDL is officially submitted by a state to EPA, EPA has 30 days to take action on the TMDL. In the case where EPA disapproves a TMDL, EPA must issue a TMDL within 30 days. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL, which is designed to restore the water quality and result in compliance with the water quality standards. In this way, the designated beneficial uses of the water will be protected for all users.

Endangered Species Act, Section 6

Section 6 of the 1973 federal Endangered Species Act, as amended, encourages states to develop and maintain conservation programs for federally listed threatened and endangered species. In addition, Section 4(d) of the ESA requires the National Marine Fisheries Service to list the activities that could result in a “take” of species they are charged with protecting. With regard to this TMDL, NMFS’ protected species are salmonid fish. NMFS also described certain precautions that, if followed, would preclude prosecution for take even if a listed species were harmed inadvertently. Such a provision is called a limit on the take prohibition. The intent is to provide local governments and other entities greater certainty regarding their liability for take.

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

1. Avoid inappropriate areas such as unstable slopes, wetlands, and areas of high habitat value;

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

Oregon Revised Statute Chapter 468B

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

ORS 468B.020 Prevention of pollution

(A) Pollution of any of the waters of the state is declared to be not a reasonable or natural use of such waters and to be contrary to the public policy of the State or Oregon, as set forth in ORS 468B.015.

(B) In order to carry out the public policy set forth in ORS 468B.015, the Department of Environmental Quality shall take such action as is necessary for the prevention of new pollution and the abatement of existing pollution by:

a) Fostering and encouraging the cooperation of the people, industry, cities and counties, in order to prevent, control and reduce pollution of the waters of the state; and

b) Requiring the use of all available and reasonable methods necessary to achieve the purposes of ORS 468B.015 and to conform to the standards of water quality and purity established under ORS 468B.048.

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

NPDES and WPCF Permits

DEQ administers two different types of wastewater permits in implementing Oregon Revised Statute (ORS) 468B.050. These are: the NPDES permits for waste discharge into waters of the United States; and Water Pollution Control Facilities permits for waste disposal on land. The NPDES permit is also a federal permit and is required under the Clean Water Act. The WPCF permit is a state program.

401 Water Quality Certification

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

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

USACE Dam Operation and Management

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

Oregon Forest Practices Act

The Oregon Department of Forestry is the designated management agency for regulating land management actions on non-federal forestry lands that impact water quality (ORS 527.610 to 527.992, and OAR 629 Divisions 600 through 665). The Board of Forestry has adopted water protection rules, including but not limited to OAR Chapter 629, Divisions 625, 630, and 635-660, which describe best management practices for forest operations. The Oregon Environmental Quality Commission, Board of Forestry, DEQ, and ODF have agreed that these pollution control measures will primarily be relied upon to result in achievement of state water quality standards. Statutes and rules also include provisions for adaptive management that provide for revisions to FPA practices where necessary to meet water quality standards. These provisions are described in ORS 527.710, ORS 527.765, OAR 629-035-0100, and OAR 340-042-0080.

Agricultural Water Quality Management Act

The Oregon Department of Agriculture is responsible for the prevention and control of water pollution from agricultural activities as directed and authorized through the Agricultural Water Quality Management Act, adopted by the Oregon legislature in 1993 (ORS 568.900 to ORS 568.933). It is the lead state agency for regulating agriculture for water quality (ORS 561.191). The Agricultural Water Quality Management Plan Act directs the ODA to work with local communities to develop water quality management plans for specific watersheds that have been identified as violating water quality standards and have agriculture water pollution contributions. The agriculture water quality management plans are expected to identify problems in the watershed that need to be addressed and outline ways to correct the problems. Water Quality area rules for areas within the John Day Basin include OAR 603-095-2000 to 2060, OAR 603-095-1000 to 1060, OAR 603-095-2500 to 2560, and OAR 603-095-2900 to 2960.

Local Ordinances

Local governments are expected to describe in their implementation plans their specific legal authorities to carry out the management strategies necessary to meet the TMDL allocations. If new or modified local codes or ordinances are required to implement the plan, the DMA will identify code development as a management strategy. Legal authority to enforce the provisions of a city's NPDES permit would be a specific example of legal authority to carry out specific management strategies.

