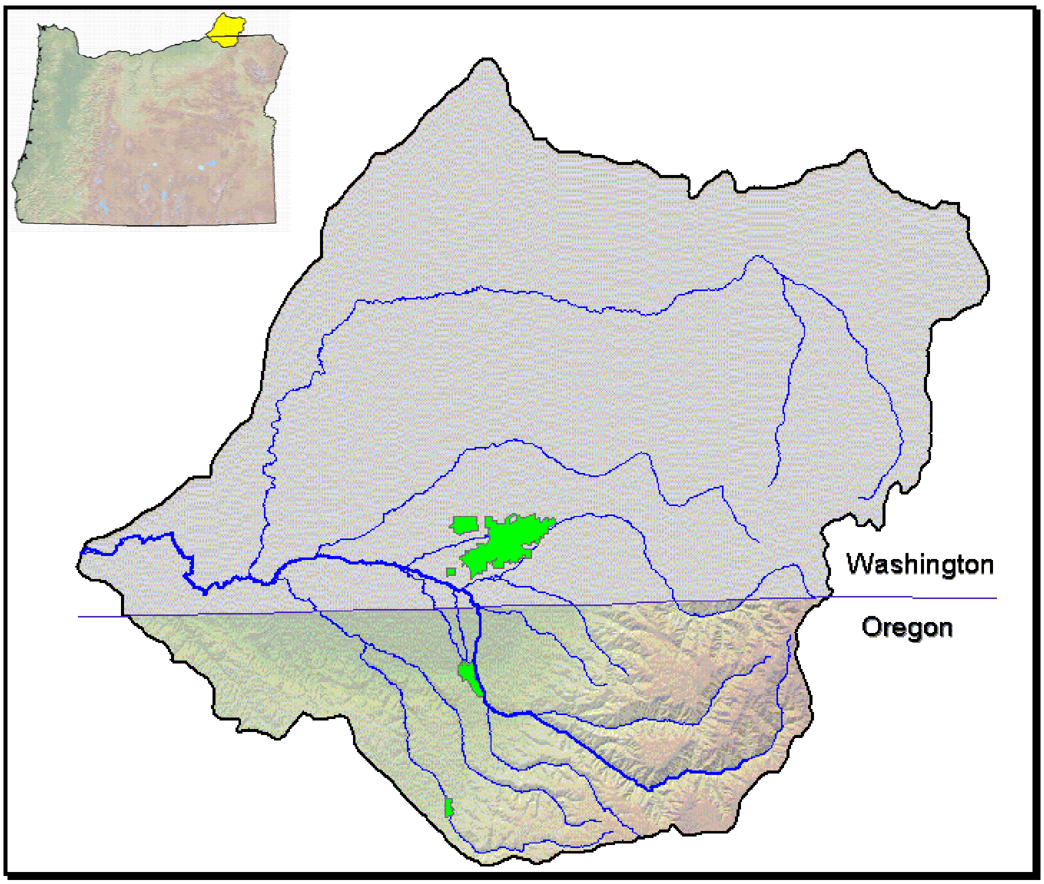
Walla Walla Subbasin
Stream Temperature
Total Maximum Daily Load
and
Water Quality Management Plan



August 2005

State of Oregon
Department of Environmental Quality

Document Table of Contents

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Major Contributors:

Walla Walla Basin Watershed Council
Washington Department of Ecology
Washington Department of Fish and Wildlife
Umatilla National Forest, Supervisors and District Offices
Confederated Tribes of the Umatilla Indian Reservation
Oregon Department of Fish and Wildlife
Oregon Water Resources Department
US Army Corps of Engineers
USDA Natural Resource Conservation Service

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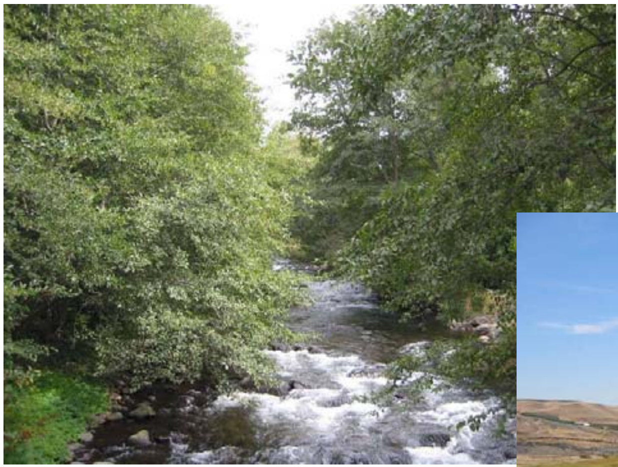


South Fork below Harris Park

Lower Walla Walla River one mile above Zangar Junction

TMDL Background

Waters of the State of Oregon are monitored by the Oregon Department of Environmental Quality (DEQ) and other agencies. This information is used to determine whether water quality standards are met, and consequently, whether beneficial uses of waters are fully supported. Section 303(d) of the federal Clean Water Act (CWA) calls for a list of water quality limited waters and requires the establishment of a total maximum daily load (TMDL) for each pollutant of concern. DEQ is responsible for assessing data, compiling the 303(d) list and developing TMDLs. Both the list and TMDLs are submitted to US Environmental Protection Agency (USEPA) for approval. TMDLs are assessments that determine the maximum amount of pollutant that can be present in a waterbody while meeting water quality standards. This loading capacity can be allocated to point, nonpoint and future sources of pollution. Uncertainty and natural pollutant sources are accounted for as well. Point sources are those associated with discrete human-made conveyances such as pipes from waste water treatment plants. Wasteload allocations are the portion of the TMDL attributed to point sources. Nonpoint sources are diffuse sources such as field runoff or excess solar radiation due to vegetation removal. Load allocations are the portion of the TMDL attributed to either natural background or nonpoint sources. TMDLs are implemented via water quality management plans and, in the case of point sources, permits issued through the National Pollutant Discharge Elimination System (NPDES).

Summary

This document lays out goals and planning to address elevated stream temperature in the Walla Walla Subbasin in Oregon. The assessment (**Appendix A**) addresses the Walla Walla River in Washington as well. Because the Walla Walla Subbasin straddles the Oregon-Washington border, DEQ and the Washington Department of Ecology (WDOE) agreed to a mutual assessment process. The Walla Walla Basin Watershed Council (Oregon) contributed substantially, sponsoring much of the outreach and monitoring.

The Walla Walla River is 303(d) listed for temperature in both Oregon and Washington. Several tributaries are listed for temperature as well. This report is issued to USEPA as the Total Maximum Daily Load to address these listings in Oregon. **Part 1** is the TMDL and **Part 2** is the WQMP. The goal of the TMDL is a natural stream temperature pattern. This is expressed first as a solar radiation heat loading and then translated to effective shade. Other measures of progress are provided as well. These targets are applicable to nonpoint sources of pollution. Temperature is of heightened concern in the Walla Walla Subbasin due to the threatened status of Bull Trout and Summer Steelhead, pursuant to the Endangered Species Act. Spring and Fall Chinook Salmon and Redband Trout are other cold-water fish species present in the subbasin.

Point sources are few in the subbasin. Existing Oregon point sources are described in this report and are collectively issued wasteload allocations of zero. This is because they will not discharge during the season of concern or at levels of concern or they discharge insignificant heat loads. Potential future point sources are addressed through reserve capacity allocation.

In addition to temperature, other 303(d) listings occur in the subbasin. An iron listing in Oregon has been deferred to future assessment, because iron was listed after the temperature monitoring was completed for the earlier temperature listing. Several pollutants are listed in Washington. WDOE is in the process of developing TMDLs for an array of pollutants.

Subbasin Overview and Cause of Stream Heating. Subbasin land cover is primarily related to agriculture, forest and the urban area of Milton-Freewater. The population density is generally low. Structural alterations to the river include the Milton-Freewater Levee, irrigation systems, road crossings and channel straightening. Below the coniferous upper watershed, riparian vegetation removal and levees are common, though substantial areas of riparian forest still remain. Both warm season flow and vegetative shade have been diminished in the last 100 plus years. **Section 1.5** of **Appendix A** describes the basin

in some detail. The TMDL assessment documents human-related stream heating associated with flow reduction, vegetation loss and channel widening.

Geographic Scope. It is important to recognize that though many figures in **Part 1** address both Washington and Oregon, this TMDL only applies in Oregon. Longitudinally continuous temperature simulation was conducted for the mainstem and South Fork of the Walla Walla River from the Columbia River to Skiphorton Creek, totaling 67 miles (114 kilometers). Other tributaries were not simulated for temperature in Oregon. Vegetation assessment and channel width-to-shade relationships address tributary heating.

Implementation and Adaptive Management

The WQMP directs management organizations to document programs leading toward TMDL attainment. Designated management agencies (DMA) include: Oregon Department of Agriculture (ODA), the US Forest Service (Umatilla National Forest), the US Bureau of Land Management (BLM) and the Oregon Department of Forestry (ODF). Action is requested of other organizations as well. The form of response varies by organization. Some are governed by existing memorandums of agreement or understanding with DEQ and others are expected to respond in accordance with a timeline specified in the **Part 2** of this document. TMDL implementation plans, specific to land use authorities, are the usual form of documentation addressing nonpoint source TMDLs. Normally existing programs are utilized.

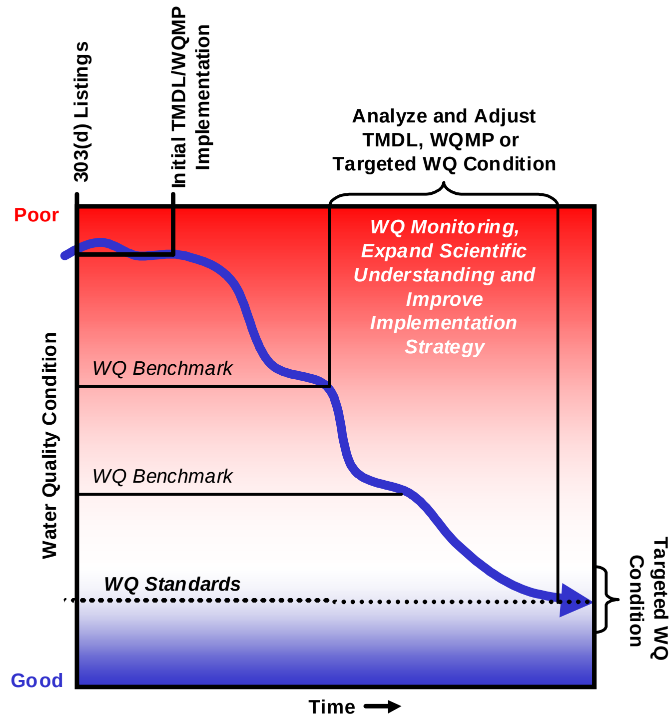
The goal of the Clean Water Act and associated Oregon Administrative Rules is to ensure that water quality standards are met or that all feasible steps are taken towards achieving the highest quality water attainable. DEQ recognizes that some improvement will require decades to fully manifest, particularly where nonpoint sources are the main concern. To achieve this goal, implementation should commence as soon as possible.

DEQ acknowledges the following, with regard to TMDLs and their implementation:

- The TMDL process occurs in ongoing cycles, based on implementation effectiveness, the availability of information and the state of understanding of watershed and management processes. DEQ recognizes that uncertainty can lead to TMDL allocations that are not realistic. For example, where conditions such as riparian vegetation or stream channel geometry are TMDL objectives, DEQ encourages ongoing scientific re-assessment of channel and vegetation potential. Also, technology and programs for controlling nonpoint source pollution are evolving. It is possible that one or more iterations of management systems may be necessary to achieve the best approach.
- The purpose of the TMDL is not to eliminate human activity in riparian areas. It is DEQ's expectation, however, that designated agencies will address how management will achieve the allocations.
- DEQ also recognizes that at various times and locations attainment of system potential conditions may be impeded by natural disturbance. The definition of *natural conditions* in rule includes: "…Disturbances from wildfire, floods, earthquakes, volcanic or geothermal activity, wind, insect infestation, diseased vegetation are considered natural conditions" (OAR 340-041-0002(34)).
- If a nonpoint source that is covered by the TMDL complies with its finalized Implementation Plan or applicable forest practice rules, it will be considered in compliance with the TMDL.
- Full TMDL attainment at all locations may not be feasible due to physical, legal or regulatory constraints. To the extent possible, the implementation plans should identify potential constraints, but should also provide the ability to address those constraints as new opportunities arise. For instance, at this time an existing bridge may preclude attainment of channel potential and not be slated for reconfiguration due to feasibility issues. In the future, should the bridge undergo repair or modification, consideration should be given to designs that support TMDL implementation.
- The Federal Advisory Committee on TMDLs, USEPA and DEQ expect reasonable assurance of implementation. DEQ envisions that sufficient initiative exists to achieve water quality goals with minimal enforcement. Should the need for additional effort emerge, it is expected that the

responsible agency will work with land managers to overcome impediments through education, technical support, and as a last resort where appropriate, enforcement.

- Where implementation of TMDL planning or effectiveness of management techniques is found to be inadequate, DEQ expects management agencies to revise planning or benchmarks to address these deficiencies (see graph below).
- DEQ anticipates that each management agency will monitor and document its progress in implementing the provisions of its implementation plan. This information will be provided to DEQ for TMDL review.



Adaptive Management - Schematic Diagram

Interstate Coordination

In order to provide for interstate coordination, in 2000 the Oregon Department of Environmental Quality and the Washington State Department of Ecology (WDOE) agreed that DEQ, having an earlier due date for temperature work in the subbasin, would conduct temperature assessment and modeling for the entire mainstem. It was envisioned that Washington would use this assessment to support their subsequent TMDL development. Accordingly, the geographic scope of the analysis in **Appendix A** includes the Walla Walla River in both states, whereas the Oregon TMDL and WQMP address only Oregon. As part of the cooperative assessment, WDOE supplied thermal infrared remote sensing for the 40 miles of river in Washington; and DEQ, the Walla Walla Basin Watershed Council (WWBWC), WDOE, the Washington Department of Fish and Wildlife (WDFW), and others formed the monitoring team in Washington. In Oregon monitoring and assessment was guided by the WWBWC and DEQ, with support from several contributing organizations.

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Part One

Temperature TMDL Elements (Oregon)

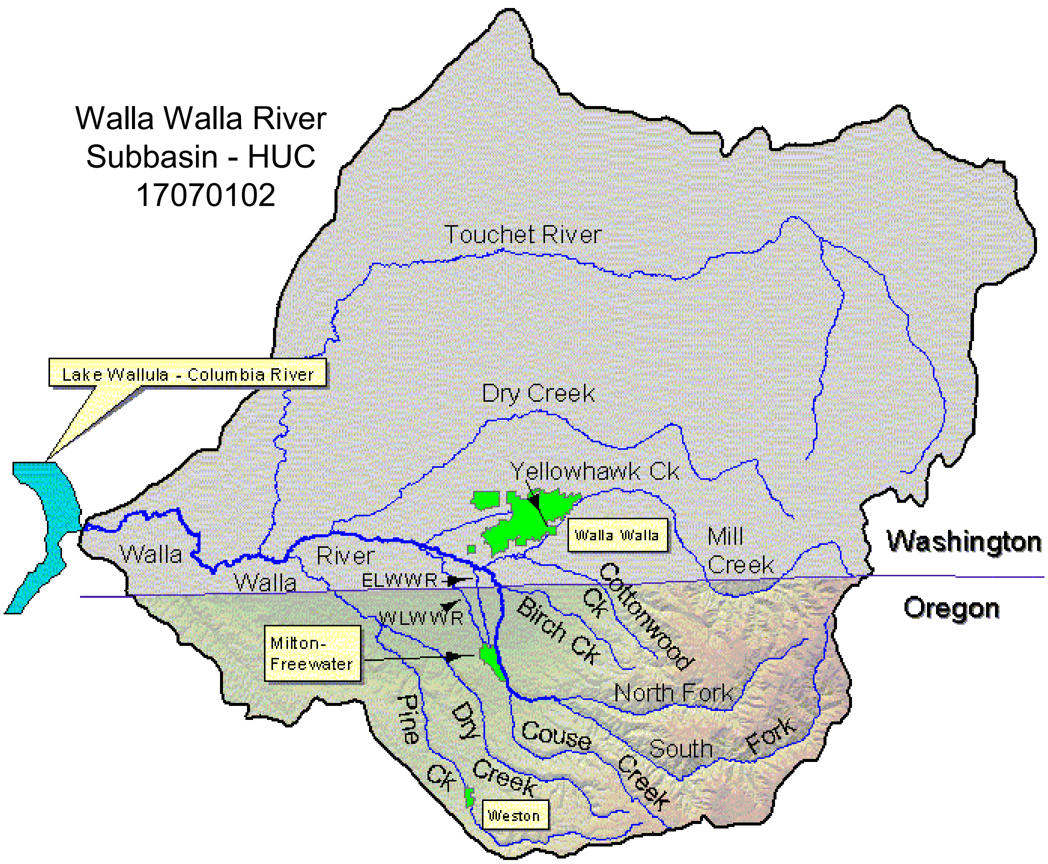

Figure 1-1. Major rivers and streams of the Walla Walla Subbasin. The Subbasin straddles the Oregon-Washington border and drains into the Columbia River. ELWWR and WLWWR are abbreviations for East Little Walla Walla River and West Little Walla Walla River, respectively.

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Part 1 Table of Contents

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Introduction

Water quality standards are designed to protect all designated beneficial uses of waters of the state including recreation, drinking water supply and fisheries. TMDLs establish the maximum level of pollutant allowable in order to meet water quality standards. **Part 1** of this document is the TMDL for the subbasin in Oregon, for elevated stream temperature. The Walla Walla Subbasin TMDL will be implemented through the *Water Quality Management Plan* (WQMP) of **Part 2**. As implementation proceeds, the TMDL will be re-visited as needed to address progress and new information regarding management effectiveness, limitations and water quality processes.

Figure 1-1 serves as a reference map for much of the discussion herein. **Appendix A** (**Section 1.5**) provides more detailed mapping. **Table 1-1** below summarizes the temperature TMDL. **Part 1** is organized based on the list of elements expected to be in Oregon TMDLs according to rule (OAR 340-042). A checklist prepared by the US Environmental Protection Agency (EPA 2002) provides another form of guidance for TMDL content. **Table 1-2** identifies the relationship between the two lists.

Table 1-1. *Temperature TMDL Summary Information*

Water body	Walla Walla Subbasin, Hydrologic Unit Code #17070102
Water Quality Standard	Recent Oregon Stream Temperature Standard (Approved by EPA March, 2004)
Applicable Water Quality Standard Criteria	Natural Condition Criteria of OAR 340-041-0028 (8)
Target Pollutant / Loading Capacity	Heat / Solar Radiation Heat Loading from system potential conditions
TMDL Surrogate	Percent Effective Shade
Related Measures of Progress	Channel Width, Meander Belt-width, Sinuosity, Diel Temperature Range, Others
Existing Pollutant Sources	Vegetation reduction and Channel Alteration (Agriculture, Flood Control, Forestry, Urban, Transportation)
Margin of Safety	Implicit – optimal conditions are targeted, and conservative assumptions are incorporated into modeling.
Reserve Capacity	Any new sources must constrain heating within the human use allowance of the temperature standard. This is a site specific determination.

