# Tualatin Subbasin

**TOTAL MAXIMUM DAILY LOAD (TMDL)**
**& WATER QUALITY MANAGEMENT PLAN (WQMP)**

# Response to Public Comment

***Prepared by:***
***Oregon Department of Environmental Quality***
***January 31, 2001***

Introduction

This Response to Public Comment addresses comments received on the Draft Tualatin Subbasin Total Maximum Daily Load (TMDL), dated August 2000. Many of the comments that were received from different individuals or organizations overlapped. This responsiveness summary document attempts to combine similar comments and provide a single response where appropriate. Grammatical, editorial, and formatting errors were not addressed here but corrections were made in the documents. DEQ appreciates the time and effort that all the commentors put into reviewing the documents. All comments have been considered by DEQ and, where appropriate, changes have been made in the final TMDL documents that have been submitted to the Environmental Protection Agency. This Response to Public Comment along with transcription of oral testimony and copies of written comments are part of that submittal. EPA will then either approve or disapprove the TMDL.

**Background – the Public Review Process**

In 1988, the Department developed TMDLs for Phosphorus and Ammonia in the Tualatin Subbasin. Work was initiated to revise the TMDLs in 1995 with the start of a technical review of phosphorus data collected and water quality models developed in the Tualatin Basin since the development of the original TMDLs. In January 1998, the Tualatin Basin Policy Advisory Committee made a series of recommendations to DEQ for refining the phosphorus and ammonia TMDLs.

Following this work, the Department proceeded to modify the original TMDLs and develop new TMDLs to address temperature and bacteria concerns basin wide and low dissolved oxygen in many of the tributaries. Preliminary draft issue papers and TMDLs were made available on the Department's website and were made available to and discussed with a variety of agencies, groups and interests including the Environmental Protection Agency, Designated Management Agencies, Tualatin Riverkeepers, the Tualatin Watershed Council and various Friends groups between 1999 and 2000. The intent was to get informal review and comment while the Department was completing the development of the draft TMDLs.

The public comment period on the draft Tualatin Subbasin TMDL was opened on August 28, 2000 and closed on October 27, 2000 (Attachment A). An informational meeting to present background on the technical and modeling components of the Draft TMDLs was held in Portland on September 28, 2000. Formal public hearings on the Draft TMDL were held on October 17, 2000 in Beaverton and October 24, 2000 in Portland.

The Draft TMDL document and appendices were available for downloading from DEQ's web site throughout the comment period. Hard copies of the documents were also available for viewing at public libraries in Washington County, at the Washington County Soil and Water Conservation District office and at DEQ's Offices in Portland. Copies of the documents were also provided to those individuals who requested individual copies. One to two page summaries of each TMDL and of the TMDL process in general were prepared and were widely disseminated during the public comment period.

**Organization of this Response to Comments**

This response to comments is organized as follows: List of Commenters; Summary of Comments; Response to Comments. The Response to Comments is organized as follows: Temperature TMDL Comments; Bacteria TMDL Comments; Dissolved Oxygen TMDL Comments; Phosphorus TMDL Comments; General Comments. Attachments to this document include the Public Notice and the comments that were received.

**Attachment A**

# Notice Of Public Hearing

## Oregon Department Of Environmental Quality

**Notice Issued: August 28, 2000, Amended on September 1, 2000**
**Close Of Comment Period: October 27, 2000**
**Public Hearings: October 17 and October 24, 2000 7 p.m.**

### TUALATIN SUBBASIN TOTAL MAXIMUM DAILY LOAD AND

## Water Quality Management Plan

**PUBLIC PARTICIPATION:**

**Public Hearing**
Public hearings will be held at:

7:00 p.m. on Tuesday, October 17, 2000 at the Tualatin Hills Parks & Recreation District Nature Park Interpretive Center, 15655 SW Millikan Blvd., Beaverton, OR 97006;

7:00 p.m. on Tuesday, October 24, 2000 in Conference Room A/B on the fourth floor, Oregon DEQ NW Regional Office, 2020 SW 4th Ave, Portland, OR.

An informational presentation beginning at 6:30 p.m will precede each hearing.