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Appendix A: List of responsible persons including Designated Management Agencies

No.	Designated Management Agencies/Responsible Persons	DMA Type	Total Acres in Basin	Acres 150ft from stream	DMA/RP Status	TMDL Plan Needed?
1	Bonneville Power Administration	Utility	4	1	New	No
2	City of Canyon City	City	897	195	existing	No
3	City of Condon	City	782	168	existing	No
4	City of Dayville	City	262	105	existing	No
5	City of Fossil	City	556	106	existing	No
6	City of Granite	City	147	8	existing	No
7	City of Grass Valley	City	324	90	existing	No
8	City of John Day	City	1249	352	existing	Yes
9	City of Lone Rock	City	643	191	existing	No
10	City of Long Creek	City	616	148	existing	No
11	City of Mitchell	City	405	144	existing	No
12	City of Monument	City	337	128	existing	No
13	City of Moro	City	310	52	existing	No
14	City of Mt. Vernon	City	283	111	existing	No
15	City of Prairie City	City	534	108	existing	Yes
16	City of Shaniko	City	309	46	existing	No
17	City of Spray	City	236	107	existing	No
18	City of Ukiah	City	140	7	existing	No
19	Crook County	County	24	0	existing	No
20	Gilliam County	County	4100	1041	existing	Yes
21	Grant County	County	13207	4155	existing	Yes
22	Harney County	County	10	5	existing	No
23	Jefferson County	County	36318	12995	existing	Yes
24	Morrow County	County	7851	1527	existing	No
25	Sherman County	County	2415	696	existing	Yes
26	Umatilla County	County	3082	830	existing	No
27	Union County	County	0	0	existing	No
28	Wasco County	County	439	258	existing	Yes
29	Wheeler County	County	4195	1319	existing	Yes
30	U.S Army Corps of Engineers	Federal	1953	1633	existing	No

No.	Designated Management Agencies/Responsible Persons	DMA Type	Total Acres in Basin	Acres 150ft from stream	DMA/RP Status	TMDL Plan Needed?
31	U.S. Bureau of Land Management	Federal	418402	114482	existing	Yes
32	U.S. Forest Service	Federal	1628108	266974	existing	Yes
33	U.S. National Park Service	Federal	11528	3491	existing	Yes
34	Oregon Department of Agriculture	State	2363113	510551	existing	Yes
35	Oregon Department of Aviation	State	82	10	New	No
36	Oregon Department of Fish and Wildlife	State	24969	6620	existing	Yes
37	Oregon Department of Forestry	State	517731	99633	existing	Yes
38	Oregon Department of Geology and Mineral Industries	State	0	0	existing	No
39	Oregon Department of State Lands	State	6466	1572	existing	Yes
40	Oregon Department of Transportation	State	8259	3613	existing	Yes
41	Oregon Parks and Recreation Department	State	7476	2846	existing	Yes
42	Private Railroad	Railroad	5	5	existing	No

Appendix B: Acres of jurisdiction, by HUC, within 150 feet of stream centerline for each entity

Upper John Day - HUC 17070201

Landowner or Jurisdiction	Classification	Acres in HUC8 subbasin	Acres in HUC8 subbasin 150 feet from a stream centerline
Grant County	County	10947	3326
U.S. Forest Service	Federal Agency	565568	81915
Oregon Department of Agriculture	State Agency	520974	120972
U.S. Bureau of Land Management	Federal Agency	100070	22286
Oregon Department of Forestry	State Agency	117837	23400
Oregon Department of Fish and Wildlife	State Agency	24649	6580
U.S. National Park Service	Federal Agency	6633	2336
U.S. Government	Federal Agency	13337	1369
Oregon Department of Transportation	State Agency	1956	895
Oregon Department of State Lands	State Agency	2477	555
City of John Day	Municipality	1249	352
State of Oregon	State Agency	1049	243
City of Canyon City	Municipality	897	195
City of Prairie City	Municipality	534	108
City of Mt. Vernon	Municipality	283	111
City of Dayville	Municipality	262	105
Oregon Parks and Recreation Department	State Agency	44	17
Harney County	County	10	5
Bonneville Power Administration	Special District	4	1