Table 1-2. *Relationship between State and Federal TMDL identification of key TMDL elements.*

Oregon Administrative Rule (340-042)	USEPA Checklist
(a) Name and Location	Scope of TMDL
(b) Pollutant Identification	Applicable Water Quality Standards and Numeric Targets
(c) Water Quality Standards and Beneficial Uses	
(d) Loading Capacity	Loading Capacity
(e) Excess Load	
(f) Sources or Source Categories	
(g) Wasteload Allocations	Wasteload Allocations
(h) Load Allocations	Load Allocations
(i) Margin of Safety	Margin of Safety
(j) Seasonal Variation	Seasonal Variation
(k) Reserve Capacity	
(l)(j) Reasonable Assurance*	Reasonable Assurance (if wasteload allocations depend on load allocations)
OAR 340-042-0050 Public Participation	Public Participation
For additional clarification relating narrative and numeric water quality standard criteria, DEQ typically prepares an additional section 'Water Quality Standard Attainment Analysis.'	

*in Water Quality Management Plan

Part 1 draws frequently on **Appendix A**. In addition to the analytical methods and inputs/outputs, **Appendix A** includes further description of the TMDL process: stream heating processes, analytical limitations, the TMDL analysis approach and scale.

(a) Name, Location and 303(d) Listings

Oregon TMDLs are being developed at the subbasin scale. The 303(d) listings addressed in this TMDL are located in the Walla Walla Subbasin, Hydrologic Unit Code # 17070102. **Table 1-3** lists the temperature-listed stream segments.

Table 1-3. *List of temperature water quality limited streams, Walla Walla Subbasin, Oregon (2002 303(d) list). Mill Creek and the North and South Forks of the Walla Walla River are listed based on the prior Oregon temperature standard criterion of 10ºC for Bull Trout. The Walla Walla River is listed based on the prior criterion of 17.8ºC for Salmonid Rearing.*

Waterbody Name	River Mile	Parameter	Season	List Date
Mill Creek	22.9 to 26	Temperature	Summer	1998
North Fork Walla Walla River	0 to 18.7	Temperature	Summer	1998
South Fork Walla Walla River	0 to 27.1	Temperature	Summer	1998
Walla Walla River	40.6 to 50.6	Temperature	Summer	1998
Total Stream Miles listed based on Bull Trout Temperature Criteria				48.9
Total Stream Miles listed based on Salmonid Rearing Criteria				10.0

The major artery in the subbasin consists of the Walla Walla River and the South Fork. Temperature was simulated for this channel from the Columbia River upstream to the confluence of Skiphorton Creek and the South Fork, totaling 67 miles (114 kilometers). Riparian vegetation and channel relationships are evaluated for this modeled corridor and throughout the subbasin in Oregon*. All perennial tributaries of the subbasin are assigned load allocations. For the purposes of this document, 'perennial' refers to all streams that have natural potential to flow into the Walla Walla River or its tributaries (including the Oregon part of those with confluences in Washington), during the timeframe addressed by the TMDL.* For a map of the subbasin and index map for subbasin location, refer to **Figure 1-1** and this document's cover page. Oregon point source locations are identified in **Section g**.

(b) Pollutant and Target Identification

Change in water temperature is an expression of heat energy transfer per unit volume. The *nonpoint source pollutant is heat originating from human-caused increases in solar radiation* received by streams. Stream heating due to existing NPDES *point sources* is rare in the Oregon part of the subbasin and significant heating will not be permitted in the warm season (**Section f**). However, future point sources may be allowable, provided that heating is slight and the receiving water has sufficient flow, as discussed in **Section k**. The *point source pollutant is heat in the form of warm water discharge* to surface waters.

Terminology Note: *Point sources* of pollution are discharges via localized human-made conveyances. For example, a city waste water treatment plant is a point source. *Nonpoint* sources of pollution are diffuse sources such as field runoff or solar radiation.

The Oregon water quality standard for temperature includes biologically based temperature targets (numeric criteria). Computer simulation of heating of the Walla Walla River indicates that these criteria are not attainable in much of the subbasin in the summer even at conditions approaching natural (**Chapter 4** of **Appendix A**). In such situations, the temperature standard (next section) specifies that ***the target of the TMDL is "natural thermal potential temperatures"*** within a 0.3 ºC (0.5 ºF) human use allowance (OAR 340-041-0028{12}{b}{B} and § 0028{8}).

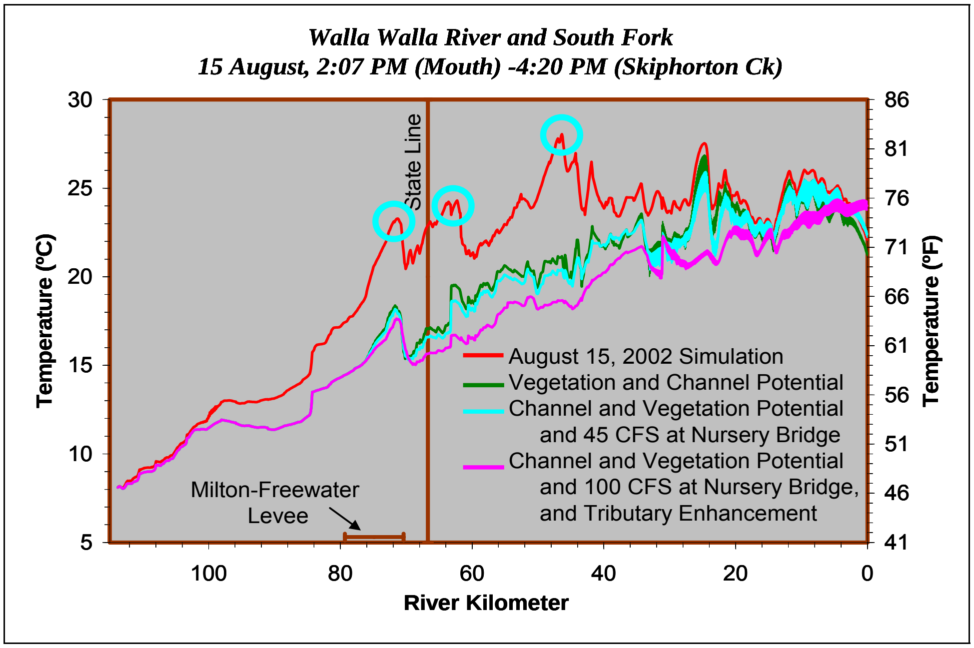
Though recently developed capabilities for estimation of solar heating are robust, estimates of natural temperatures are limited by practical difficulties in assessing groundwater influence and some of the influences of increased sinuosity. Given this limitation, a best approximation is made by assessing solar heating in relation to channel and vegetation geometry. Improved riparian conditions set the stage for channel evolution and vegetation that ultimately lead to natural temperatures, particularly if management allows for restoration of other stream functions as well, such as floodplain recharge and increased sinuosity.

The term *system potential*, discussed in detail in **Section 1.4** of **Appendix A**, refers to the best estimate of vegetation, channel shape and other riparian conditions that would occur with past and present human disturbance minimized. ***System potential channel and vegetation conditions are the basis for the load allocations of this TMDL***. Temperatures are simulated for various flow profiles as well. Hence the TMDL addresses the applicable water quality criteria – natural thermal potential temperature. Potential channel width and depth, vegetation and flow were simulated along the entire length of the Walla Walla River and the South Fork up to Skiphorton Creek.

Typically the highest stream temperatures in the subbasin occur 2:00 PM – 5:00 PM in late July and early to mid August. Accordingly, August afternoon temperatures are the focus of temperature discussion and illustration in this document. **Figure 1-2** illustrates the estimate of natural thermal potential temperature for the modeled corridor, based on system potential.

It is noted that, where analysis has been conducted, future NPDES sources are subject to this same target – natural thermal potential temperature. At other locations or outside of the season of thermal potential assessment, they would be held to other criteria of the temperature standard.

Figure 1-2. {modified Figure 4-10 in Appendix A} *Existing and simulated temperature profiles for an afternoon in August. The August 15, 2002 simulation is calibrated to measured temperature and represents the existing condition. Blue circles show points of maximum deviation from system potential temperatures. For location reference - river miles, key locations and tributaries are related to river kilometers in* ***Figure 1-5A***. *Refer to* ***Appendix A*** *for further details. The upper model scenario below represents the existing condition (August 15, 2002 flow levels). The second represents improved vegetation and channel shape at the same flow level. Flows of 45 to 100 CFS represent a range of natural heating scenarios, as described later in this section.*



The high-flow temperature increase near the mouth of the Walla Walla River, apparent in **Figure 1-2**, is explained as follows: Currently temperatures are relatively low at the mouth of the Walla Walla. This is because with the existing summer low flow in the Walla Walla River, mixing from comparatively cool Lake Wallula (the receiving Columbia River pool behind McNary Dam) and its associated groundwater decreases the "slack water" lower Walla Walla River temperature. More Walla Walla River flow, as simulated, increases the warm upstream volume, more than offsetting the cooling effect of vegetation and channel restoration.

Human Use Allowance

As mentioned earlier in this section, the temperature standard also provides for a human use allowance:"…a cumulative increase of no greater than 0.3 ºC (0.5 ºF) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact" {OAR 340-041-0028 (12)(a)(B)}.

Along the modeled corridor, the "point of maximum impact" would be where the greatest deviations from system potential temperatures occur – just below Nursery Bridge in Milton-Freewater, just below the state border and just above Dry Creek near Lowden (**Figure 1-2**).

The human use allowance (HUA)would not significantly influence nonpoint source objectives (load allocations). The value is small enough to be masked by uncertainty associated with instream measurement and modeling software. For this reason, a human use allowance is not assigned to nonpoint sources. The allowance could be significant with regard to any existing or future point source discharges and is generally available for that purpose (**Section k**).

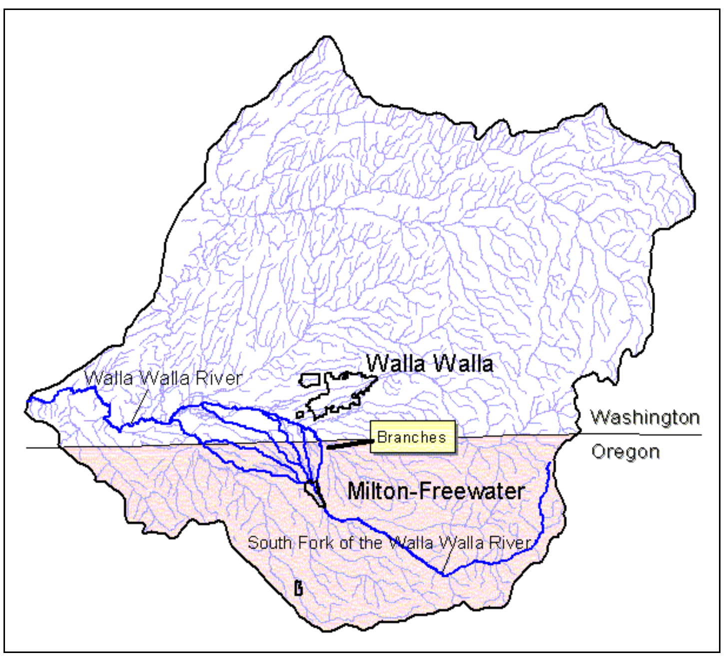
Addressing Stream Flow

The water quality standard defines the TMDL target of *natural thermal potential* as "the determination of the thermal profile of a water body using best available methods of analysis and the best available information on the site potential riparian vegetation, stream geomorphology, stream flows and other measures to reflect natural conditions" (OAR 340-041-0002(35)). The stream flow component of this definition is distinct from the others, in that flow effects aren't readily described in terms of target pollutants. Also, the CWA specifically states: "…nothing in this Act shall be construed to supersede or abrogate water rights to quantities of water which have been established by any state…" (Section 101(g)). The reader should note that DEQ is not the State authority for managing or regulating water quantity and distribution.

This may seem paradoxical – one rule requiring targeting natural temperatures and related flows in a TMDL; and policy and jurisdictional limitations on doing so. And there's the reality that flow influences temperature. In order to resolve this, DEQ bases the TMDL allocations on solar radiant heat per unit stream surface area – such an allocation is not flow dependant. The resultant temperatures *are* flow dependant, and are simulated and published for a range of flows, including natural flow estimates. Flow however, is not allocated. The purpose of natural flow temperature profiles is to provide information. Restoration strategy development may benefit and, over time, the profiles inform the questions: are beneficial uses fully supported?

Another complexity in resolving flow and the temperature TMDL is found in defining "natural" flow given that the drainage pattern of the Walla Walla River has been modified. In brief, the Walla Walla River divided historically as it entered the Milton-Freewater area (**Figure 1-3**). Perhaps half, or more, of the mainstem water naturally exited at the Little Walla Walla River distributary, which in turn divided into branches. All branches ultimately reunite in Washington. The northeastern most channel, the Tumalum branch, was evidently the largest. In the late 1800's, the Little Walla Walla River was head-gated, diverting the winter-spring channel-forming flows down the Tumalum branch, thus enlarging it to form the modern mainstem. Much of the Little Walla Walla River network still exists and serves as part of an irrigation system during the growing season. The lower reaches in particular are fed by ground water and function largely as natural streams.

Figure 1-3. *Historical distributary branches of the Walla Walla River*



Accordingly, two flow profiles were modeled to characterize natural heating for the mainstem leaving Milton-Freewater. First, forty-five cubic feet per second at Nursery Bridge was chosen to represents the historical summer flow in the Tumalum branch. This is a rough estimate based on modern channel dimensions and historic mapping (Mullan, 1858). Second, one-hundred cubic feet per second at Nursery Bridge is the approximate potential of the system without withdrawal at the Little Walla Walla River. ***The latter is not the historic natural flow (emphasis added)***, but in the enlarged mainstem, 100 CFS leads to a closer approximation of the natural width to depth ratio of summer low flow – and thus a more natural solar heating rate, absent restoration of the original channel form. Channel restoration would require resumption of the winter/spring channel-forming flows. Both scenarios were simulated for potential with lower width/depth channels than present, but still assuming channel geometry resulting from mainstem aggregation of channel-forming flow.

A further note on DEQ's practice with regard to flow –DEQ practices *encouragement* of innovative measures to restore natural flows where reduced by human activities. Estimating temperatures from various flows should not be interpreted as a requirement by DEQ to limit irrigation. Instead, the intent is to determine the extent to which increased flow, if available, would change stream temperatures.

Flow restoration is underway. Irrigators are in interim discussions with US Fish and Wildlife Service (USFWS). The current agreement includes irrigation withdrawal reductions that have led to a transition from an annually dewatered reach below Nursery Bridge since 1880 or earlier, to year-round flow through that reach. As of summer 2002, more than 25 CFS have been returned continuously to the River during the low instream flow period. In addition, a local flow restoration feasibility study is underway that considers water conservation, a storage reservoir, Columbia River water exchange or voluntary purchasing or leasing of water rights. The US Army Corps of Engineers (USACE) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) are implementing this feasibility study.

And finally, an additional note on flow - the relationships between temperature and flow, and mainstem versus distributary flow are not simple. In addition to the difficulty in determining natural flow discussed in previous paragraphs in this section, there are other complicating issues:

- During the warms season, increased mainstem flow at Milton-Freewater leads to locally increased water temperature downstream – below Tumalum Bridge and below State-Line in areas where cool ground water flow previously dominated the River. This is common in de-watered rivers (e.g., Umatilla River), and is likely one of the instances where there is greater ecological benefit from flow continuity (enabling fish mobility & habitat) than from local cool spots. The Department notes that increased mainstem flow does provide for overall temperature reduction in the mainstem, as the cool areas are relatively localized, and the high temperature "spikes" would be dramatically reduced by increased river flow.
- Increasing mainstem flow can cause a decrease in flow elsewhere. Lessening distribution to the Little Walla Walla River, and thereby increasing mainstem flow, decreases ground water recharge via the distributary branches of the Little Walla Walla River. In turn less groundwater is available to supply springs, downstream distributaries and seeps that provide spring branch flow and mainstem cooling at and below the State Line. For instance, the West Fork of the Little Walla Walla River has become intermittent since 2000, most likely due to decreased distribution to the Little Walla Walla River. Optimization of flow in both the mainstem and distributary system is ecologically and hydrologically important.

(c) Water Quality Standards and Beneficial Uses

In order to protect all designated beneficial uses, water quality standards are developed to protect the most sensitive beneficial use. The Oregon temperature water quality standard is based on protection of cold water fish through various life phases. Two of the most sensitive uses are salmonid spawning in general and Bull Trout spawning and rearing. Both occur presently and historically in the Walla Walla Subbasin. The full list of designated beneficial uses is shown in **Table 1-4**. **Figure 1-4** maps the most sensitive of these beneficial uses.

Table 1-4. *Designated Beneficial Uses, Walla Walla Basin (OAR 340-04-0330, Table 330A). On-Line at: http://www.deq.state.or.us/wq/standards/WQStdsFinalGenBenUseTables.htm*

Beneficial Uses	Walla Walla River Main Stem from Confluence of North & South Forks to State Line	All Other Basin Streams
Public Domestic Water Supply[1]	X	X
Private Domestic Water Supply[1]	X	X
Industrial Water Supply	X	
Irrigation	X	X
Livestock Watering	X	X
Fish & Aquatic Life[2]	X	X
Wildlife & Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X
Aesthetic Quality	X	X
Hydro Power		X
Commercial Navigation & Transportation		
[1] With adequate pretreatment (filtration & disinfection) and natural quality to meet drinking water standards.		
[2] See also Figures 310A and 310B for fish use designations for this basin.		