**Written comments**:
People do not need to attend the public hearing in order to submit comments. Written comments on the proposed TMDL and Management Plan can be submitted at any time between the opening of the comment period (August 28, 2000) and the close of the comment period (October 27, 2000). This comment period has been extended from the normal 30-day comment period to allow additional time for public review and participation. All comments must be received at the Oregon Department of Environmental Quality by 5 p.m. on October 27, 2000. Written comments should be mailed to Oregon Department of Environmental Quality, Attn: Rob Burkhart, 2020 SW 4th Ave., Suite 400, Portland, OR 97201. ***People wishing to send comments via e-mail should be aware that if there is a delay between servers or if a server is not functioning properly, e-mails may not be received prior to the close of the public comment period.*** People wishing to send comments via e-mail should send them in Microsoft Word (through version 7.0), WordPerfect (through version 6.x) or plain text format. Otherwise, due to conversion difficulties, DEQ recommends that comments be sent in hard copy. The email address is burkhart.robert@deq.state.or.us.

**WHO IS THE APPLICANT:**

Oregon Department of Environmental Quality

**LOCATION:**

The Tualatin Subbasin includes all lands, public and private, draining to the Tualatin River or its tributaries from the confluence of the Tualatin and Willamette rivers at West Linn, Oregon upstream to the Tualatin River headwaters.

**WHAT IS PROPOSED:** The Department of Environmental Quality proposes to submit the Tualatin River Subbasin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) to the US Environmental Protection Agency (EPA) for adoption as a Total Maximum Daily Load (TMDL) for the waters mentioned above.

**WHO IS AFFECTED:** Local public and private land owners and managers, industrial sources, public wastewater treatment facilities, cities and counties located within the Tualatin Subbasin, residents within the subbasin, persons interested in local water quality, and persons interested in the Department's implementation of Section 303(d) of the federal Clean Water Act.

**NEED FOR ACTION:** The Clean Water Act requires that Total Maximum Daily Loads be established for waters that do meet state water quality standards. Thirty-one stream segments within the Tualatin Subbasin have been identified as not meeting standards and have been placed on the 303(d) list. The proposed TMDL applies to the entire Subbasin.

**WHERE TO FIND DOCUMENTS:** Documents and related materials are available for examination at:
Public Libraries in Washington County
Oregon DEQ, NW Regional Office, 2020 SW 4th Ave., Suite 400, Portland, OR
503-229-5552
Oregon DEQ Water Quality, 811 SW Sixth Avenue, Portland, OR, (503) 229-5630

While not required, scheduling an appointment will ensure documents are readily accessible during your visit. Documents are also available for viewing or down-loading from the DEQ Web Site: www.waterquality.deq.state.or.us/wq/

Any questions on the proposed actions may be addressed to Rob Burkhart at 503-229-5566 or toll free within Oregon at 800-452-4011. People with hearing impairments may call DEQ's TTY at 503-229-5471.

**WHAT HAPPENS NEXT:** DEQ will review and consider all comments received during the public comment period. Following this review, the TMDL and WQMP may be sent to the U.S. Environmental Protection Agency as is currently proposed, or in a modified form. You will be notified of DEQ's final decision if you present either oral or written comments during the comment period. Otherwise, if you wish to receive notification, please call or write DEQ at the above address to be placed on the mailing list.

**ACCOMODATION OF DISABILITIES:** DEQ is committed to accommodating people with disabilities. Please notify DEQ of any special physical or language accommodations you may need as far in advance of the date as possible. To make these arrangements, 503-229-6232 or by calling toll free within Oregon at 800-452-4011. People with hearing impairments can call DEQ's TTY at 503-229-5471.

**ACCESSIBILITY INFORMATION:** This publication is available in alternate format (e.g. large print, Braille) upon request. Please contact DEQ Public Affairs at 503-229-6232 or toll free within Oregon 1-800-452-4011 to request an alternate format. People with a hearing impairment can receive help by calling DEQ's TTY at 503-229-5471.

**Attachment B**

**Comments Submitted to the Department**
**During the Public Comment Period**

In order to save paper and conserve resources, specific comments can be made available in either electronic format or paper format upon request.