North Fork John Day - HUC 17070202

Landowner or Jurisdiction	Classification	Acres in HUC8 subbasin	Acres in HUC8 subbasin 150 feet from a stream centerline
U.S. Forest Service	Federal Agency	692895	128673
Oregon Department of Forestry	State Agency	215612	44453
Grant County	County	1170	440
U.S. Bureau of Land Management	Federal Agency	69721	18385
Oregon Department of Agriculture	State Agency	176082	40486
State of Oregon	State Agency	17177	3585
Morrow County	County	5144	1001
Umatilla County	County	3082	830
Oregon Department of Transportation	State Agency	1228	541
Oregon Department of State Lands	State Agency	1003	292
U.S. Government	Federal Agency	698	160
City of Monument	Municipality	337	128
Oregon Parks and Recreation Department	State Agency	176	57
Oregon Department of Fish and Wildlife	State Agency	160	20
City of Granite	Municipality	147	8
City of Ukiah	Municipality	140	7
Baker County	County	1	1
City of Greenhorn	Municipality	7	0

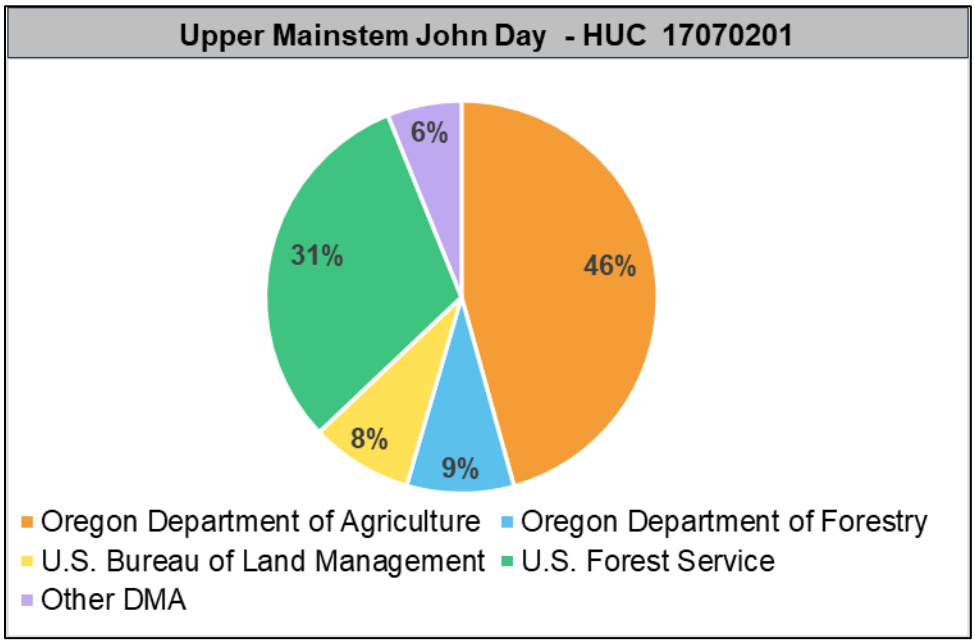
Middle Fork John Day - HUC 17070203

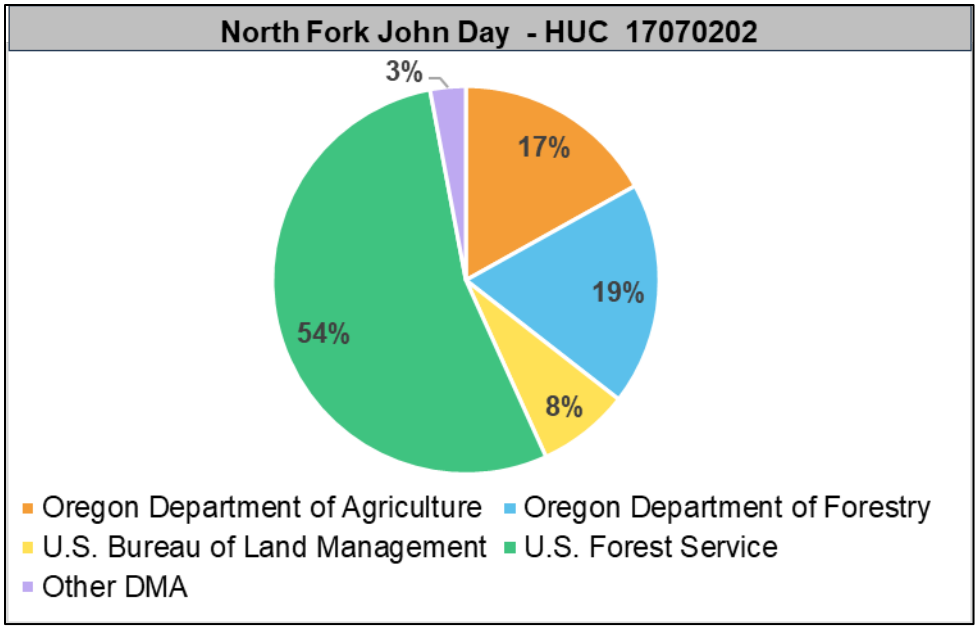
Landowner or Jurisdiction	Classification	Acres in HUC8 subbasin	Acres in HUC8 subbasin 150 feet from a stream centerline
U.S. Forest Service	Federal Agency	290939	44010
Grant County	County	1068	375
Oregon Department of Forestry	State Agency	53643	10723
Oregon Department of Agriculture	State Agency	157344	28054
U.S. Bureau of Land Management	Federal Agency	1925	416
Oregon Department of Transportation	State Agency	711	235
City of Long Creek	Municipality	616	148
Oregon Department of State Lands	State Agency	524	85
Oregon Parks and Recreation Department	State Agency	138	43
Oregon Department of Fish and Wildlife	State Agency	160	20
U.S. Government	Federal Agency	43	6
State of Oregon	State Agency	34	1