Table produced November, 2003

The Oregon temperature standard is defined in OAR 340-041-0028. The applicable biologically based temperature thresholds (numeric criteria) in the subbasin are:

- Salmon and trout rearing and migration (18.0 ºC(64.4 ºF)) applicable at all times when not superseded by a cooler criterion below
- core cold water habitat criterion (16 ºC (60.8 ºF)), applicable year round in waters draining to the mainstem while still in Oregon; except where cooler criteria apply simultaneously
- salmon and steelhead spawning criterion (13 ºC (55.4 ºF)), applicable above the state border to the upstream part of the city of Milton-Freewater from January 1 through June 15
- bull trout spawning and juvenile rearing criterion (12 ºC (53.6 ºF)), applicable above the state border during times of spawning and rearing

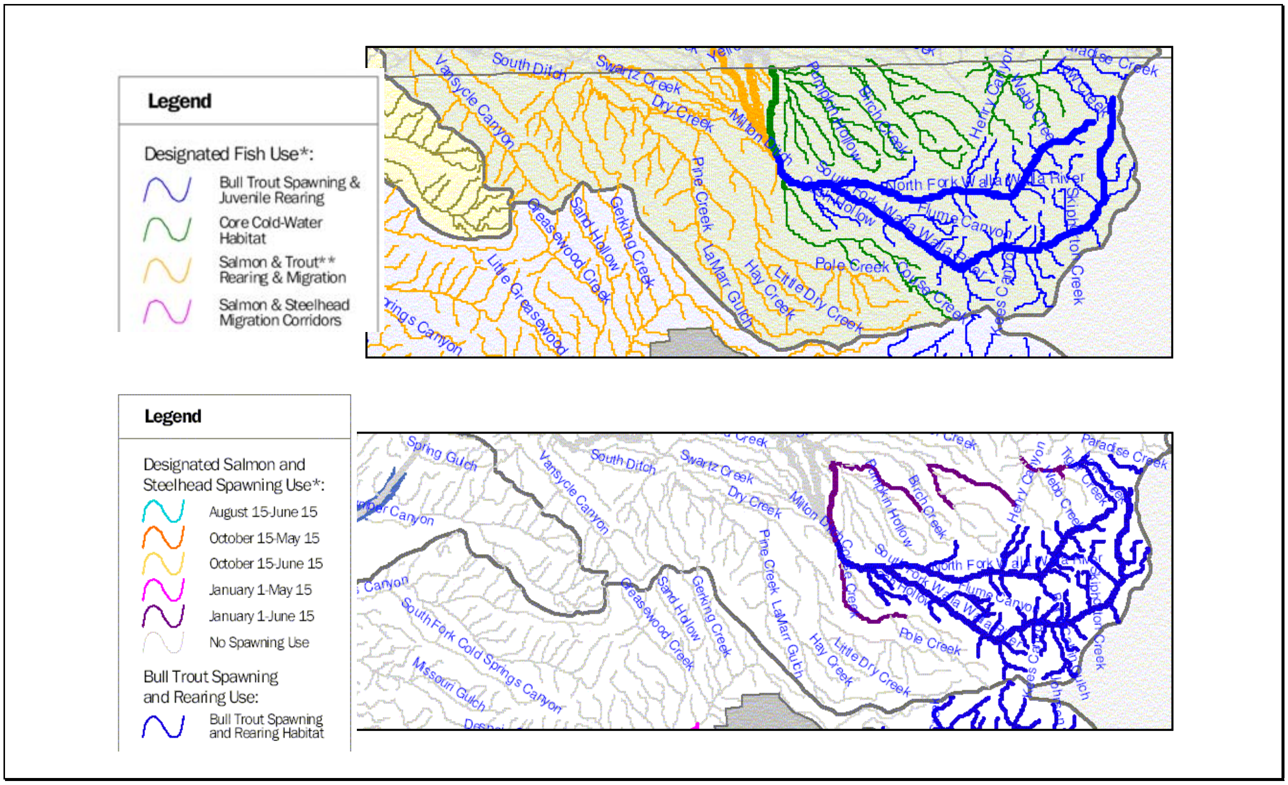


Figure 1-4. *Map of applicability for Water Quality Standard biologically based numeric criteria. Note that these plates are excerpted from larger maps -not all criteria in the legend are applicable in the Walla Walla Subbasin. These maps and further explanation are available at: http://www.deq.state.or.us/wq/standards/WQStdsTemp.htm. In the legends, ' * ' references the adjacent map and ' ** ' refers to the species addressed: all salmon species and rainbow, steelhead and cutthroat trout.*

These criteria are graphically compared with river temperature patterns (refer to **Figures 1-2** and **1-12** for spatial and seasonal patterns). The criteria would not be met during the summer in much of the subbasin even at system potential conditions. As discussed in **Section b**, system potential is the best available approximation of a more natural condition. The temperature standard states "Where the Department (DEQ) determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically based criteria, and are deemed to be the applicable temperature criteria for that water body" (OAR 340-041-0028(7)).

Additionally, the standard contains the text: "Following a temperature TMDL or other cumulative effects analysis, wasteload and load allocations will restrict all NPDES sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact" (OAR 340-041-0028(12)(b)(B)).

Accordingly, a natural temperature profile is the applicable criteria for this TMDL, to be met within 0.3 ºC at the point of maximum impact. This supersedes the numeric biologically based except at times and locations where the natural thermal profile has not been assessed (cool season and tributaries other than the modeled part of the South Fork). The previous section (**b**) elaborates further by discussing the following:

- system potential conditions are the basis for approximating a natural condition
- the current points of maximum impact for the subbasin
- the application of the 0.3 ºC human use allowance

Interstate Objectives. DEQ advocates interstate cooperation and watershed-based approaches. This raises the question – will interstate streams originating in Oregon meet Washington water quality standards when they cross the border? Washington is still in the process of updating their temperature standard. We anticipate that the Washington Department of Ecology will recognize that natural conditions are optimal and represent the lowest feasible temperatures attainable.

(d) Loading Capacity

USEPA defines loading capacity as "the greatest amount of loading that a water can receive without violating water quality standards" (40 CFR 130.2(f)). The loading capacity provides a reference for calculating the amount of pollutant reduction needed to bring water into compliance with standards. Nonpoint loading capacities in the Walla Walla Subbasin are solar radiation heat loads based on potential land cover (primarily vegetation) and channel width.

A total loading capacity can be defined as:

$$LC = WLA + LA_{nps} + LA_{bkgd} + MOS + RC$$

Where:

LC = Loading Capacity
WLA = Wasteload Allocation*
LA_{nps} = Load Allocation* from human nonpoint sources
LA_{bkgd} = Load Allocation* from natural background
MOS = Margin of Safety
RC = Reserve Capacity, for such as population growth or increased human loading
* the terms *Load Allocations* and *Wasteload Allocation* are defined in **sections g** and **h**

The loading capacity and its components are specified in **Table 1-5**. For further discussion of point sources, margin of safety and reserve capacity, refer to the applicable sections in this chapter (**g**, **i**, **k,** respectively).

For the mainstem in Oregon and the South Fork where computer modeling was performed, the bulk loading capacity without the Reserve Capacity (RC) is a maximum daily heating rate of 52.9 megawatt – the amount of solar energy that the stream is exposed to (**Section 4.2.6** of **Appendix A**). This is translated into site-specific load allocations and other objectives (**Section h)**.

Table 1-5. *Loading Capacity Distribution*

Loading Capacity in Modeled Corridor
Loading Capacity = 52.9 MW daily solar radiation heat loading
WLA = Zero
LA_{nps} = Zero or System Potential Riparian Conditions
LA_{bkgd} = 52.9 MW daily solar radiation heat loading
MOS = Not assigned (implicit).
RC = Not assigned. For future or expanded point sources this may be addressed through the human use allowance of the temperature water quality standard.

(e) Excess Load

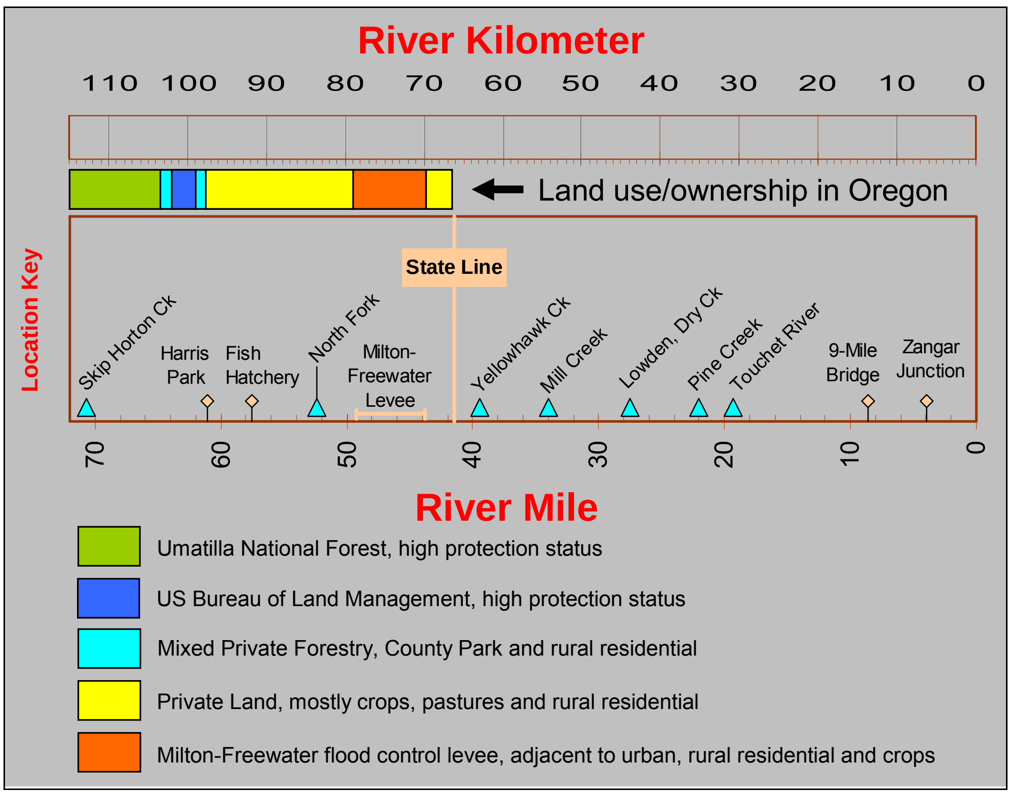
The 'excess load' element identifies the difference between the actual pollutant load in a water body and the loading capacity of that water body. Heat loading was calculated for nonpoint sources. Of the total heat exposure that occurs along the simulated part of the Walla Walla River and South Fork in Oregon, during the height of summer, fifty-one percent (daily heat load equal to 56.1 megawatt) results from human activities (**Section 4.2.6** of **Appendix A**). Point source heating is considered insignificant (**Section 2.3** of **Appendix A**, also refer to discussion in **Section g** of **Part 1**).

(f) Pollutant Sources and Jurisdictions

Human-related summer heating in the subbasin has been found to be spatially diffuse and is therefore attributable *nonpoint source* heating. Using computer simulation, nonpoint source solar heating was evaluated by comparing the existing vegetation and channel with an estimate of undisturbed conditions. In some areas, substantial solar heating occurs due to the combined effects of reduced riparian vegetation height and density and increased channel width that are related to human activities. Point source data and timing were reviewed as well and are addressed in the following section and in **Section 2.3** of **Appendix A**.

Land use categories with activities that influence channel and vegetation structure are: agriculture, urban/levee, forestry and transportation corridors. Agriculture occupies the largest area of land use in the Subbasin. Along the mainstem, roadways typically are not close enough to constrain channels except at some bridge crossings, or limit vegetative shading, but roads often follow tributaries closely. The area of urban development is quite small, however the Milton-Freewater Levee area constrains a substantial length of the mainstem in Oregon. Coarse land use, cover and ownership maps are available in **Section 1.5.6** and **1.5.7** of **Appendix A**. Basin description and development history are summarized in **Section 1.5** of **Appendix A**. **Figure 1-5a** below identifies existing land use and ownership close to the mainstem and South Fork.

Figure 1-5a. *Existing land use in Oregon along the South Fork and mainstem. Distances are approximate. Landmark locations and tributaries are shown for location reference.*

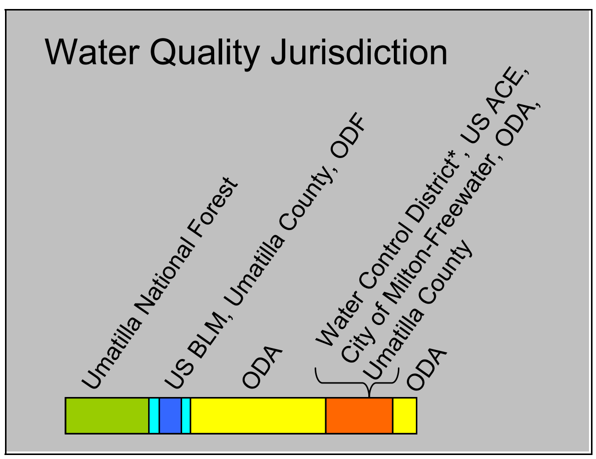


Each segment described in **Figure 1-5a** has unique channel, vegetation and land use characteristics. These are described here beginning with the upper watershed and moving downstream. The South Fork watershed in the Umatilla National Forest is generally forested with about ten percent non-forest land in grasses and shrubs and is currently managed with special protections. This area is considered to be at system potential vegetation and channel conditions (memo and discussion in **Section 3.3.3** of **Appendix**

A). Between the US Forest Service boundary and the lower part of Harris County Park (light blue in **Figure 1-5a**), the land use is mostly recreation and forestry. Both channel and vegetation modification has occurred through road construction, forest harvest, park development and recreational vehicle activities. In the reach between Harris Park and the city of Milton-Freewater, the land use is primarily agriculture. Both flow and riparian vegetation occur in relative abundance compared to reaches downstream. Channel straightening and re-location and levee construction are apparent and likely to have influenced the channel structure and ground water exchange. The channel in the Milton-Freewater Levee area is straight, wide and relatively high in gradient. Parts of this reach are losing (stream water discharge to subsurface) including dramatic localized loss in the area just below Nursery Bridge. This is true in the summer – more assessment would be needed to evaluate other seasons. Much of the area within the Levee lacks riparian vegetation, particularly in the lower Levee below Nursery Bridge (the Levee area is described and mapped in **Section 1.5** of **Appendix A**). Below the Levee the mainstem is wide and braided, passing through rural agricultural land, with some narrowing and substantial vegetation increase downstream towards the state border. Groundwater returns to the river just below Tumalum Bridge, downstream from Milton-Freewater.

Jurisdictional responsibility for water quality planning is clear in much of the Oregon part of the subbasin but may be complicated in the Milton-Freewater area. Multiple entities have responsibility for the flood control Levee construction and management, and for the management of adjacent lands (**Figure 1-5b**). **Part 2** of this document includes discussion of opportunities and responsibilities in this key area.

Figure 1-5b. *Organizations with potential responsibility for management and decisions relating to mainstem and South Fork water quality, riparian management and river structures. The colored rectangles are mainstem and South Fork land use or ownership zones from* ***Figure 1-5a****. Abbreviations: ODA – Oregon Department of Agriculture; ODF – Oregon Department of Forestry; USACE – US Army Corps of Engineers. *Milton-Freewater Water Control District.*



Solar radiation is the energy source driving daily stream heating. Solar radiation is directly influenced by channel and vegetation conditions as stated previously. In addition, streams manifest indirect causes of solar heating and features that buffer heat input (minimize temperature increase associated with heat input). Stream straightening can be an indirect cause of solar heating. Straightening increases gradient, in turn increasing velocity and associated erosivity. This typically enlarges the channel, resulting in a wide and shallow stream, particularly during the low flow season. Bank weakening, by vegetation disturbance and associated loss of soil/root strength, similarly results in wide and shallow flow. Bank disturbance by livestock, vehicles and development generally leads to increases in stream width. A wide shallow stream is readily heated by the sun if not shaded. These situations are common in the Walla Walla Subbasin, as elsewhere.

In contrast, summer daily temperature increases are less when ground water enters streams. The subsurface zone of water exchange between ground water and a stream is called the *hyporheic zone.* This zone, along with net ground water input to the stream, absorbs heat and directly cools stream water via mixing (in the summer subsurface water is cooler than stream water). Common causes of decreased groundwater input and exchange are: less floodplain area to collect spring floodwater, decreased sinuosity and associated reduction in bank area to transmit pore water, incision-lowered water tables, well withdrawal and decreased vegetative trapping and storage of precipitation and flood water. The type, amount and location of crop irrigation often influence groundwater patterns as well.

Examples and evaluation of Walla Walla River sinuosity reduction, channel modification and an assessment comparing existing and potential vegetation are described in **Appendix A**: **Sections 2.1.4**, **3.2.3**, and **3.3**. It is important to also recognize that the capacity of a stream to assimilate solar radiation is a function of stream flow rate (volume per time). Various flow profiles are assessed in **Sections 2.1.2** and **3.5** of **Appendix A**. **Figure 1-2** summarizes temperature simulations for key scenarios of flow, vegetation and channel width. Several more scenarios are included in **Chapter 4** of **Appendix A.**

(g) Wasteload Allocations (point sources)

USEPA defines Wasteload Allocation as “The portion of receiving water’s loading capacity that is allocated to one of its existing or future point sources of pollution” (40 CFR 130.2(h)).

For individual point source facilities, DEQ has issued two NPDES permits in the subbasin, assigned to the City of Weston Waste Water Treatment Plant (WWTP) and the South Fork Walla Walla Salmon and Steelhead Acclimation Facility. The Acclimation Facility permit (General Permit 300J) is no longer in effect. Permit coverage was withdrawn because the facility processes less fish than the minimum amount for which a permit is required. The permit is applicable when production is greater than 20,000 pounds of fish per year. Neither facility is assigned a non-zero WLA for reasons discussed later in this section. The Weston WWTP NPDES permit number is OR-002067-2. The Acclimation Facility NPDES prior permit number is OR-004129-7. Future point sources may access the reserve capacity allocation (as stated in the following section).

As noted in **Section b**, where appropriate analysis has been conducted, nonpoint sources and existing and future NPDES point sources are subject to the same target – natural thermal potential temperature. At other locations or outside of the season of thermal potential assessment, they will be held to other criteria of the temperature standard. The time frame of TMDL applicability is described in **Section j**.

Figure 1-6 identifies the location of these facilities. Both facilities are described briefly in **Section 2.3** of **Appendix A**, along with relevant water quality data.

For informational purposes it is noted here that the City of Milton-Freewater does not discharge directly to surface water body. The City of Milton-Freewater’s treated effluent undergoes re-use, for crop irrigation northwest of the City. This would not contribute thermal loading to the Walla Walla River or its tributaries.

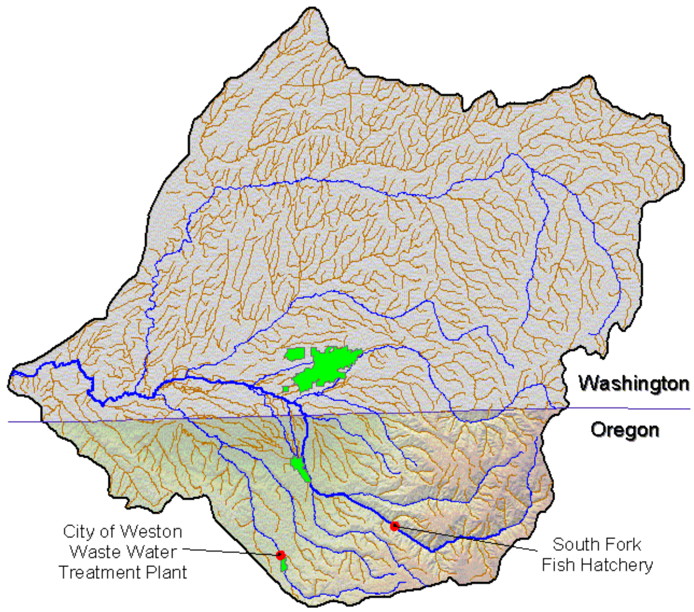


Figure 1-6. *Direct Discharge Point Sources in Oregon (storm water and agricultural drains excluded). The City of Weston waste water treatment plant discharges to Pine Creek.*

<u>South Fork Walla Walla Salmon and Steelhead Acclimation Facility</u>. The Acclimation Facility is an adult spring Chinook salmon holding structure. It is a flow-through facility, receiving water from the South Fork of the Walla Walla River and returning it over a relatively short distance. This facility was originally permitted by Bonneville Power Administration and is operated by the CTUIR. The facility operated under a State general NPDES permit for fish hatcheries during the late 1990's. As stated previously in this section, the permit has been since withdrawn and permit coverage has been considered unnecessary due to the small amount of fish processed.

DEQ evaluated thermal data for the facility. CTUIR provided temperature data from temperature data loggers placed to evaluate upstream and final effluent temperature. The data logger output, shown graphically in **Figure 2-18** of **Appendix A**, indicates no measurable difference (usually less than 0.1ºC) in daily maximum temperature between the upstream and downstream sensors. In addition, the surface temperature patterns were documented via the August 15, 2000 thermal infrared flight (accuracy is normally within 0.5 ºC). No detectable temperature increase from the facility is apparent in the thermal infrared image shown in **Figure 2-19** of **Appendix A**.

Because the function of the facility is such that heating must be minimized and the facility data shows no measurable increase to the daily maximum temperatures of the river, no wasteload allocation is developed for the facility and DEQ does not expect that the facility should constrain its operation, given the current levels of discharge and processing. Moreover, CTUIR is not requesting a wasteload allocation.