## ORAL TESTIMONY GIVEN AT PUBLIC HEARINGS

| Comment # | Comments Received From: | Affiliation | Written Testimony |
|---|---|---|---|
| 01 | Tom VanderPlaat | Unified Sewerage Agency | |
| 02 | Charles Logue | Unified Sewerage Agency | |
| 03 | Amin Wahab | City of Portland | |
| 04 | John McDonald | Private Citizen | X |
| 05 | Bill Gillham | Private Citizen | |
| 06 | Tyson Smith | NEDC | |
| 07 | Ela Whelan | Clack.Co. WES | |
| 08 | Dan Logan | Wash. Co. SWCD | X |
| 09 | Stuart Rounds | USGS | X |
| 10 | David Prlain | Private Citizen | |
| 11 | Dean Marriott | City of Portland | X |
| 12 | John Jackson | Private Citizen | X |
| 13 | Steve Lundt | LOC/Private Citizen | |
| 14 | Gail Boyd | URS-Greiner for USA | |
| 15 | Bill Gaffi | USA | |
| 16 | Sue Marshall | Tualatin Riverkeepers | X |
| 17 | Andrew Swanson | Clack. Co. WES | |
| 18 | Walter Gorman | Chair, USA Advisory Com. | |
| 19 | Mike Bernard | Intel Corp. | X |
| 20 | Trudy Knowles | Private Citizen | |
| 21 | Tom Brian | Chair, BOC – Wash Co. and USA | |
| 22 | Aubrey Russell | Trout Unlimited | |
| 23 | Travis Williams | Willamette Riverkeeper | |