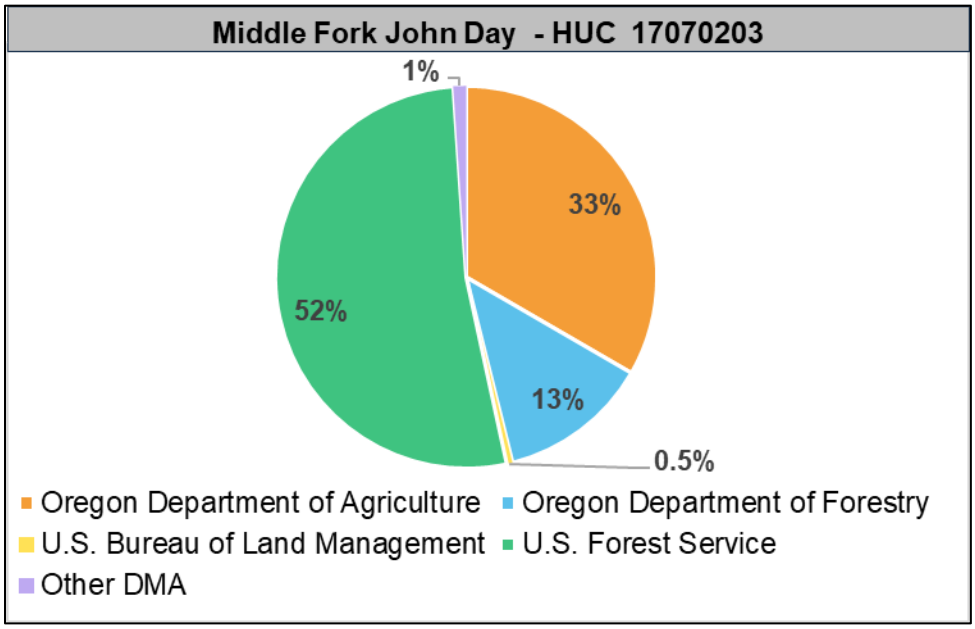
Lower John Day HUC 17070204

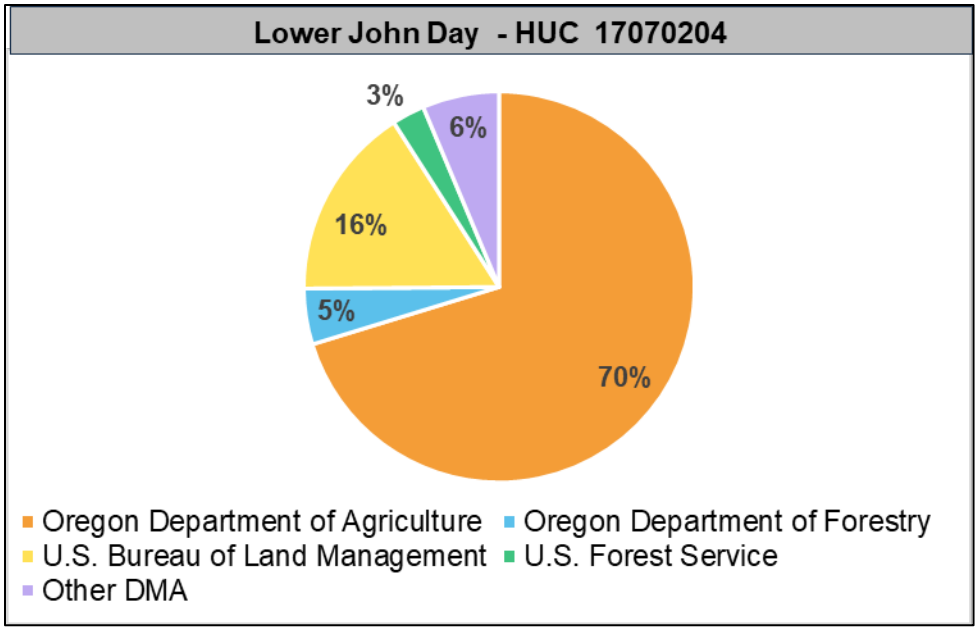
Landowner or Jurisdiction	Classification	Acres in HUC8 subbasin	Acres in HUC8 subbasin 150 feet from a stream centerline
Oregon Department of Agriculture	State Agency	1508733	321039
U.S. Bureau of Land Management	Federal Agency	246686	73395
Jefferson County	County	36318	12995
Oregon Department of Forestry	State Agency	130639	21057
U.S. Forest Service	Federal Agency	78705	12376
Oregon Parks & Recreation Department	State Agency	205	78
Oregon Department of Transportation	State Agency	4364	1941
U.S. Army Corps of Engineers	Federal Agency	1953	1633
Wheeler County	County	3993	1277
U.S. Government	Federal Agency	3862	1261
U.S. National Park Service	Federal Agency	4895	1155
Gilliam County	County	4100	1041
Grant County	County	22	13
Sherman County	County	2415	696
Oregon Department of State Lands	State Agency	2462	641
State of Oregon	State Agency	2071	631
Morrow County	County	2706	525
Wasco County	County	439	258
City of Lone Rock	Municipality	643	191
City of Condon	Municipality	782	168
City of Mitchell	Municipality	405	144
City of Spray	Municipality	236	107
City of Fossil	Municipality	556	106
City of Grass Valley	Municipality	324	90
Oregon Parks and Recreation Department	State Agency	205	78