CTUIR staff have informed DEQ that long range planning and design for the facility accommodates possible expansion. The resultant facility outflow would increase by an estimated three cubic feet per second. Preliminary review by DEQ suggests that such an increase may result in a pollutant load that would require a wasteload allocation and an individual facility NPDES permit. The TMDL reserve capacity (Section k) provides for such situations. The reserve capacity would be the source of loading capacity for facility expansion, providing that sufficient unallocated reserve capacity exists at that time. The natural thermal profile for the facility location is already established via this TMDL. It is anticipated that a WLA would be produced through an addendum to this document, without necessitating a comprehensive subbasin TMDL review.

City of Weston Waste Water Treatment Plant (WWTP). The Weston WWTP discharges into an intermittent stream, Pine Creek, near the city's western boundary. The outfall average dry weather design flow is 0.1 million gallons per day. The permit limits facility discharge to no more than 1/30th of the stream's flow. The facility is not permitted to discharge during the warm season, during July 1 through October 31. In practice, the facility rarely discharges after June 1. When not discharging to Pine Creek, the facility discharges to a neighboring waste water treatment plant pond. The pond water is then re-used for crop irrigation, under a DEQ Water Pollution Control Facility Permit.

Temperature simulation of natural thermal potential was not carried out on Pine Creek because summer flow is small. As with any NPDES point source, treatment plant discharge must not cause violation of water quality standards outside of a designated mixing zone. The numeric biologically based criteria of the temperature water quality standard provide the needed targets.

Typical facility flow and a historic Pine Creek gage record are displayed in **Table 2-10** and **Figure 2-17 of Appendix A.** Based on the permit limitation of 1/30th minimum dilution and the dry weather design flow, the facility should not discharge to Pine Creek when creek flow is less than 4.6 cubic feet per second. A review of the most recent years of available data (1979-1985) reveals that Pine Creek flow has been consistently less than 4.6 cubic feet per second during the interval variously beginning May 8 to June 1 and ending November 21 to December 20. During some years flow was less than this threshold in January as well. This indicates that, with regard to the existing permit dilution requirement, the only months that are routinely appropriate for direct discharge are February, March and April.

The facility is currently operating under NPDES permit issued in 2004 and a Mutual Agreement and Order (MAO) administered by DEQ. In accordance with this MAO, the City submitted an Engineering Evaluation (March of 2004) which identifies "alternative improvements capable of meeting all applicable water quality standards and waste discharge limitations…". The alternative proposed in this evaluation eliminates discharge to Pine Creek and was approved by DEQ.

The approved alternative includes partial use of the existing plant with irrigation re-use (land application) rather than discharge to Pine Creek. The engineering evaluation recommends the expansion of the facility to include a new mechanical fine screen following the existing headworks grit channels and flume, conversion of the existing clarifier into a primary clarifier, refurbishing of the existing biosolids facilities, and development of a reclaimed water irrigation site. Additional features will include a lift station, polishing and storage pond system, and disinfection for the irrigation system.

For the purpose of this TMDL, the facility receives a wasteload allocation of zero. This is based on the permit prohibition of discharge during Pine Creek flow levels encountered during May through January, encompassing the TMDL season. In addition, issuing a wasteload allocation of zero is consistent with the facility's pending elimination of discharge to Pine Creek.

(h) Load Allocations, Surrogates and Measures of Progress

USEPA defines load allocation as "The portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources or to natural background sources" (40 CFR 130.2(g)). "Sources" means sources of pollutants, in this case excess heat.

The load allocation for the simulated river corridor in Oregon is the potential warm season solar radiation heat loading, summarized graphically in **Figure 1-7**, as a daily longitudinal heating rate per area (heat flux). Effective shade is proportional to heat flux and is shown in the figure as well, and discussed subsequently in this section, as a surrogate measure. Heat fluxes are assessed at 100 meter (328 feet) intervals along the mainstem and South Fork. In total, this load allocation is a maximum daily heating rate of 52.9 megawatt, representing forty-nine percent of the existing heat load for the simulated rivers. This loading is attributed to natural background sources. The potential solar radiation heat loading is a measure of the reduced heating associated with taller and denser vegetation and a narrower channel, relative to existing conditions, as discussed in previous sections. **Chapters 3** and **4** of **Appendix A** describe system potential conditions and the simulation of associated heat loads, in greater detail.

Figure 1-7. {Modified from Apx. A, Figure 4-2} *Load allocations for the simulated length of the Walla Walla River and the South Fork. The load allocation is the blue line (System Potential with regard to Channel and Vegetation) - Oregon only. Other lines illustrate solar heating from the existing condition, or that would occur with topographic shade only. For location reference - river miles, key locations and tributaries are related to river kilometers in* ***Figure 1-5a****.*

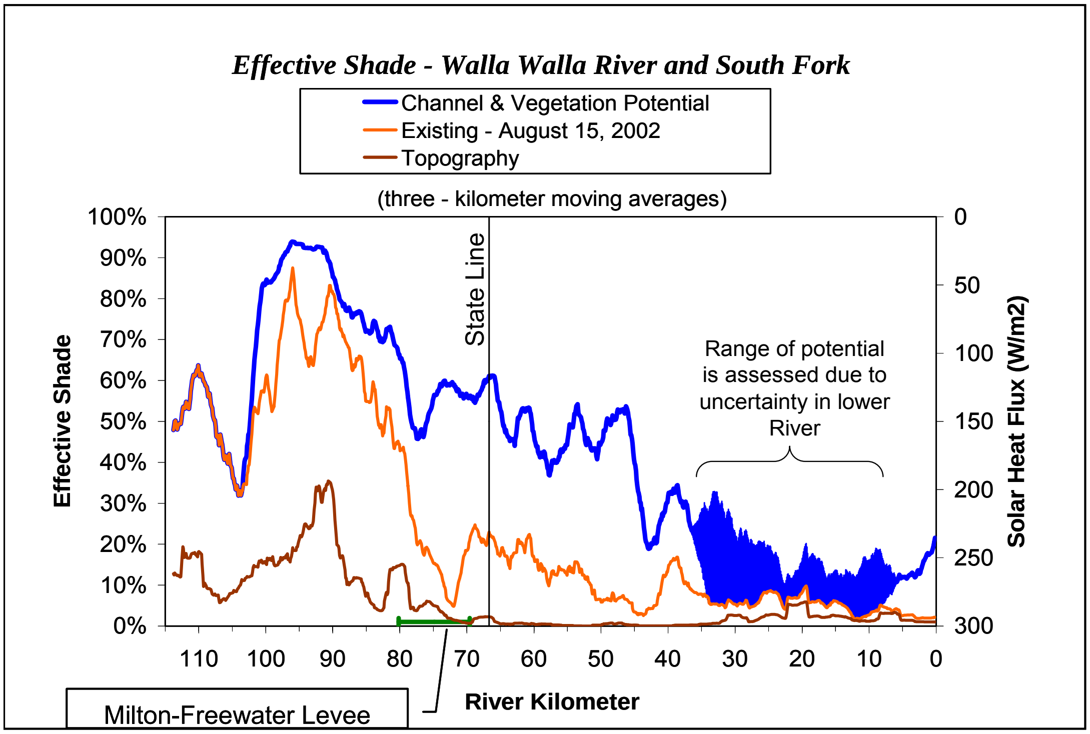


Figure Note - the entire mainstem was simulated in agreement with the WDOE. The load allocations, as described in this Section, apply solely in Oregon. The approach to integrate this assessment with WDOE's work in the Washington part of the subbasin has not yet been evaluated by WDOE. Heating is graphed here for both states for information only. The "range of potential" in Washington occurs in an area where insufficient information limited the determination of system potential vegetation.

Because the aim of the applicable criterion of the temperature standard is natural thermal potential, human activities do not receive an allocation. DEQ recognizes that attaining system potential conditions may be a lengthy process and that cost and other limitations may be encountered. This should be addressed in the TMDL implementation plans prepared by designated management agencies. DEQ also recognizes that at various times and locations attainment of system potential conditions may be impeded by natural disturbance.

The classes of system potential vegetation determined for the mainstem and South Fork are also applied to perennial tributaries (based on elevation, valley form, and precipitation). These zones are described and mapped in **Table 1-6** and **Figure 1-8**. In order to view examples of near-potential and relatively disturbed riparian areas, refer to **Figure 1-9**.

Table 1-6. *Estimated system potential vegetation species, with mainstem and South Fork locations in Oregon*

River Mile	Riparian Zone Name	Height Dominant Plants
23.0 to 52.2 (South Fork - 2.8 miles upstream of North Fork Confluence)	Deciduous Zone	Mixed Willow, Mixed Alder, interspersed Black Cottonwood
52.2 to 59.0 (Lower South Fork to BLM Trailhead)	Deciduous-Conifer Zone	**Deciduous -** Quaking Aspen, Black Cottonwood, Mixed Willow, Mixed Alder, Red Osier Dogwood. **Conifer -** Grand Fir, Douglas Fir, Ponderosa Pine
59.0 to 67.0 (BLM Trailhead to Model Upper Boundary at Skiphorton Ck)	Conifer Zone	**Deciduous -** Quaking Aspen, Mixed Willow, Mixed Alder, Red Osier Dogwood, Paper Birch, etc. **Conifer -** Mixed Firs, Ponderosa Pine, Engelmann Spruce

Figure 1-8. {Apx. A, Figure 3-19} *Map of system potential vegetation – the Oregon part is keyed by color to **Table 1-6** (Note: refer to Appendix A for bi-state assessment)*

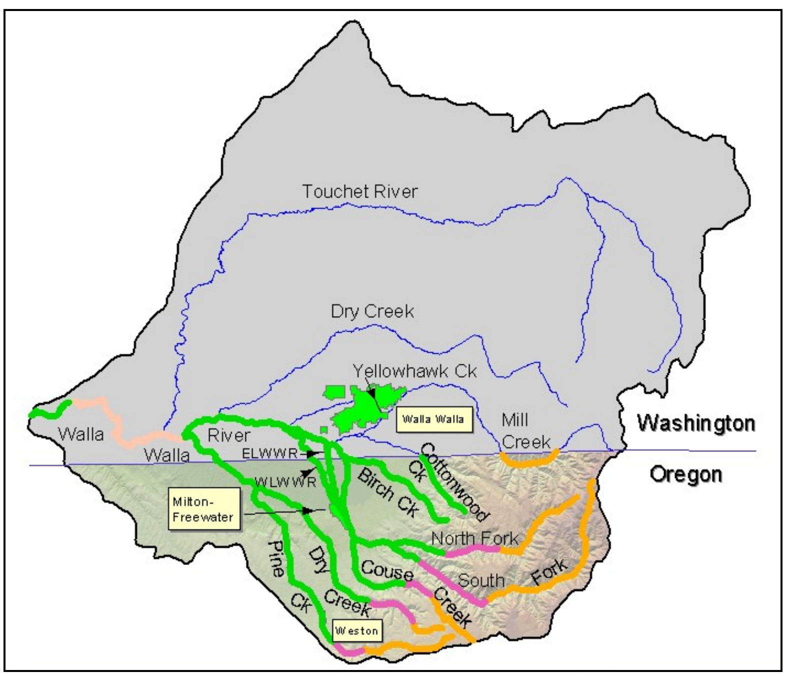


Figure 1-9. *Photographs of Riparian Vegetation along the mainstem and South Fork, as examples of vegetative conditions approaching and deviating from system potential*

Surrogate Measures

As used here, a load allocation *surrogate measure* is an alternative expression of a TMDL. Where feasible, TMDL allocations are expressed as a maximum amount of pollutant per time. This enables an 'apples to apples' division of loading among point and nonpoint sources, natural and human sources, existing and future sources. However, radiant heat energy per time, employed when addressing solar radiation, is not readily translatable to on-the-ground management. Therefore surrogates, such as *effective shade,* are established to translate the TMDL to everyday terms. Attainment of the effective shade surrogates below fulfills the Walla Walla Subbasin load allocation. The effective shade surrogates address both the size of shade-producing features and stream width, thus entirely addressing solar radiation received by streams. Resource managers can measure effective shade at any point on a stream with an instrument such as a Solar Pathfinder™.

For purposes of this TMDL, effective shade is defined as the percent reduction of potential solar radiation load delivered to the water surface, over the course of a mid-summer day**. Figures 1-5** and **1-6** of **Appendix A** illustrate this definition. Effective shade is proportional to the solar radiation heat load allocation (**Figure 1-7**).

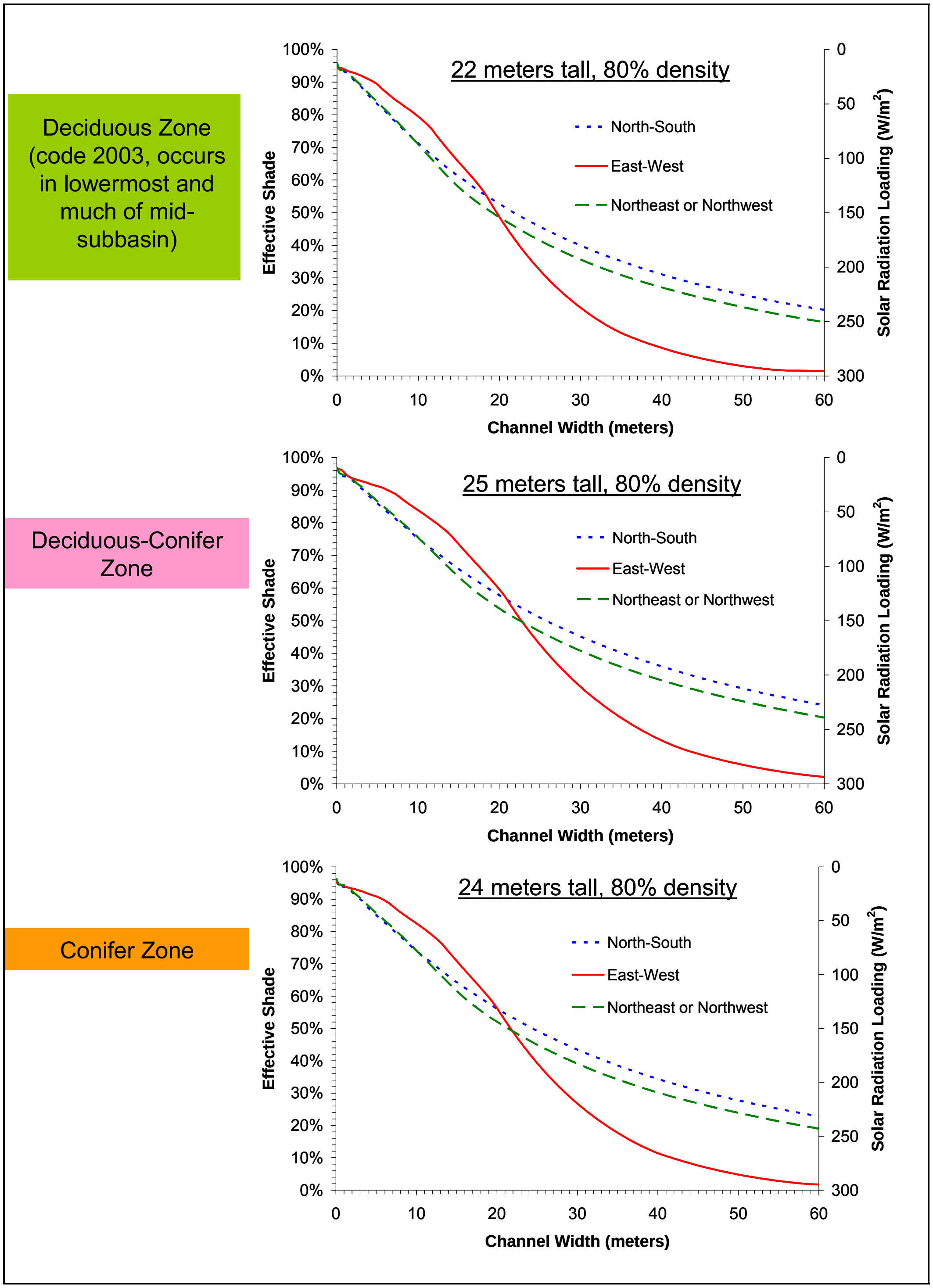
SURROGATE MEASURE #1 – Site Specific Effective Shade for the Walla Walla River and South Fork below Skiphorton Creek.

> *Surrogate Measure #1* is the system potential site effective shade shown in **Figure 1-7** (effective shade axis, channel and vegetation potential). This surrogate, as a site-specific measure, is developed only where temperature/hydrologic simulation was conducted – on the Walla Walla River and South Fork.
>
> To apply this surrogate, a resource manager would identify the river kilometer of concern (landmarks and river miles are cross-referenced to river kilometer in **Figure 1-5a**) and apply **Figure 1.7**. The blue line – channel and vegetation potential, shows the target effective shade levels along the river. This can be compared with the orange line, which is the existing shade created by both vegetation and hills. Where the blue line is significantly above the orange line, more shade is needed. For instance, at the state border, the existing shade is roughly 20 percent and the target shade is 60 percent. Taller and/or denser vegetation and channel narrowing are needed. Channel narrowing at any given point requires upstream restoration, whereas vegetation can be enhanced locally. DEQ recognizes that TMDL implementation is a community effort that may take many decades.

SURROGATE MEASURE #2 – Effective Shade Curves for perennial streams other than the South Fork below Skiphorton Creek.

> This surrogate applies on perennial tributaries where temperature and shade were not simulated. The surrogate is expressed as effective shade curves – refer to **Figure 1-10**. The curves are based on system potential vegetation and channel relationships. This vegetation is described and mapped in **Table 1-6** and **Figure 1-8** and examples are included in **Figure 1-9**.
>
> Effective shade curves are designed to display effective shade levels for a specific land cover type as a function of channel width. The curves presented in this document are developed for the Walla Walla Subbasin (i.e., vegetation assessment, latitude and longitude) and are accurate for the critical time period (**Section j**). The method considers stream aspect (flow direction) as well.
>
> Vegetation height and density are identified on the shade curve graphs of **Figure 1-10**. For more information regarding the system potential land cover types, refer to **Appendix A, Section 3.3.2**.
>
> In order to apply these curves, a resource manager will (1) choose a stream location, (2) measure the existing channel width (3) select the appropriate curve based on the channel compass direction. The effective shade indicated by the curve for that channel width is the expected shade if system potential vegetation height and density is in place. Simply put, perennial tributaries should have system potential vegetation.

Figure 1-10. *{Appendix. A, Figure 4-5} Effective shade curves. Each set of curves has color coded vegetation labels. The map of* ***Figure 1-8*** *is colored accordingly, to indicate where each set of curves applies. (Note: only Oregon is addressed in Table 6 & Figure 8, refer to Appendix A for bi-state assessment)*



SURROGATE MEASURE #3 – Channel Width, Stream Type and Width/Depth ratios.

Surrogate Measure # 3 addresses the estimated system potential channel width and width/depth ratios shown in **Figure 1-11** and **Table 1-7**. Though this is accounted for in the site-specific effective shade determination of **Figure 1-7**, channel width in and of itself provides a direct and simple measure of stream condition related to heating processes. The channel width and stream type surrogate applies to the simulated river corridor – the Walla Walla River and South Fork below Skiphorton Creek. The derivation of system potential channel widths is described in Section **3.2.3.1** of **Appendix A.** Channel complexity is a related factor that typically provides thermal and ecological benefits. Features such as beaver ponds and braided meadow areas may widen streams and yet provide a cooler, more natural setting. Channel complexity, where resultant from decreased human stress to the channel and riparian area, can be substituted for this surrogate.