| Written/Faxed/Emailed and Phoned Comments | | |
|---|---|---|
| Comment # | Comments Received From: | Affiliation |
| 24 | Robert Evans | Private citizen |
| 25 | Ralph Brown | Mayor, City of Cornelius |
| 26 | Richard Porn | Western Realty Advisors |
| 27 | Kelly Ross | HBA of Metro. Portland |
| 28 | Calvin Krahmer | Private Citizen |
| 29 | Roy Gibson | City of Hillsboro |
| 30 | Mark Boguslawski | Private Citizen |
| 31 | Dale DeHarpport | Private Citizen |
| 32 | Harold Nygren | White Oak Natural Resource Svc. |
| 33 | John Hawksworth | Private Citizen |
| 34 | Vergie Ries | City Manager –Forest Grove |
| 35 | Anne MacArthur | Private Citizen |
| 36 | Michael McKillip | City Engineer – City of Tualatin |
| 37 | Greg Berry | City of Tigard |
| 38 | Jannine Jennings | USEPA |
| 39 | Kelli Grover | City of West Linn |
| 40 | Sue Marshall | Tualatin Riverkeepers |
| 41 | Jack McGowan | SOLV |
| 42 | Kathryn VanNatta | NW Pulp and Paper Assoc. |
| 43 | Tyson Smith | NEDC |
| 44 | Mike Oswald | Mult. Co. DES |
| 45 | Laura Hill | Rock Cr. Watershed Partners |
| 46 | Janet Gillaspie | ACWA |
| 47 | Timothy Ewert | City Manager, Hillsboro |
| 48 | Ted Lorensen | OR. Dept. of Forestry |
| 49 | Steve Lundt | Lake Oswego Corporation |
| 50 | Ela Whelan | Clackamas Co. WES |
| 51 | Bill Gaffi | Unified Sewerage Agency |
| 52 | Marvin Lewallen | Weyerhaeuser Co. |
| 53 | Spencer Bobli | Maxim |
| 54 | Joe Keating | OR Chapter Sierra Club |
| 55 | Andrew Harris | City of Lake Oswego |
| 56 | Rick Kepler | ODFW |
| 57 | John Rosenburger | Washington County |
| 58 | Dean Marriott | City of Portland |
| 59 | James McCauley | Oregon Forest Industries Council |
| 60 | Stuart Rounds | USGS |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | Tom VanderPlaat | Unified Sewerage Agency | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 02 | Charles Logue | Unified Sewerage Agency | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 03 | Amin Wahab | City of Portland | Contained in Summary of City of Portland Written Comments (#58) | | | | | | | | |
| 04 | John McDonald | Private Citizen | 1. Continue cooperative nature of effort.<br>2. Recognize the limits of current knowledge of system.<br>3. Listen to the challenges being made to the TMDLs.<br>4. Take holistic approach to subbasin.<br>5. Balance environment and economy.<br>6. Make the final TMDLs achievable and adaptable. | X | | | | | X | | W2<br>W1<br>W1<br>W3<br>W4<br>W1 |
| 05 | Bill Gillham | Private Citizen | 1. Has lived along the Tualatin since 1940 and the river has gotten much better. Appreciates effects and challenges all agencies to more, especially with the growth we are experiencing. | X | | | | | | | W24 |
| 06 | Tyson Smith | NEDC | Contained in Summary of NEDC Written Comments (#43) | | | | | | | | |
| 07 | Ela Whelan | Clack. Co. WES | Contained in Summary of Clackamas Co WES Written Comments (#56) | | | | | | | | |
| 08 | Dan Logan | Wash. Co. SWCD | 1) Why are augmented flows included in system potential scenario?<br>2) How will temperature TMDL be implemented and reviewed in the future?<br>3) Is there any discussion on removing the LO diversion dam?<br>4) Are waterfowl and pet influences included in bacteria model?<br>5) Has there been a significant change in the amount of sedimentation since different crops have been used?<br>6) Can DEQ assist with acquiring local funding for SWCD?<br>7) Need good, solid science with the TMDLs<br>8) Need to have a reasonable set of goals.<br>9) Continue to facilitate cooperation and collaboration. | X | X | X | | X | X | X | T1<br>W1<br>W7<br>B62<br>D87<br>W5<br>W1<br>W1<br>W2 |
| 09 | Stuart Rounds | USGS | Contained in Summary of USGS Written Comments (# 60) | | | | | | | | |
| 10 | David Prlain | Private Citizen | 1. Expressed concern about growth in Bronson Creek, polluted runoff and degradation of fish and other aquatic life.<br>2. Problems need to be addressed on watershed basis | X | | | | | | | W24<br>W3 |
| 11 | Dean Marriott | City of Portland | Contained in Summary of City of Portland Written Comments (#58) | | | | | | | | |
| 12 | John Jackson | Private Citizen | 1. DEQ's approach is to use simplistic models to drive a one-size-fits-all strategy.<br>2. TMDLs are being set w/o recognition of what the river can realistically provide via prescriptive pollution control.<br>3. Continue positive collaboration and partnerships<br>4. Admit that we don't have all of the answers<br>5. Why is DEQ ignoring successes and good science and supporting ready, fire aim management strategies. | X | | | | | X | | W6<br>W1<br>W2<br>W1<br>W1 |
| 13 | Steve Lundt | LOC/Private Citizen | Contained in Summary of LOC Comments (#49) | | | | | | | | |
| 14 | Gail Boyd | URS-Greiner for USA | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 15 | Bill Gaffi | USA | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 16 | Sue Marshall | Tualatin Riverkeepers | Contained in Summary of Tualatin Riverkeepers Written | | | | | | | | |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Comments (#40) | | | | | | | | |
| 17 | Andrew Swanson | Clack. Co. WES | Contained in Summary of Clackamas Co WES Written Comments (#56) | | | | | | | | |