City of Moro	Municipality	310	52
City of Shaniko	Municipality	309	46
Oregon Department of Aviation	State Agency	82	10
Private Railroad	Private	5	5
Crook County	County	24	0

Appendix C: Graphs showing estimated Designated Management Agency jurisdiction by subbasin and within 150 feet of a stream




North Fork John Day - HUC 17070202
3%
17%
19%
54%
8%
Oregon Department of Agriculture
Oregon Department of Forestry
U.S. Bureau of Land Management
U.S. Forest Service
Other DMA


Middle Fork John Day - HUC 17070203
1%
33%
52%
13%
0.5%
Oregon Department of Agriculture
Oregon Department of Forestry
U.S. Bureau of Land Management
U.S. Forest Service
Other DMA


Lower John Day - HUC 17070204
3%
6%
16%
5%
70%
Oregon Department of Agriculture
Oregon Department of Forestry
U.S. Bureau of Land Management
U.S. Forest Service
Other DMA

Appendix D: List of Reservoirs in the John Day Basin TMDL project area

DEQ compiled this list of 32 dams located within the John Day Basin temperature TMDL project area from the U.S. Army Corps of Engineers National Inventory of Dams (NID; USACE, 2025) database and a similar database maintained by the Oregon Water Resources Department, dam safety program (i.e. large dams 10 feet or higher, or store 9.2 acre-feet or more (OAR 690-020-0000)).