Figure 1-11. {Appendix. A, Figure3-12} *Existing and system potential channel width for the mainstem and South Fork below Skiphorton Creek. For location reference - river miles, key locations and tributaries are related to river kilometers in* ***Figure 1-5a****.*

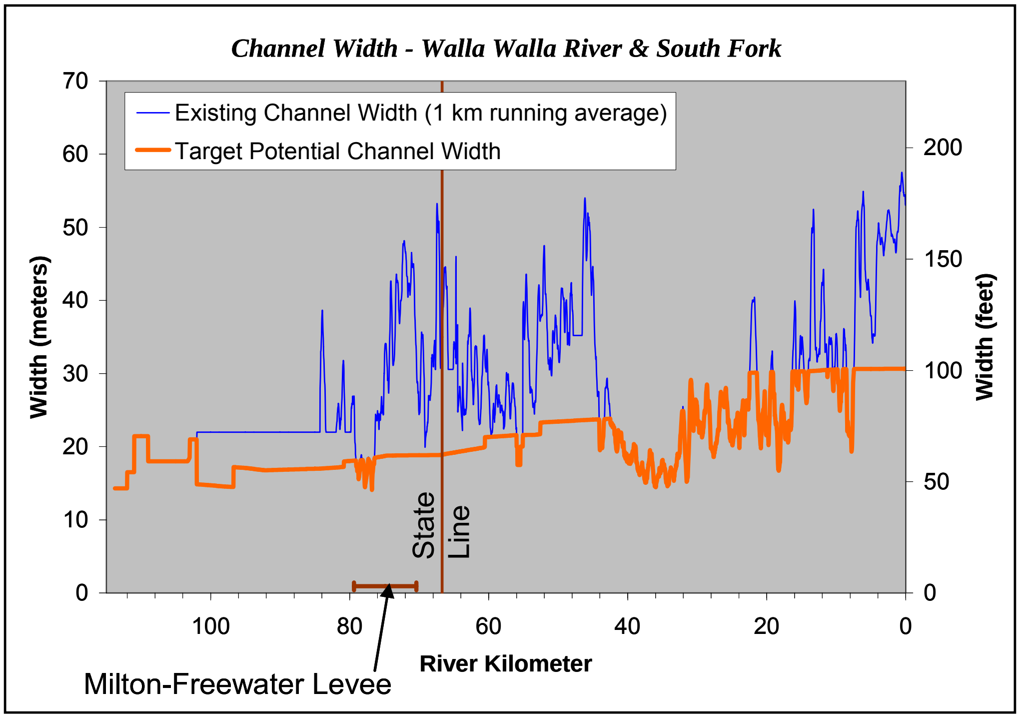


Table 1-7 displays the width/depth ratios used in the mainstem and South Fork temperature simulations to represent system potential. The rationale and relation to local measurements is described in **Appendix A**. The ratios are applied using the Rosgen (1996) classification stream type. For the mainstem and lower-middle South Fork, C-type predominates as the existing stream type. Much of the remaining channel is expected to evolve toward a C-Type configuration as well. These width/depth goals should be applied outside of the modeled corridor as well, throughout the perennial stream network. The Rosgen stream classification is described in **Section 2.1.3** of **Appendix A**.

Table 1-7. {Apx. A, Table 3-1} *Channel width/depth ratio used in system potential assessment – refer to Appendix A for details.*

Measured width/depth ratios for a wide range of US streams and rivers (Rosgen, 1996) mid-range of the greatest mode)				
Stream Type	A	B	C	F
width/depth	7	17	24	29

Implementation Responsibilities

Designated Management Agencies (DMA) are responsible for developing and implementing plans to fulfill TMDL load allocations and surrogate measures. These agencies are identified in **Part 2**, the TMDL Water Quality Management Plan (WQMP). The agency implementation plans typically stem from their existing programs, and once submitted, are included physically or by reference in the WQMP. These implementation plans must meet the requirements of OAR 340-042.

The process for identifying DMAs is straightforward. DEQ identifies existing jurisdictional responsibility for water quality in the areas where the load allocations apply. For example, the Oregon Department of Agriculture is the DMA for areas near the stream in which agriculture and rural residential land use are predominant. **Figures 1-3a** and **1-3b** indicate where this occurs along the Walla Walla River and South Fork. **Section f** further discusses DMA identification.

Through management planning, projects and ongoing assessment, the DMAs are expected to ensure that all feasible steps are taken toward attainment of the surrogate measures of this section, thus addressing load allocations. Other measures of progress are provided as well, in the next sub-section.

Measures of Progress

In addition to the previously described load allocations and surrogates, other targets can be tracked as progress is made towards a more natural heating condition. With some exceptions, these other 'measures of progress' have not been evaluated in terms of temperature reduction due to limitations in assessment capabilities or model technology. However, some measures can be quantified in terms of their expected value in the Walla Walla Subbasin (e.g., sinuosity, meander belt width), and some can be addressed narratively.

These other 'measures of progress' are listed in **Table 1-8**. These do not have the status of a TMDL load allocation or TMDL surrogate, because "surrogate environmental indicators should be clearly related to the water quality standard that the TMDL is designed to achieve" (EPA 1998). While these measures clearly lead to more natural and generally cooler streams, quantitative assessment of cooling is impractical. These measures are included here to provide increased clarity on the range of management practices and projects available to bring the stream system to a more natural thermal condition.

Table 1-8. *Measures of progress*

Measure	Suggested Objective
Channel type	Discussed in **Section 3.2.3.1** of **Appendix A**
Sinuosity	Where unconstrained alluvial channel with low gradient, expected potential sinuosity is 1.8-2.2 (**Section 3.2.3.1** of **Appendix A**)
Meander belt-width	**Figure 1-12** (following in this section)
Bank stability	General increase
Bed/channel stability	Relative Bed Stability Index (Kaufmann, 1999)
Upland and bank erosion	General reduction where increased by human activities
Increased channel complexity (increased pool frequency & large woody debris where appropriate; increased space for overflow/side channels, oxbows, off-channel pools, sloughs and other wetlands; and other enhancements to hyporheic exchange). *This measure can substitute for channel width surrogate allocation.*	Support natural channel evolution with decreased bank and riparian disturbance.
Increased active floodplain area	Setback levees, increased space, vertical channel stability
Diel temperature range	**Figure 1-13** (following in this section)
Increased flow	**Figure 1-2** of **Part 1** displays flow/temperature simulation, for flow profiles shown in **Figure 3-20** of **Appendix A**.
Vegetative buffer width	Sufficient to allow for maximum vegetation density and resilience

Figures 1-12 and **1-13** display the calculated system potential meander belt width and diel (24-hour change) temperature range. The reader is referred to **Appendix A** for details.

Figure 1-12. {Appendix. A, Figure 3-13} *Expected Walla Walla River and South Fork meander belt width resulting from system potential channel size and shape.*

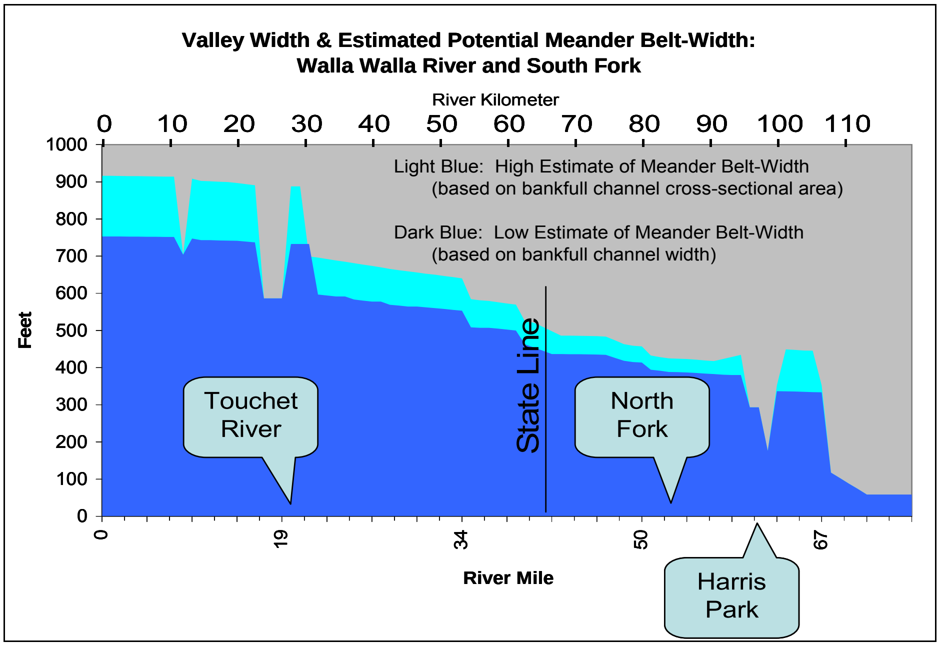
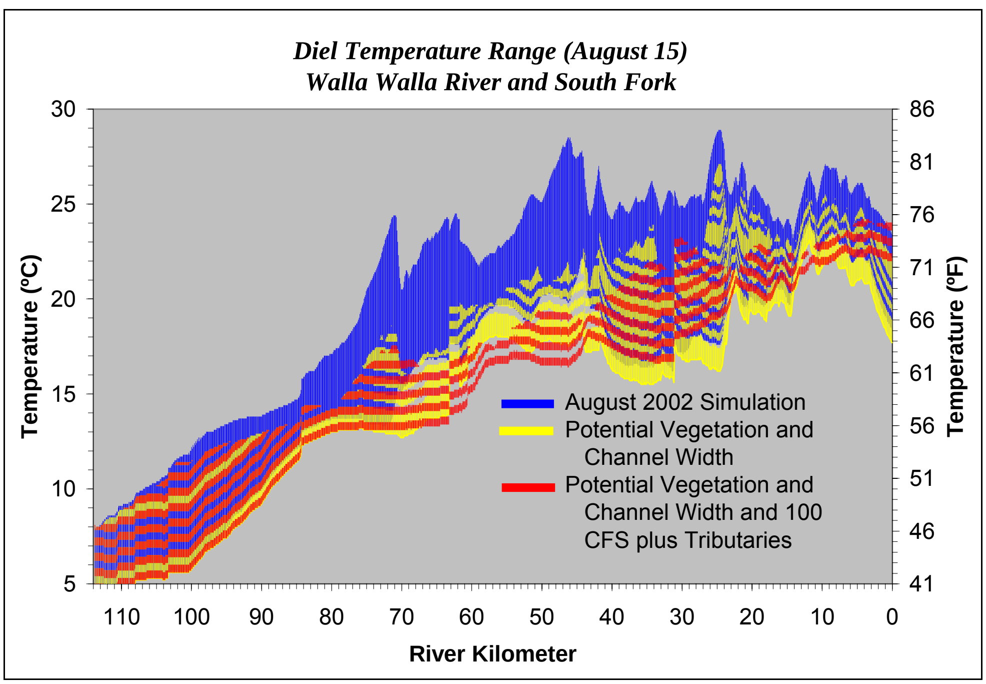


Figure 1-13. {Appendix. A, Figure 4-11} *Simulated diel temperature pattern at system potential. The red pattern is assessed at substantially more flow than existing conditions, as well as being based on system potential channel width and vegetation.*



(i) Margin of Safety

The Clean Water Act requires that each TMDL be established with a margin of safety (MOS). The statutory requirement that TMDLs incorporate a MOS is intended to account for uncertainty in available data or in the effect controls will have on loading reductions and receiving water quality. A MOS is expressed as unallocated loading capacity or conservative analytical assumptions used in establishing the TMDL (e.g., derivation of numeric targets, modeling assumptions or effectiveness of proposed management actions).

The MOS for the Walla Walla Subbasin Temperature TMDL is implicit, based on conservative analytical assumptions. Conservatively low estimates for groundwater inflow were used in stream temperature calibrations. Recall that groundwater directly cools stream temperatures via mass transfer/mixing. In addition, wind speed was also assumed to be zero or at the lower end of recorded levels. Wind speed is a controlling factor for evaporation, a cooling process. Further, cooler microclimates associated with mature and healthy near stream land cover were not accounted for in the simulation methodology.

Calculating a numeric MOS is not easily performed with the methodology presented in this document. In fact, the basis for the loading capacities and allocations is the determination of system potential conditions. It is illogical to presume that anything more than system potential riparian conditions, channel width and flow are feasible or reasonable.

(j) Seasonal Variation and TMDL Time Frame

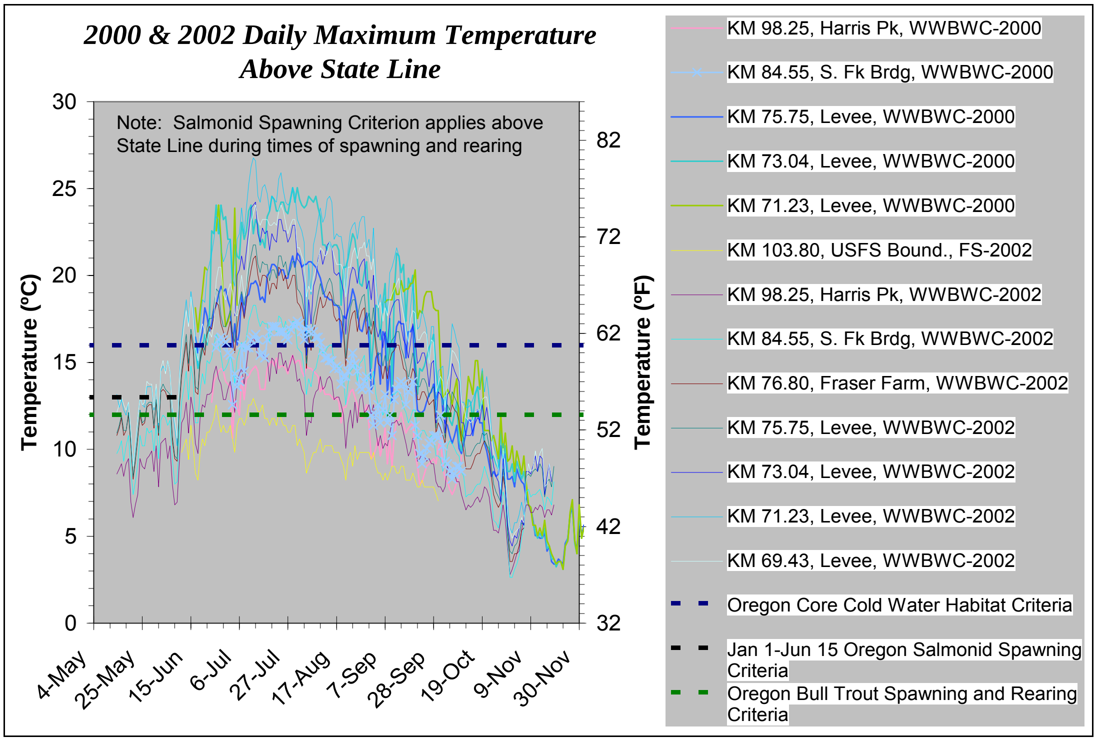
This TMDL addresses 303(d) listings for summer exceedances of temperature standard criteria. Point source permits require careful consideration of seasonality. The seasonal time-frame of the TMDL applicability, however, is not a critical concern for nonpoint sources. This is because channel and vegetation restoration are required to reduce summer heating. These improvements do not lend themselves to seasonal manipulation. It is also noted that while the load allocations are developed based on the warmest time of year, reduced impairment associated with load allocation implementation extends over a broad time frame – spring, summer and fall.

The season and location of TMDL applicability is critical for any point sources because (1) the human use allowance is assessed in the receiving water body, which varies in temperature seasonally, (2) the water quality standard criteria other than that targeted by the TMDL is still applicable outside of the TMDL assessment time frame, and (3) the TMDL target of system potential temperatures (displayed in **Figure 1-2**) only applies where assessed, on the Walla Walla River and the South Fork. Note that this discussion serves primarily for potential *future* point sources – currently there are no NPDES permitted sources on the modeled river section in Oregon.

The Walla Walla Subbasin temperature TMDL provides a system potential temperature target for the mainstem and part of the South Fork. This temperature target varies longitudinally, and serves as a point source target criteria *during the timeframe in which the river exceeds the assessed July-August system potential*.

Figure 1-14 is included here for informational purposes and to support any future point source permit development. Maximum temperatures typically occur in July and August. The TMDL focuses the analysis during the August period as the peak thermal timeframe as identified by 2000 and 2002 temperature data. The relevant biological criteria are shown on **Figure 1-14**. Further discussion and illustration of biological criteria and seasonal patterns can be found in **Chapter 5** of **Appendix A**.

Figure 1-14. {Appendix. A, Figure 5-3} *Seasonal temperatures, Walla Walla River and South Fork*



(k) Reserve Capacity

Reserve capacity is defined as “that portion of a receiving stream’s loading capacity which has not been allocated to point sources or nonpoint sources and natural background as wasteload allocations or load allocations, respectively. “The reserve capacity includes that loading capacity which has been set aside for a safety margin and is otherwise unallocated” (OAR 340-041-0002(47). It is intended to account for possibilities such as population growth or new industry.

As stated in **Section b**, within a temperature TMDL DEQ can allow an insignificant addition of heat exceeding the applicable temperature criteria, provided that wasteload and load allocations restrict all NPDES point sources and nonpoint sources to “…a cumulative increase of no greater than 0.3 ºC (0.5 ºF) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact” {OAR 340-41-0028(12)(b)(B)}. This additional heat load is termed the “human use allowance.” Because human-based thermal input is not otherwise accounted for in this TMDL, DEQ will allocate the entire human use allowance to “reserve capacity” for possible future or expanded point sources (also discussed in **Section b**).”

Any person wishing to obtain a wasteload allocation from the reserve capacity will have to apply for an NPDES permit. The application must ensure that the resulting discharge will not increase stream temperatures over the allotted amount at the point of maximum impact. This point of maximum impact may be those points already defined within this TMDL or may be at other points within the basin that have not yet been modeled. In addition, the application will have to ensure compliance with all requirements for new discharges, including anti-degradation.

Water Quality Standard Attainment Analysis

The temperature TMDL is achieved during the warm season when (1) nonpoint source solar radiation heat loading is at a natural level and (2) point source discharges cause no measurable temperature increases in surface waters or are within an allotted human use allowance. The latter is currently being achieved.

Figure 1-2 displays the stream temperatures that result from existing and system potential conditions during warm summer afternoons. Two flow scenarios are included to represent natural flow and a natural flow cross-section (this is explained in **Section b** – **Addressing Stream Flow**).

Figures 1-15 and **1-16** summarize the distribution of stream temperature simulation results. The most dramatic potential spatial temperature reduction occurs at about 22.2 ºC (72 ºF). Referring to **Figure 1-16**, note that forty-two percent of the simulated stream length is currently less than 22 ºC (71.6 ºF); whereas at system potential conditions and high flow, 84% of the river meets this threshold. For reference, temperatures that are generally protective of salmonid rearing and migration are around 17.8 ºC (64 ºF), and sub-lethal temperatures for Chinook salmon and steelhead are 25 ºC (77 ºF) and 25.6 ºC (78 ºF), respectively (Brett, 1952; Hokanson et al., 1977; OAR 340-041). The line graph of **Figure 1-16** clearly shows the shift in overall temperature regime from warmer to cooler conditions in the system potential scenario (i.e., the line has shifted to the left, which correlates to cooler temperatures).

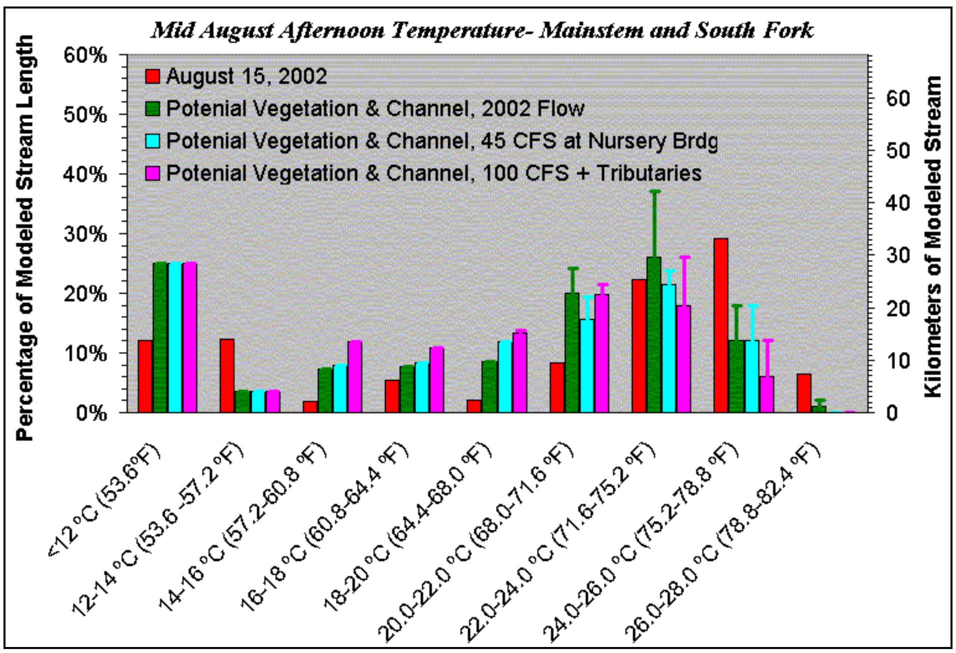


Figure 1-15. {Appendix. A, Figure 4-12} *Spatial temperature distribution for modeled stream segments. The tails on the graph bars illustrate a range due to the uncertainty in vegetation potential in the lower Basin. Note- figure addresses Oregon and Washington.*

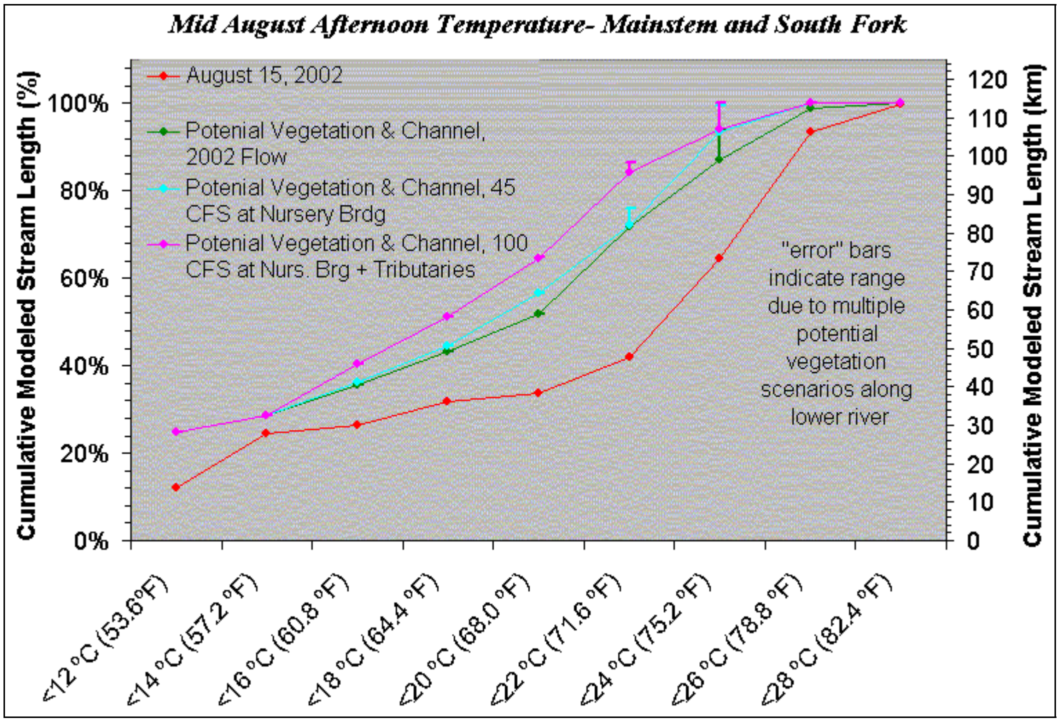


Figure 1-16. {Appendix A, Figure 4-13} *Cumulative spatial temperature distribution for modeled stream segments. The term 'potential' is 'system potential' as discussed in* ***Section b****. Note- figure addresses Oregon and Washington.*

Public Participation

Phase I. The Walla Walla Basin Watershed Council followed the TMDL development process and conducted outreach throughout the three years from monitoring to completion of this document. Eighteen formal public presentations were brought to the Council and numerous discussions were held. Typically the analytical work was co-presented by DEQ and Council staff. The TMDL analysis was presented by DEQ at a conference organized by the Council at Whitman College in Walla Walla, Washington. A presentation forecasting TMDL implementation was given at a regional TMDL implementation conference at Skamania Lodge in Washington. DEQ maintained communication with, and attended outreach events sponsored by WDOE to assist in providing bi-state integration. Several bi-state workgroup meetings were organized to discuss the TMDLs and related topics. The Watershed Council meetings are publicly advertised and are attended by citizens and partnering agencies. As draft components of the document were completed, they have been made publicly available via the Council's website at: http://www.wwbwc.org/, and direct distribution.

Phase II. This document will undergo a formal public comment period. Two meetings will be held during the public comment period, one at the beginning focusing on explanation, and one at the end focusing on a formal hearing. The comment period will be 60 days in accordance with a request from the Walla Walla Basin Watershed Council. The document will be made accessible via CDs, hard copies and on-line. DEQ will document and incorporate input, concerns and information from the public comment period, prior to submittal to the US Environmental Protection Agency for final review.

Literature Cited

The citations here are specific to **Part 1**. Other citations in **Part 1** can be found in the **Literature Cited** section of **Appendix A**.

Kaufmann, Philip; Levine, Paul; Robison, George; Seeliger, Curt; and Peck, David. 1999. *Quantifying Habitat in Wadeable Streams.* Environmental Monitoring and Assessment Program, EPA/620/R-99/003.

Mullan, John, 1858. *Report on the Construction of a Military Road from Fort Walla Walla to Fort Benton,* Ye Galleon Press, Fairfield, Washington.

US EPA. January, 2002. *TMDL Review Guidelines*. US Environmental Protection Agency, Region 10.

US Environmental Protection Agency. 1998. *Report of the Federal Advisory Committee on the Total Maximum Daily Load Program*. EPA 100-R-98-006.

Part Two

Water Quality Management Plan (Oregon)

Part 2 Table of Contents

Background

A Total Maximum Daily Load (TMDL) defines the amount of a pollutant that can be present in a water body while meeting water quality standards. A Water Quality Management Plan (WQMP) is developed by DEQ as a broad strategy for implementing TMDL allocations. TMDLs, WQMPs and associated planning work together to protect designated beneficial uses, such as aquatic life, drinking water supplies, and water contact recreation.

In December of 2002, the State of Oregon's Environmental Quality Commission (EQC) adopted a new rule, commonly referred to as the "TMDL rule" (OAR 340-042). The TMDL rule defines DEQ's responsibilities for developing, issuing, and implementing TMDLs as required by the federal Clean Water Act (CWA). The WQMP is one of the twelve TMDL elements called for in the TMDL rule. Oregon Administrative Rule **340-042-0040-(4)(l)** states:

> *(l) Water quality management plan (WQMP). This element provides the framework of management strategies to attain and maintain water quality standards. The framework is designed to work in conjunction with detailed plans and analyses provided in sector-specific or source-specific implementation plans.*

Introduction

This WQMP lays out strategies for implementing the Walla Walla Subbasin TMDL documented in **Part 1**. As indicated above, two scales of planning are addressed. The WQMP itself serves as a multi-sector framework plan for the entire Subbasin. It describes and references various plans and programs that are specific to a given land use or management sector. The sector-specific plans, or *TMDL Implementation Plans*, comprise a second tier of planning prepared by the local land use or water quality authority. This organizational process is represented schematically in **Figure 2-1**.

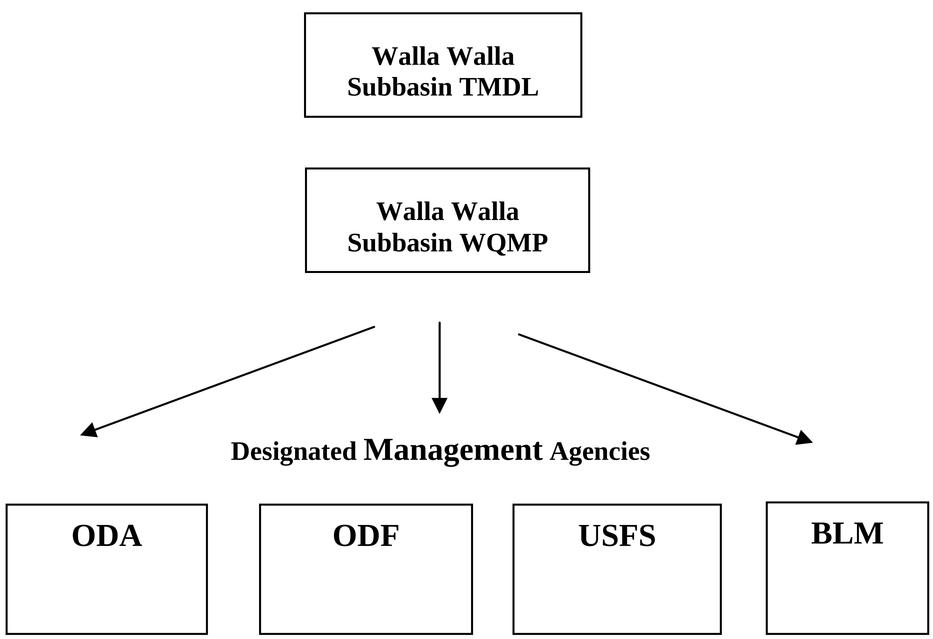


Figure 2-1. *TMDL/WQMP/Implementation Plan Schematic*

This WQMP addresses the entire Walla Walla Subbasin in Oregon, as does the TMDL. The TMDL Implementation Plans, when complete, are expected to fully describe the efforts of Designated Management Agencies (DMAs) to achieve their applicable TMDL allocations. Because the DMAs will require some time to fully develop these Implementation Plans once the TMDLs are finalized, the first iterations of the Implementation Plans are not expected to completely describe management efforts.

This WQMP establishes timelines to develop Implementation Plans. DEQ and the DMAs will work collaboratively to assure that the WQMP and TMDL Implementation Plans collectively address the elements described below under "TMDL Water Quality Management Plan Guidance". In short, this document is a starting point and foundation for the WQMP elements being developed by DEQ and the DMAs.

DEQ recognizes that the relationship between management actions and pollutant load reductions is often not precisely quantifiable. An ***adaptive management*** approach is encouraged, including interim objectives and feedback through monitoring. This is addressed in **Implementation and Adaptive Management** section, preceding **Part 1**.

Water Quality Management & Implementation Plan Guidance

The TMDL rule of OAR 340-042 lists the required elements of a WQMP. This WQMP is intended to fulfill the requirement of the rule. These elements, identified below, serve as the outline for this WQMP.

WQMP Elements

A. Condition assessment and problem description
B. Goals and objectives
C. Proposed management strategies
D. Timeline for implementing management strategies
E. Relationship of management strategies to attainment of water quality standards
F. Timeline for attainment of water quality standards
G. Identification of responsible participants or DMAs
H. Identification of sector-specific implementation plans
I. Schedule for preparation and submission of implementation plans
J. Reasonable assurance
K. Monitoring and evaluation
L. Public involvement
M. Planned efforts to maintain management strategies over time
N. Costs and funding
O. Citation to legal authorities

A final section, **TMDL-Related Programs, Incentives and Voluntary Efforts**, recognizes the importance of related programs and initiative-based efforts in watershed restoration.

TMDL Implementation Plan – Expected Components

Some of the elements listed above are sufficiently addressed in the WQMP and others are partly or largely deferred to the DMA programs. The TMDL Implementation Plans need not further elaborate upon elements E, G, H, I, and O. The Oregon Administrative Rules in OAR 340-042 clarify DEQ's expectation of TMDL Implementation Plan content, as follows:

> 340-042-0080(2): "The Oregon Department of Forestry will develop and enforce implementation plans addressing state and private forestry sources as authorized by ORS 527.610 through 527.992 and according to OAR chapter 629, divisions 600 through 665. The Oregon Department of Agriculture will develop implementation plans for agricultural activities and soil erosion and enforce associated rules as authorized by ORS 568.900 through 568.933 and according to OAR chapter 603, divisions 90 and 95."
>
> 340-042-0080(3): "Persons, including DMAs other than the Oregon Department of Forestry or the Oregon Department of Agriculture, identified in a WQMP as responsible for developing and revising sector-specific or source-specific implementation plans must:
>
> (a) Prepare and Implementation Plan and submit the plan to DEQ for review and approval according to the schedule specified in the WQMP. The Implementation Plan must:
>
> > (A) Identify the management strategies the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading;
> >
> > (B) Provide a timeline for implementing management strategies and a schedule for completing measurable milestones;
> >
> > (C) Provide for performance monitoring with a plan for periodic review and revision of the implementation plan;
> >
> > (D) 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
> >
> > (E) Provide any other analyses or information specified in the WQMP.
>
> (b) Implement and revise the plan as needed.

The following **Sections C**, **F**, **I**, **K** and **M** include further discussion regarding TMDL Implementation Plan Content.

General discussion of the expected content of TMDL Implementation Plans can be found in *Guidance for Developing Water Quality Management Plans that will Function as TMDLs for Nonpoint Sources*, DEQ, 1997. Nonpoint source pollution reduction measures are described in *Nonpoint Source Pollution Control Guidebook for Local Government*, DEQ and Oregon Department of Land Conservation and Development, 1994. More recent guidance for urban settings is available on the DEQ website http://www.deq.state.or.us/wq/, including the *Water Quality Model Code and Guide Book*, DEQ and Oregon Department of Land Conservation and Development, 2000. Most Federal and State natural resource agencies publish watershed planning guidance as well.

(A) Condition Assessment and Problem Description

In brief, the issue of concern is that the water quality standard for temperature is not being met during the summer in much of the Walla Walla Subbasin stream network. A description of the Subbasin is provided in **Section 1.5** of **Appendix A**. The temperature objectives and current summer temperature profile are shown in **Part 1, Section b**. **Section f** of **Part 1** summarizes the assessed causes of excess stream heating.

(B) Goals and Objectives

The overarching goal of this WQMP is to reduce nonpoint source pollution in the form of solar heating and in doing so to address the 303(d) temperature listings in the Walla Walla Subbasin. This will be achieved by improving riparian and channel conditions until the load allocations of **Part 1**, or their surrogates, are met. Instream flow restoration is encouraged as well, where flow regimes have been artificially modified.

(C) Proposed Management Strategies

DEQ acknowledges that restoration and conservation planning and implementation has commenced, in a manner supportive of TMDL attainment. We also recognize that in much of the basin, more restoration is needed and that long term planning should provide for maintenance of effort over time, including areas where the load allocations are currently being met. As described previously, DEQ is reliant on the DMAs for programs and projects providing strategies to minimize stream heating. The following is a list of conditions for management to address.

- Healthy riparian vegetation, including shade producing types. There is potential for continuous stands of riparian trees along most of the Subbasin perennial streams in Oregon, though in some situations this will require channel stabilization and decreased depth to groundwater. This could take decades. Potential shade producing vegetation is described in **Part 1**, **Section h**. Though DEQ does not specify required vegetation types, for overall ecological benefits and consistency with programs directed to fish and wildlife habitat restoration, native vegetation is generally optimal.
- A stable and natural channel form that will typically be narrower and/or more complex than the existing state. Passive or active restoration could be applied. Potential channel types and widths are discussed in **Part 1**, **Section h** and **Appendix A**.
- Increased sinuosity will lead to attainment of a more natural channel width:depth ratio.
- Though not assessed in the TMDL, upland management that reduces erosion and sediment runoff will support attainment of a more natural channel form.
- Increased instream flow, where depleted, will ultimately be needed to achieve the water quality standard for temperature. Note that the TMDL calls for heat reduction, and though we recommend restored flow levels as well, increased flow is not an objective required by the TMDL. Similarly, functioning floodplains are not called for in the TMDL but are recommended for their ability to increase groundwater input, and thus decrease stream temperature, during the warm season.

Management strategies should include outreach, effectiveness monitoring and inventory and tracking of water quality management practices. Implementation Plans should identify the sources of heating/cooling addressed by proposed measures. For instance, “the specified road modifications will support channel stabilization and associated narrowing, resulting in decreased stream surface area receiving solar radiation.”

(D) Timeline for Implementing Management Strategies

Individual TMDL Implementation Plans will address timelines for completing measurable milestones as appropriate. Time frames for TMDL attainment and Implementation Plan submittal are addressed in **Sections F** and **I**.

DEQ also recognizes that there has been and continues to be much progress towards increased water quality in the Subbasin, that has been occurring for years. Natural resource agencies, local jurisdictions, landowners and the Walla Walla Basin Watershed Council have been active both directly and through outreach. This report does not attempt a timeline addressing the many ongoing and voluntary efforts.

(E) Relationship of Management Strategies to Attainment of Water Quality Standards

Riparian vegetation and channel shape substantially and quantifiably influence stream heating. **Figures 1-2** and **1-7** of **Part 1** illustrate the temperature and heat loading profiles for various configurations of vegetation and channel form. **Appendix A** provides further information documenting these relationships in the Walla Walla Subbasin. The TMDL objective is the natural thermal profile that would be attained when solar heating is reduced to the level of the load allocations, as accomplished by improving vegetation and channel conditions.

The temperature water quality standards (natural condition criteria) will be met as load allocations are attained, if sufficient stream flow restoration occurs. Management strategies should be clearly linked to the load allocations and their surrogates.

(F) Timeline for Attainment of Water Quality Standards

The timeline for attainment will vary substantially across the Subbasin. In the upper South Fork watershed, the natural condition criterion is currently met. In the Milton-Freewater area, key societal decisions addressing the Levee have not yet been fully addressed. DEQ expects that water quality standards will be attained as soon as feasible given technical, political, and economic constraints.

Vegetation growth rates can be readily assessed and channel recovery rates can be roughly estimated. With disturbance minimized and recovery enabled, substantial reduction in solar heating could be achieved in much of the Subbasin in 25 to 75 years. However the rate of management systems development and adoption is a key part of the timeline and remains uncertain. DMAs are expected to estimate these timelines, to the extent feasible.

(G) Identification of Responsible Participants or DMAs

The purpose of this element is to identify the organizations responsible for the implementation of the Walla Walla Subbasin TMDL (**Table 2-1**). A more detailed discussion of each organization's responsibilities is provided in **Section H**.