No.	Reservoir Name	NID/DAM ID	Owner Names	Owner Types	Primary Purpose	NID Reservoir Storage (Acre-Ft)
1	Olive Lake	OR00341	USDA FS	Federal	Recreation	3300
2	Rock Creek Lake (Wheeler)	OR00265	Alscott Antone Ranches, LLC	Private	Irrigation	2600
3	Painted Hills Reservoir	OR00658	Pape Group	Private	Irrigation	1040
4	Currant Creek	OR00696	Washington Younglife Ranch	Private	Irrigation	1020
5	Penland Lake Reservoir	OR00501	Glenn Ward	Private	Recreation	590
6	Waller No. 3	OR00407	Rudio Creek Ranch, LLC	Private	Irrigation	510
7	Mays	OR00355	Young Life, C/O Jim Frank	Private	Irrigation	457
8	Officer Reservoir	OR00458	T.G. Brown	Private	Irrigation	400
9	Lofton Dam	OR00177	Rock 'N A, LLC	Private	Irrigation	387
10	Blann Meadows Dam	OR00325	Water Bear LLC	Private	Irrigation	320
11	Fort Creek Reservoir	OR00223	Alscott Antone Ranches, LLC	Private	Irrigation	300
12	Collins Dam (Wheeler)	OR00438	4b Trust	Private	Irrigation	255
13	Fopiano Reservoir	OR00311	Water Bear LLC	Private	Irrigation	200
14	Thomas-Cavender	OR00739	J & L Orchards LLC	Private	Irrigation	175
15	Bull Prairie Reservoir	OR00363	Oregon Department of Fish and Wildlife - Dave Sandstrom	State	Recreation	168

No.	Reservoir Name	NID/DAM ID	Owner Names	Owner Types	Primary Purpose	NID Reservoir Storage (Acre-Ft)
16	Wineland	OR04061	Roderick Paul	Private	-	166
17	Beaver Pond Dam (Wheeler)	OR01134	Alscott Antone Ranches LLC	Private	Irrigation	120
18	Long	OR04084	Terry Long	Private	-	120
19	Bates Reservoir	OR00454	Oregon State Parks	Private	Recreation	100
20	Cherry Creek	OR00634	Joe Paulson	Private	Irrigation	95
21	Oxbow Ranch Dam (Grant)	OR00639	Jake Williams	Private	Irrigation	90
22	Clark Lake	OR00512	Kinzua Lodge, LLC C/O George Tarnasky	Private	Recreation	89
23	Six Shooter Ranch	OR04036	Six Shooter Ranch I, LLC	Private	Irrigation	60
24	Harris Reservoir	OR00755	Alscott Antone Ranches	Private	Irrigation	59
25	Yokom Reservoir	OR03629	Broken Leg Ranch, Mt. Vernon, 97865	Private	Irrigation	45
26	Fred Creek Lake Dam	OR03723	Alscott Antone Ranch LLC	Private	Fish and Wildlife Pond	43
27	Kinzua	OR02101	Roderick Paul	Private	Irrigation	40
28	Rickman Reservoir	OR02829	Tg Cattle Company, Canyon City, 97820	Private	Irrigation	33.5
29	Shaniko Ranch	OR03976	Shaniko Ranch	Private	Irrigation	32
30	Hidden Lake (Sluice Can.)	OR03893	Gm Ranch	Private	Irrigation	27
31	Emmel Bros. Reservoir	OR01654	Emmell Brothers Ranch	Private	Irrigation	23
32	Miller Dam	OR02409	Circle Bar Investments	Private	Irrigation	19