DMAs are defined as "federal, state or local government agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the DEQ in a TMDL" (OAR 340-042). To the extent the term DMA is applied to organizations responsible for TMDL implementation plans or programs, the DMAs for the Walla Walla Subbasin TMDL are: ODA, ODF, BLM, and the Umatilla National Forest. Other organizations share in TMDL implementation responsibility and are discussed in this and following sections, but are not required to submit TMDL implementation plans. Also with regard to TMDL responsibilities, DEQ recognizes that organizations are not responsible for land use activities or load allocations outside of their area of jurisdictional authority.

Part 1, **Section f** describes the geographic and/or land use areas of responsibility for various organizations with TMDL implementation responsibilities. The location of load allocation applicability is described in **Part 1**, **Section h** and **f**.

Table 2-1. *List of organizations with TMDL responsibilities*

Management Agency	Area of Jurisdiction	Expected Form of Planning in Response to TMDL
Oregon Department of Agriculture	Agricultural and associated rural residential land use along the mainstem and all perennial tributaries	SB1010 Agricultural Water Quality Management Area Plan, updated as needed in 2006 to address the TMDL
Oregon Department of Forestry	Conifer and Mixed Forest on non-Federal upper reaches of the South & North Forks, Mill Ck, Couse Ck, Dry Ck and Pine Ck	Ongoing implementation of the Forest Practices Act
US Forest Service	Umatilla National Forest	USFS Water Quality Restoration Plan
US Bureau of Land Management	BLM managed area above Harris County Park	BLM Water Quality Restoration Plan
Umatilla County	County roads along subbasin perennial tributaries.	DEQ expects that through time consideration be given to road and/or bridge modifications in support of vegetation and channel recovery. At this time a TMDL Implementation Plan is not required.
US Army Corps of Engineers, Milton-Freewater Water Control District	Mainstem flood control Levee between Couse Creek confluence and Tumalum Bridge	At this time a TMDL Implementation Plan is not required. DEQ and Levee Authorities are currently in discussion regarding Levee planning in relation to the TMDL.

Note that the City of Weston is not obligated to submit a TMDL Implementation Plan for Pine Creek because Pine Creek is not perennial in the Weston area and the load allocations only apply on streams that directly influence mainstem temperature during the summer. It is also noted that the City is a very small part of the Pine Creek drainage. However, there is a 303(d) listing on Pine Creek for dissolved iron (deferred till later TMDL development). This should be kept in mind for water quality assessment and planning.

Similarly, the City of Milton-Freewater, though not obligated to respond to the TMDL, may choose to be involved in decisions relating to the Milton-Freewater Levee.

This WQMP primarily addresses nonpoint sources. Point sources have minimal contributions and are addressed through permits rather than nonpoint source TMDL implementation plans, as discussed in **Part 1**. However, for clarity and completeness point sources are accounted for in the following **Section**.

(H) Existing Planning Framework and Expected TMDL Response

Several organizations utilize existing programs as TMDL Implementation Plans. This is typically documented in a memorandum of understanding or agreement with the DEQ. The following planning efforts provide for TMDL implementation in the Walla Walla Subbasin. DEQ expects that they will be updated as needed to layout all feasible steps toward meeting the TMDL. The sections below describe the general form of the anticipated response to the TMDL. Expected elements of TMDL Implementation Plans are listed in a preceding **Section** entitled ***Water Quality Management & Implementation Plan Guidance***.

NPDES Permit Program – Point Sources

DEQ administers the National Pollutant Discharge Elimination System (NPDES) permits for surface water discharge; and is delegated to do so by USEPA. The NPDES permit is a federal permit, required under the Clean Water Act for discharge of waste into waters of the United States.

Individual facility NPDES permits are unique to a discharge facility. General NPDES permits address categories of facilities or aggregate pollutant sources, such as fish hatcheries or storm water. There is presently one individual facility NPDES permit issued in the Walla Walla Subbasin. This facility, the City of Weston Waste Water Treatment Plant (WWTP), will not be permitted to discharge directly to surface water in the warm season when the TMDL applies. In addition, DEQ has approved the City's plan to eliminate WWTP discharge to Pine Creek. In the event that any new individual facility permits are issued in the Subbasin, they will be written to insure that all 303(d) related issues are addressed in the permit.

There are two storm water NPDES general permits that apply in the Walla Walla Subbasin. Storm water runoff is slight during the warm season, because summer rainfall is slight.

In summary, NPDES permit requirements need not be modified in response to this TMDL. Any future permits must address the TMDL as appropriate given their location and season of discharge.

Nonpoint Sources

Agricultural Lands

The Oregon Department of Agriculture (ODA) is the DMA responsible for regulating agricultural activities that affect water quality. ODA employs *Agricultural Water Quality Management Area Plans* (AgWQMAP) and associated rules to implement TMDLs throughout the state. Periodic review of the progress of AgWQMAP implementation is called for in rule (OAR 603-090-0020). The AgWQMAP are reviewed biennially.

DEQ and ODA coordinate TMDLs and agricultural planning through a 1998 Memorandum of Agreement (MOA). The MOA states that "*Load allocations for agricultural nonpoint sources will be provided by DEQ to ODA which will then begin developing an AgWQMAP, or modifying an existing AgWQMAP, to address the load allocation*" and, specific to situations where AgWQMAP development has proceeded a TMDL: "*At the time that DEQ develops load allocations for agricultural nonpoint sources or groups of sources, ODA will evaluate the AgWQMAP previously developed plan to assure the attainment of DEQ's load allocations for agriculture*."

Local Management Agencies (LMA) are funded to conduct outreach and education, develop individual farm plans for operations in the planning area, work with landowners to implement management practices, and help landowners secure funding to cost-share water quality improvement practices. The Local Management Agency is the Umatilla County Soil and Water Conservation District, working under contract to ODA.

Progress reports, which are submitted to the Board of Agriculture after the biennial review process, are developed based on data collected by Local Management Agencies and ODA on progress of implementation of the plans and rules. Reports to the Board of Agriculture and Director will include statistics on numbers of farm plans developed and types of management practices being employed. These reports are available to DEQ for review in assessing implementation progress.

Current Status. The first Walla Walla Subbasin AgWQMAP and rule were adopted by the Board of Agriculture on April 17, 2002. A first biennial review was recently implemented by the ODA and the Local Advisory Committee (LAC). The review report, issued to the Board of Agriculture on December 16, 2004, concludes that "*The Walla Walla Area Plan and Rules have been an effective component of a cooperative effort to protect and enhance water quality and quantity*." The report states that "*based on the evaluation, the LAC decided that there was no need to revise the Area Plan or Rules. The LAC wanted to defer the inclusion of TMDL load allocations until the next biennial review, when the TMDL will be complete.*" The AgWQMAP and Rules are available from ODA's website at: http://www.oda.state.or.us/nrd/water_quality/areapr.html.

DEQ Expectations. DEQ expects that the next biennial review, in 2006, will address the temperature TMDL for the Walla Walla Subbasin – including identifying how progress toward achievement of the surrogate measures for load allocations will be approached.

Non Federal Forest Lands

The Oregon Department of Forestry (ODF) is the DMA for water quality protection from nonpoint source discharges or pollutants resulting from forest operations on non federal forestlands in Oregon.

The Forest Practices Act (FPA) applies broadly to state forest lands and also provides for watershed-specific protection rules. Watershed-specific protection rules are a mechanism for subbasin-specific TMDL implementation in non-Federal forest land where water quality impairment is attributable to current forest practices. Legacy issues are addressed through management planning with ODF as a participant.

Coordination between ODF and DEQ is guided by a Memorandum of Understanding (MOU) signed in April of 1998. This MOU was designed to improve the coordination between the ODF and the DEQ in evaluating and proposing possible changes to the forest practice rules as part of the TMDL process. ODF and DEQ are involved in several statewide efforts to analyze the existing FPA measures and to better define the relationship between the TMDL load allocations and the FPA measures designed to protect water quality.

Current Status. The Forest Practice Rules apply in non-federal forest areas in the Walla Walla Subbasin. Watershed-specific rules have not been established in the Basin.

DEQ Expectations. DEQ has not identified water quality impairment that is specific to forest management in the basin and the subbasin land area of non-federal forest is small. DEQ expects ongoing implementation of the Forest Practices Act and further assessment by ODF on tributaries, as to whether tributary shade/channel surrogates are met.

Federal Lands – US Forest Service and the US Bureau of Land Management

The US Forest Service (USFS) and Bureau of Land Management (BLM) are DMAs for federal lands in the Subbasin in Oregon. In July 2003, both agencies signed memorandums of agreement with DEQ defining how water quality rules and regulations regarding TMDLs will be met. The agencies generally respond to TMDLs by developing and implementing Water Quality Restoration Plans (WQRPs) which will be the equivalent of TMDL Implementation Plans. The U.S. Forest Service and BLM have developed a protocol to be used to guide the development of WQRPs (USFS 1999). The WQRPs are revised as needed in order to implement TMDLs.

Umatilla National Forest. The USFS manages lands in the upper part of the Subbasin, along its eastern boundary. This area is administered by the Umatilla National Forest, through the Supervisor's Office in Pendleton, Oregon and the District Office in Walla Walla, Washington. The South Fork watershed is under special protection status (refer to Appendix A, Section 3.3.3) and is considered to be at potential, in terms of vegetation and channel conditions. DEQ regards this area as currently meeting the load allocations of Part One. Other watersheds in the Subbasin that are managed by the Umatilla National Forest include Mill Creek and the North Fork of the Walla Walla River. National Forest lands in the North Fork Watershed are managed under the same Forest Plan designation as the South Fork. The Mill Creek Watershed has more restrictive (less human impact) management designations reflecting its status as a municipal watershed. The load allocation surrogate addressing the North Fork and Mill Creek watersheds is effective shade in relation to channel width. Historic management included some harvest in riparian areas (memo of Figure 3-18b, Appendix A), though not in large aerial extent and not in the municipal watershed.

Current Status. A WQRP has not yet been developed.

DEQ Expectations. DEQ expects documentation reflecting a commitment on the part of the Umatilla National Forest to maintain the existing level of channel and riparian protection, thus providing for ongoing attainment of load allocations in the South Fork Watershed. The Mill Creek and North Fork watersheds should be addressed through a WQRP or some form of documentation evaluating current departure from potential, if any, and specifying ongoing management to attain or maintain load allocation attainment.

BLM Lands above Harris County Park. The BLM manages an area of TMDL applicability above Harris County Park on the South Fork of the Walla Walla River. This area encompasses roughly 3 miles of river and is administered by the BLM Baker Resource Area Field Office in Baker City, Oregon. **Figure 1-2** shows apparent excess heating in this vicinity – however, in this area the assessment of channel width and vegetative structure is of relatively low resolution. It is not clear whether heating is attributable to legacy forest practices, recreational usage or natural causes. Recreational access is a salient issue because in this area the riparian corridor and river crossings (fords) are the pathway to hiking, camping, vacation cabins and other recreational usage upstream from Harris County Park.

Current Status. As yet there has not been a WQRP developed for BLM lands in the Subbasin. The primary BLM management on the South Fork relates to resource protection and recreational access. The Field Office plans to prepare an Environmental Assessment and is currently working with landowners regarding access. Additionally, the BLM has designated this land an Area of Critical Environmental Concern (ACEC). The ACEC designation of 1992 is intended to "recognize the relevance and importance of the fisheries, wildlife, riparian and scenic values found within the area" (BLM, 1992). The goal of this designation is to provide necessary special management direction to protect and enhance the riparian ecosystem while still allowing recreational use.

DEQ Expectations. DEQ anticipates WQRP development and implementation in order to ensure that the river does not exceed its natural thermal potential.

Umatilla County

There are two areas in the Subbasin where Umatilla County seems most likely to have TMDL involvement: the Milton-Freewater Levee and County roads along perennial tributaries. At this time a TMDL evaluation for the Levee is expected from the organizations directly responsible for Levee construction and management. Accordingly, DEQ does not expect the County to submit TMDL implementation documentation. There may be areas as yet unidentified, along tributaries, where County roads influence channel and vegetation in a manner that leads to stream heating.

DEQ Expectations. DEQ expects that through time the County should assess County roads along perennial tributaries. These roads should be evaluated for impediments to load allocation attainment. DEQ requests that the County clarify these objectives in road maintenance and construction planning. In addition, expansion or modification of Harris Park or other County near-stream facilities should be accompanied by TMDL planning and should not impair or preclude river shading and channel restoration. A TMDL Implementation Plan is not anticipated.

Milton-Freewater Levee

The Milton-Freewater flood control Levee was originally completed in 1952. USACE rebuilt the Levee after it was damaged in the flood of 1964. **Appendix 1**, **Chapter 1** includes maps and a description of this Levee and its history. The Levee is a distinctive feature in the basin, for its size and the degree of river straightening that has occurred. The Levee is 5.3 miles in length. Due to its role in minimizing vegetation, increasing the channel width to depth ratio, decreasing sinuosity and eliminating floodplain area, it is a substantial cause of excess heating of the Walla Walla River. It is, however, important in protecting the community from flood hazard. Large public projects such as large levees and highways may paradoxically limit water quality while providing societal benefits. We encourage consideration of long-term and opportunity-based actions that lead to improved water quality. For instance, the Levee requires ongoing maintenance and construction to maintain its integrity – if part of the Levee needs to be rebuilt, that may be an opportunity to allow more space for sinuosity or floodplain area within the Levee. It is DEQ's understanding that the Levee is currently in need of repair. Streambed degradation below Nursery Bridge is undermining the toe of the Levee.

Below Nursery Bridge in Milton-Freewater, the Levee extends for 2.4 miles to its terminus at Tumalum Bridge. This lower section runs through a rural landscape, mostly agricultural. This reach, being diked on both sides, is the most impaired (ecologically) within the length of the Levee and may have the greatest restoration potential. DEQ staff have had numerous conversations with community members and officials regarding possibilities for the Levee. An understanding of the feasibility (engineering, social, economic) of reducing heating in this reach is evolving, and there does appear to be local interest. In support of water quality improvements, a loan through the State Revolving Fund (SRF), administered by DEQ, is likely an option. The US Army Corps of Engineers has indicated a willingness to seek partial funding for a Levee setback project, up to seventy-five percent of the cost. Other grant sources may be available as well.

As stated above, in its current configuration the Levee results in excess heating of the river. Hence change is needed if the reach is to be improved ecologically and load allocations are to be achieved. In support of this, it is important to recognize efforts underway and in the past, reflecting progress and community initiative:

- As discussed previously, instream summer flow in the leveed reach is being maintained year round, including the previously intermittent reach above Tumalum Bridge.
- USACE prepared an Environmental Evaluation of the cost and practicality of widening the Levee corridor at various locations (though this was not implemented due to lack of funding, it provided substantial information and is an important step towards developing practicable solutions).
- The Milton-Freewater Water Control District has negotiated with USACE to modify maintenance policies to allow trees on the back slope of the Levee (some of these trees provide summer afternoon shade crossing the river). Within the Levee trees with trunk diameters up to four inches are allowed.
- Natural resource organizations worked together to modify the gravel mining permit (remove and fill, Division of State Lands) so that only newly accreted gravel can be removed from the channel bed. Prior to this, gravel mining was allowed to penetrate the cemented gravel aquitard, which may have increased river flow loss to the subsurface as well as disturbing fish habitat.

DEQ Expectations. Ongoing evaluation of potential mechanisms for temperature and habitat restoration in this reach is needed. Cost and funding sources should be identified. Feasible modifications would require design, project management and implementation. Targeted planning scenarios should include:

- decreased channel width to depth ratio
- vertical and lateral channel stability
- increased river shading
- increased floodplain area
- increased sinuosity
- increased hyporheic exchange

The Levee authorities are the US Army Corps of Engineers and the Milton-Freewater Water Control District. USACE designed and constructed the Levee, as mentioned previously. The Water Control District oversees the maintenance of the project in compliance with specifications set forth by USACE.

USACE has agreed to continue to work with the community on water quality improvement in the Levee. The Walla Walla Basin Watershed Council has agreed to assist in the facilitation of this process. The Milton-Freewater Water Control District currently has limited funding and direction to address water quality. The DEQ will support efforts of, and work with, Levee authorities and the Watershed Council in taking the next steps of seeking funding, encouraging community interest and evaluating feasible measures to decrease river heating within the Levee.

From DEQ’s perspective, the initial objective is to evaluate paths toward decreased river temperature in the Levee reach. If methods and viability of temperature reduction are still unclear after the first iteration of this TMDL, DEQ will re-engage the Levee authorities and community in further discussion of possible temperature reduction measures. DEQ may also formally name one or more of the Levee or land use authorities as the Designated Management Agency (DMA) responsible for addressing the temperature effects of the levee.

(I) Schedule for Preparation of Implementation Plans

This section specifies a timeline for the preparation and submission of implementation plans by DMAs. In accordance with OAR 340-042-0060, TMDL are issued as a DEQ order, effective on the date signed by the Director. DEQ will notify all affected NPDES permittees, nonpoint source DMAs identified in this document and persons who provided formal comment on the draft TMDL within 20 business days of TMDL issuance. DEQ expects that the USFS, and BLM will fulfill the planning expectations of **Section H** with 18 months of the date of receipt of their notification letter. The Forest Practice Rules of ODF are already in effect and ODA follows a two year timeline from the last AgWQMAP review as specified by rule. As a schedule benchmark, the Levee evaluation process should identify potential alternatives to be evaluated within this 18 month timeframe as well.

DEQ review and approval of TMDL implementation plans is called for in OAR 340-042. Following Implementation Plan submittal, DEQ will work closely with DMAs to ensure a successful and timely review/approval process. In accordance with MOUs, once a USFS or BLM WQRP is received by DEQ, DEQ will provide a letter of approval within 60 days with any appropriate requirements for revision.

The implementation plans, this WQMP and the TMDLs are part of an adaptive management process. Review of the TMDLs, WQMP and Implementation Plans will tentatively target a 5 year cycle, but this is subject to available staff time and varying levels of priorities within and outside of DEQ. Evaluations that trigger revision of the Implementation Plans will include, but not be limited to, consideration of: DMA recommendations, the periodic evaluation called for in **Section M**, new 303(d) listings, TMDL revision and other BMP effectiveness and water quality trend evaluations.

(J) Reasonable Assurance

This section of the WQMP is intended to provide reasonable assurance that the WQMP (along with the associated DMA-specific Implementation Plans) will be implemented and that the TMDL and associated allocations will be met. NPDES point sources are addressed through the DEQ and USEPA permit program. This Section will focus on nonpoint sources.

Federal Lands
As discussed previously, the BLM and USFS are DMAs for federal lands in the Walla Walla Subbasin and both agencies have signed memorandums of agreement with DEQ. These MOAs include agreement to prepare and implement Water Quality Restoration Plans (WQRPs) addressing TMDLs. For further discussion, refer to **Sections H** and **O**.

Non Federal Forest Lands
As discussed previously, the Oregon Department of Forestry (ODF) is the DMA, by statute, for water quality protection from nonpoint source discharges or pollutants resulting from forest operations on non federal forestlands in Oregon. Linkage to TMDLs and legal authority are discussed in **Sections H** and **O**.

Agricultural Lands
As discussed previously, the Oregon Department of Agriculture (ODA) is the DMA responsible for regulating agricultural activities that affect water quality. AgWQMA Plans are the TMDL implementation mechanism for agricultural and related rural residential land use. As noted in **Section H**, an AgWQMA Plan has been prepared for the Walla Walla Subbasin and ODA has institutionalized a 2-year update cycle.

Voluntary Farm Plans are a key component of the SB1010 planning process. In addition, ODA has the ability to assess civil penalties when local operators do not follow their local Agricultural Water Quality Management Area rules. Legal authority is discussed in **Sections H** and **O**.

Urban and Rural Lands
Oregon cities and counties have authority to regulate land use activities through city and county ordinances and local comprehensive land use plans. The Oregon land use planning system, administered through the Oregon Department of Land Conservation and Development, requires local jurisdictions to address water quality protection through Statewide Planning Goals 5 and 6. Though counties and cites are not identified herein as DMAs, both have potential contributions in preventing possible future point source pollution and both will likely interact with TMDL DMAs on stream-temperature related issues.

Umatilla County is participating in the ESA Bi-State Habitat Conservation Plan process. This plan relates to the TMDL in that several of its objectives have similar aims. Umatilla County employed a consultant to review County land use plans, codes and ordinances to assess risk to Endangered Species Act (ESA) listed salmonids. The review identified several areas of strength with regard to existing capacity to protect endangered species. A few provisions are mentioned here as TMDL-supportive examples: wetland setbacks (Comprehensive Plan 1987, VIII-5): restrictions on development in natural areas (Natural Area Overlay Zone 152.470.152.475): minimization of road impacts to water quality (Comprehensive Plan 1987, VIII-7): maintenance of water quality in streams and groundwater (Comprehensive Plan 1987, VIII-22), development limited to non-structure improvements that are non-detrimental to maximum run-off flows (Comprehensive Plan 1987, X-2): restrict or limit channelization, alteration of stream banks, vegetation removal and stream channel filling (Comprehensive Plan 1987, VIII11); replanting in riparian areas shall occur with indigenous species (Zoning Ordinance and Map, 152.016); and no more of a parcel's existing vegetation shall be cleared from the setback and adjacent area than necessary for uses permitted (Zoning Ordinance and Map, 152.016).

Voluntary Efforts and Public Funding
Environmental watershed planning in Oregon is supported through outreach, technical assistance, monetary incentives and cost share funding through a variety of organizations and programs (refer to **Sections N** and **TMDL-Related Programs, Incentives and Voluntary Efforts**). As watershed programs continue to develop and more projects are implemented, landowner adoption of water quality practices broadens through increasing knowledge, familiarity and success.

(K) Monitoring and Evaluation

Monitoring and evaluation has three basic components: 1) implementation of TMDL implementation plans identified in this document; 2) management practice effectiveness monitoring and, 3) assessment of water quality improvement. DEQ generally expects that DMAs will monitor implementation efforts and that DEQ and various natural resource organizations including DMAs will participate in effectiveness and water quality monitoring.

The information generated by each of these organizations will be pooled and used to determine whether management actions are having the desired effects or if changes in management actions and/or TMDLs are needed. This detailed evaluation (refer to **Section M**) will be planned, as feasible, roughly on a five year cycle. If progress is insufficient, then the appropriate management agency will be contacted with a request for additional action. This monitoring and feedback mechanism is a major component of the "reasonable assurance of implementation" for the Walla Walla Subbasin WQMP.

Although collaborative monitoring capabilities and plans have not yet been developed in response to an approved TMDL, it is anticipated that monitoring efforts will consist of some of the following types of activities:

- Reports on the numbers, types and locations of projects, BMPs and educational activities completed
- In-stream temperature monitoring to track progress towards achieving water quality numeric criteria
- Monitoring of channel type, width and depth

- Monitoring riparian vegetation communities and shade to assess progress towards achieving system potential targets established in the TMDL

DEQ is currently developing state-wide guidance for Implementation Plan monitoring, including a matrix for tracking implementation efforts. Ongoing monitoring of water quality and quantity, riparian vegetation, channel shape and fish is taking place largely through the efforts of the Watershed Council, the US Forest Service, the Confederated Tribes of the Umatilla Indian Reservation, the Oregon Department of Fish and Wildlife and the Oregon Department of Agriculture. The Walla Walla Basin Watershed Council has extended considerable effort in monitoring and inter-organizational data collection. DEQ recognizes that such coordinated local efforts are important and encourages them accordingly. As available, DEQ will contribute resources and training to such efforts.

(L) Public Involvement

Refer to the ***Public Participation*** section of **Part 1**, for public involvement during TMDL development. Public involvement in implementation will be important as well. The Walla Walla Basin Watershed Council has demonstrated commitment to ongoing outreach related to water quality including TMDL implementation. Each DMA is responsible for outreach efforts relating to their ongoing land management and TMDL implementation.

(M) Maintaining Management Strategies over Time

In response to Walla Walla Subbasin TMDL, each DMA will review their TMDL Implementation Plan or program for its effectiveness in addressing load allocations. In addition, each DMA will submit a report describing the implementation efforts underway and noting changes in water quality every five years. DEQ will review these submittals and recommend changes to individual Implementation Plans if necessary. The 303(d)listing and TMDL process and the management planning associated with WQRP, forest practices and agricultural planning are ongoing by design.

(N) Costs and Funding

One purpose of this element is to demonstrate there is sufficient funding available to begin implementation of the WQMP. Another purpose is to identify potential future funding sources for project implementation. DMAs are expected to provide a fiscal analysis of the resources needed to develop, execute and maintain the programs described in their Implementation Plans. DMAs and other natural resource organizations are implementing numerous natural resource enhancement efforts and projects in the Subbasin which are relevant to the goals of the plan, through a variety of funding sources.

The cost of restoration projects varies considerably and can range from zero cost, or even profit due to improvements, to full channel reconstruction and land acquisition which can cost hundreds of thousands of dollars per river mile. Restoration can be passive or active. Passive restoration results from removing stresses to the channel, vegetation and floodplain and allowing the river system to naturally recover. Active restoration involves channel construction, installation of structures to capture sediment or re-direct water, etc., and tends to cost more than passive. Passive restoration can be accomplished through measures such as fencing or allowing natural vegetation to grow between farm fields and streams. Different measures are appropriate for different management styles, land uses, and types of geomorphic or vegetative impairment. Restoration can be accomplished by simply changing management as a matter of business, such as changing the timing of pasture use. Given these complexities and uncertainties, a cost analysis is not attempted here. Generalized costs for a variety of possible restoration scenarios were estimated for the Umatilla Basin TMDL, with a focus on temperature. The reader is referred to **Chapter 3.5.1** of that document.

Potential Sources of Project Funding
Financial assistance is provided through a mix of cost-share, tax credit, and grant funded incentive programs designed to improve on-the-ground watershed conditions. Some of these programs, due to the sources of their funding, have specific qualifying factors and priorities. The following is a partial list of assistance programs available in the Subbasin.

Program	Agency/Source
Oregon Plan for Salmon and Watersheds	OWEB
Environmental Quality Incentives Program	USDA-NRCS
Wetland Reserve Program	USDA-NRCS
Conservation Reserve Enhancement Program	USDA-NRCS
Stewardship Incentive Program	ODF
Access and Habitat Program	ODFW
Partners for Wildlife Program	USDI-FSA
Conservation Implementation Grants	ODA
Conserved Water Program and other water projects	WRD
Nonpoint Source Water Quality Control (EPA 319)	DEQ-EPA
Riparian Protection/Enhancement	COE
State Revolving Fund low interest loans	DEQ-EPA
Bonneville Power Administration	BPA
Confederated Tribes of the Umatilla Indian Reservation	CTUIR
Nonpoint Source Pollution Reduction Tax Credit	DEQ

Grant funds are available for water quality improvement projects, typically on a competitive basis. Field specialists assist landowners in identifying, designing, and submitting eligible projects for these grant funds. Assistance is available through the Walla Walla Basin Watershed Council and the Umatilla Soil and Water Conservation District. Both organizations administer restoration projects in the Subbasin.

(O) Citation of Legal Authorities

Clean Water Act Section 303(d)
Section 303(d) of the 1972 Federal Clean Water Act as amended requires states to develop a list of rivers, streams and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. Such water bodies are referred to as “water quality limited”. Water quality limited water bodies are identified by DEQ. DEQ updates the list of water quality limited waters every two years. The list is commonly referred to as the 303(d) list. Section 303(d) of the Clean Water Act further requires that Total Maximum Daily Loads (TMDLs) be developed for all waters on the 303(d) list.

Oregon Revised Statute
The Oregon Department of Environmental Quality is authorized by law to prevent and abate water pollution within the State of Oregon pursuant to ORS 468B.015, which declares that it is the public policy of the state to maintain and protect quality of waters of the state. The statute ORS 468B.020 (Prevention of pollution) provides that:

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

(2) In order to carry out the public policy set forth in ORS 468B.015, the department 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."

Oregon Administrative Rules

The following Oregon Administrative Rules provide numeric and narrative criteria (water quality standards, discussed in **Part 1**) for stream temperature in the Subbasin:

Antidegradation – OAR 340-041-0004
Statewide Narrative Criteria – OAR 340-041-0007
Temperature – OAR 340-041-0028

Forest Practices

The Oregon Forest Practices Act (FPA) was enacted in 1971. The Board of Forestry has adopted water protection rules, including but not limited to OAR Chapter 629, Divisions 635-660, which describes BMPs for forest operations. The Environmental Quality Commission (EQC), Board of Forestry, DEQ and ODF have agreed that these pollution control measures will be relied upon to result in achievement of state water quality standards. Forest operators conducting operations in accordance with the Forest Practices Act (FPA) are considered to be in compliance with water quality standards. A 1998 Memorandum of Understanding between both agencies guides the implementation of this agreement, as described in **Section H**.

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

Agricultural Lands

The Oregon Department of Agriculture (ODA) is the DMA responsible for regulating agricultural activities that affect water quality through the Agricultural Water Quality Management Act of 1993 (SB1010, ORS 569.000 through 568.933) and Senate Bill 502 (adopted 1995, ORS 561.191).

SB1010 directs ODA to work with local communities, including farmers, ranchers, and environmental representatives, to develop Agricultural Water Quality Management Area Plans (AgWQMAP) and rules throughout the State. SB502 stipulates that ODA "*shall develop and implement any program or rules that directly regulate farming practices that are for the purpose of protecting water quality and that are applicable to areas of the state designated as exclusive farm use zones or other agricultural lands*." The plans are accompanied by regulations in OAR 603-90 and portions of OAR 603-95, which are enforceable by ODA. As discussed in **Section H**, TMDL implementation coordination between ODA and DEQ is guided by an MOA signed in 1998.

Federal Land Managers

As discussed in **Section H**, DEQ maintains Memorandums of Agreement with BLM and the USFS; both were signed in July, 2003. The MOAs define processes by which the agencies will work with DEQ to meet State and Federal water quality rules and regulations. This agreement recognizes the BLM and USFS as DMAs for the lands they administer in Oregon, and clarifies that WQRPs are the TMDL Implementation Plans for these agencies.

TMDL-Related Programs, Incentives and Voluntary Efforts

TMDLs in Oregon are designed to coordinate with and support other watershed protection and restoration efforts. Watershed enhancement in the Subbasin is ongoing and is, for the most part, consistent with or directly implements the load allocations of the TMDL. While regional programs are in place, much of the restoration is locally based. Collectively these organizations and programs produce technical assistance, financial assistance, restoration opportunities, outreach, discussion forums, incentives and planning.

Local Collaborative Watershed Enhancement Processes

The following is a list of several broad-scale watershed enhancement processes or programs in the Walla Walla Subbasin in Oregon. Some overlap the state border.

- Activities of the Walla Walla Basin Watershed Council – Guided by its Strategic Action Plan, the Council has implemented numerous grants in the Subbasin for riparian restoration, irrigation efficiency, habitat enhancement and stream monitoring. They have created an ongoing communication forum and are synthesizing high quality scientific assessment of water quality patterns and surface and ground water interaction.
- Habitat Conservation Plan Bi-State Process – In response to the Endangered Species Act (ESA) ‘threatened’ status of Bull Trout and Steelhead in the Subbasin, natural resource managers and stakeholders are co-preparing, with the US Fish and Wildlife Service, an interstate habitat conservation plan that will be broadly applicable in the Subbasin.
- Mainstem summer flow restoration – Irrigation Districts and the US Fish and Wildlife Service have established interim instream flow targets that have resulted in restoring year-round flow to the mainstem, since 2001, for the first time in many decades (additional discussion can be found in **Part 1** and **Appendix A**).
- The CTUIR Fisheries Program includes substantial resources invested in monitoring, watershed restoration efforts, fish passage and hatchery re-introduction of Chinook salmon to the Walla Walla Watershed.
- Flow Restoration Feasibility Study – The CTUIR and US Army Corps of Engineers are conducting a feasibility study for enhancing spring and summer flows in the mainstem Walla Walla River. Alternatives being considered are reservoir storage, voluntary purchase or lease of water rights, water conservation and exchange/piping from the Columbia River.
- Subbasin Planning – Through the Northwest Power and Conservation Council’s regional response to ESA-listed Columbia Basin fish and wildlife, a recent Subbasin Plan has been collaboratively and locally developed (2004) for the Walla Walla Subbasin. Ecosystem Dynamics modeling was optimized in part by inputting TMDL temperature model data and outputs. The two efforts are well-integrated, largely through the efforts of the CTUIR and the Watershed Council.
- Comprehensive Irrigation District Management Plan – This planning process is underway for 2 Oregon irrigation districts and multiple irrigators upriver from Milton-Freewater and serves to organize an agreed upon community standard for ESA/CWA compatible natural resource management among land owners/managers who irrigate using river water, where ESA fish listings and 303(d) listings occur.

The Oregon Plan for Salmon and Watersheds

The Oregon Plan for Salmon and Watersheds represents a major process, unique to Oregon, to improve watersheds and restore endangered fish species. The Plan consists of several essential elements:

(1) Coordinated Agency Programs
Many state and federal agencies administer laws, policies, and management programs that have an impact on salmonids and water quality. These agencies are responsible for fishery harvest management, production of hatchery fish, water quality, water quantity, and a wide variety of habitat protection, alteration, and restoration activities. Previously, agencies conducted business independently. Water quality and salmon suffered because they were affected by the actions of all the agencies, but no single agency was responsible for comprehensive, life-cycle management. Under the Oregon Plan, all government agencies that impact salmon are accountable for coordinated programs in a manner that is consistent with conservation and restoration efforts.

(2) Community-Based Action
Government, alone, cannot conserve and restore salmon across the landscape. The Oregon Plan recognizes that actions to conserve and restore salmon must be worked out by communities and landowners, with local knowledge of problems and ownership in solutions. Watershed councils, soil and water conservation districts, and other grassroots efforts are vehicles for getting the work done. Government programs will provide regulatory and technical support to these efforts, but local people will do the bulk of the work to conserve and restore watersheds. Education is a fundamental part of the community based action. People must understand the needs of fish and wildlife, and how rivers function, in order to make informed decisions about how to make changes to their way of life that will accommodate clean water and the needs of fish.

(3) Monitoring
The monitoring program combines an annual appraisal of work accomplished and results achieved. Work plans will be used to determine whether agencies meet their goals as promised. Biological and physical sampling will be conducted to determine whether water quality and salmon habitats and populations respond as expected to conservation and restoration efforts.

(4) Appropriate Corrective Measures
The Oregon Plan includes an explicit process for learning from experience, discussing alternative approaches, and making changes to current programs. The Plan emphasizes improving compliance with existing laws rather than arbitrarily establishing new protective laws. Compliance will be achieved through a combination of education and prioritized enforcement of laws that are expected to yield the greatest benefits for salmon.

Landowner Assistance Programs

A variety of grants and incentive programs are available to landowners in the Subbasin. These incentive programs are aimed at improving the health of the watershed, particularly on private lands. They include technical and financial assistance, provided through a mix of state and federal funding. This assistance is administered by several organizations, including but not limited to: the Walla Walla Basin Watershed Council and the Umatilla County Soil and Water Conservation District, the Oregon Department of Forestry, the Oregon Department of Agriculture, the Oregon Department of Fish and Wildlife, DEQ, and the National Resources Conservation Service. These services include on-site evaluations, technical project design, stewardship/conservation planning, and referrals for funding. This assistance and funding is further assurance of implementation of the TMDL WQMP. A list of funding sources or programs is provided in **Section N**.

Natural Resource Agencies
Several Natural Resource Agencies have active restoration, protection and monitoring programs in the Basin, including: OWRD, ODFW, ODA, DEQ, Umatilla National Forest, US BLM.

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The citations here are specific to **Part 2**.

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DEQ
State of Oregon
Department of Environmental Quality

Abbreviations

BLM	United States Bureau of Land Management
CFS	Cubic Feet Per Second
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DEM	Digital Elevation Model
DEQ	Department of Environmental Quality
DOQ	Digital Orthophoto Quadrangle
EPA	United States Environmental Protection Agency
FLIR	Forward Looking Radiometry (synonym for Thermal Infrared Radiometry)
GIS	Geographic Information Systems
GPS	Global Position Sensor
HUC	Hydrologic Unit Code
km	Kilometer
m	Meter
MAO	Mutual Agreement and Order
MW	Megawatt
NPDES	National Pollutant Discharge Elimination System
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OGIC	Oregon Geographic Information Center
OWRD	Oregon Department of Water Resources
PRISM	Parameter-elevation Regressions on Independent Slopes Model
TIR	Thermal Infrared Radiometry(synonym for Forward Looking Infrared Radiometry)
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USFW	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDFW	Washington Department of Fish and Wildlife
WDOE	Washington Department of Ecology
WWBWC	Walla Walla Basin Watershed Council
WWTP	Waste Water Treatment Plant
WQMP	Water Quality Management Plan

Description of Selected Terms

Highlighted terms are defined in rule and the reader should refer to the text of the rule.

303(d) Listing	Listing of a water body in accordance with Section 303(d) of the Clean Water Act.
Criteria, Biologically Based Criteria	Typically used herein in the context of water quality standards. The numeric or narrative target of the standard, designed to protect beneficial uses. Biologically based criteria are derived from studies of the requirements of aquatic organisms, often fish. Other criteria, such as the *protecting cold water criteria*, may target other provisions of water quality standards such as the anti-degradation policy.
Designated Management Agency	Organization responsible for implementation planning designed to attain TMDL load allocations and surrogates. OAR 340-042-0025: Federal, state or local government agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the DEQ in a TMDL.
Diel	The 24-hour cycle of temperature change associated with day and night.
Hydrologic Unit Code	A nesting classification of watersheds.
Load Allocation	Refer to beginning of Section h.
Loading Capacity	Refer to beginning of Section d.
Meander Belt-Width	Width of zone of sinuosity. Discussed in Section 3.2.3.2 of Appendix A and Section h of Part 1.
Nonpoint Source	Diffuse landscapes source of pollution
Point Source	Localized human-made source of pollution, conveyed to water body via human made conveyance.
Reserve Capacity	Refer to beginning of Section k.
Sinuosity	The curving path of a stream, measured as valley length divided by stream length.
Subbasin	4^{th} field of the Hydrologic Unit Code classification of watersheds.
Surrogate	An alternative target to a load allocation, a measure to achieve a load allocation, expressed typically in units or measures other than mass per time.
System Potential	A condition representing minimized human-caused stream warming. Defined in Section 1.4, Appendix A. Described and contextualized in Section b of Part 1. System potential channel and riparian conditions are displayed in Section h of Part 1.
Total Maximum Daily Load	Described in Document Summary page.
Wasteload Allocation	Refer to beginning of Section g.

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