| 18 | Walter Gorman | Chair, USA Advisory Com. | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 19 | Mike Bernard | Intel Corp. | 1. TMDL process should allow flexibility in implementation and acknowledge there is still much to learn.<br>2. Specifically, the TMDL should either direct action to improve water quality in the basin while concurrently allowing adequate char. Of the problem, or specify a process wherein TMDL goals are updated as credible data come to light.<br>3. Adoption of inflexible criteria forces the focus on compliance at the expense of environmental performance | X | | | | | X | | W1<br>W1<br>W1 |
| 20 | Trudy Knowles | Private Citizen | 1. Wants to see a healthy system and has been doing her part in trying to litter and cigarette butts that get to the storm drains. We all need to come together and work on it. | X | | | | | | | W2 |
| 21 | Tom Brian | Chair, BOC – Wash Co. and USA | Contained in Summary of Unified Sewerage Agency Written Comments (#51) | | | | | | | | |
| 22 | Aubrey Russell | Trout Unlimited | 1. The fish will tell us when the river is clean and not through flexibility and innovation. Urge DEQ to do Section 7 consultation with NMFS.<br>2. Hopes that urban stormwater will be treated as point source of pollution | X | | | | | | | W15<br>D40, W24 |
| 23 | Travis Williams | Willamette Riverkeeper | 1. While many fight over the science, the issue is a functioning river. With uncertainty, you have to side with the resource.<br>2. We still need to pay attention to phosphorus | X | | | | | | | B12<br>P1 |
| 24 | Robert Evans | Private citizen | 1. Recommends against any new regulations and "moving goal posts" and encourages building on cooperative efforts that have been developed | X | | | | | | | W6<br>W2 |
| 25 | Ralph Brown | Mayor, City of Cornelius | 1. Recommends that we enable the DMAs and DEQ to incorporate new science as it emerges, allowing plans for pollution control to continuously improve. | X | | | | | X | | W1 |
| 26 | Richard Porn | Western Realty Advisors | 1. Recommends that we enable the DMAs and DEQ to incorporate new science as it emerges. Adaptive management. | X | | | | | X | | W1 |
| 27 | Kelly Ross | HBA of Metro. Portland | Recommends that we enable the DMAs and DEQ to incorporate new science as it emerges. Adaptive management.<br>Specifics:<br>1. Why need for additional phosphorus control?<br>2. Worried that plans may be vulnerable due to inadequate TMDL methodology.<br>3. Formal codification of proposed TMDLs will lead to inflexibility<br>4. Temperature TMDL's objective is unrealistic. | X | X | | X | | X | | W1<br>P1<br>W25<br>W1<br>T2,3 |
| 28 | Calvin Krahmer | Private Citizen | 1. Reorganize WQ committee<br>2. Remove USA flows from river – use for irrigation, etc.<br>3. Install small dams on tributaries.<br>4. Remove Lake Oswego diversion dam.<br>5. One-year moratorium on regulations. | X | | | | | | | W7<br>W7<br>W7<br>W7<br>W6 |
| 29 | Roy Gibson | City of Hillsboro | 1. TMDLs should be based on hard science.<br>2. Should consider all testimony.<br>3. TMDLs should be flexible to account for dynamic science ant technologies. | X | | | | | X | | W25<br>W8<br>W1 |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | Mark Boguslawski | Private Citizen | 1. In general thinks Tualatin TMDL is good.<br>2. Recommends that adaptive management language be further incorporated into all related documents.<br>3. Disagrees with statement that sufficient initiative currently exists to achieve water quality goals with minimal enforcement. | X | | | | | X | | Thanks<br>W1, Done<br><br>W9 |
| 31 | Dale DeHarpport | Private Citizen | 1. If the draft TMDLs are codified in their present form it will be difficult to apply new scientific information<br>2. Recommends a management approach allowing for flexibility in plans and inclusion of new science | X | | | | | X | | W25<br><br>W1 |
| 32 | Harold Nygren | White Oak Natural Resource Svc. | 1. Recommends adaptive management approach.<br>2. Standards should be written so they do not become a legal pitfall.<br>3. Temperature TMDL based on unrealistic assumptions.<br>4. The TMDL should be developed and evaluated in a holistic manner. | X | X | | | | X | | W1<br>W10<br><br>T2<br>W3 |
| 33 | John Hawksworth | Private Citizen | 1. Recommends against using USA's Hagg Lake flows to determine temp. system potential.<br>2. Also need to look at Barney Reservoir releases.<br>3. Submitted some clarification and stylistic comments | X | X | | | | | | T1<br><br>T9<br>Made |
| 34 | Vergie Ries | City Manager –Forest Grove | 1. Recommends adaptive management approach for both implementation plans and the inclusion of new science.<br>2. TMDLs should allow flexibility to manage for overall watershed health.<br>3. TMDLs should be based on current scientific knowledge. | X | | | | | X | | W1<br><br>W3, W23<br>W25 |
| 35 | Anne MacArthur | Private Citizen | 1. Keep allocations at zero or as close as possible | X | | | | | | | W11 |
| 36 | Michael McKillip | City Engineer – City of Tualatin | 1. Need flexibility.<br>2. Need adaptive management.<br>3. Need to ensure appropriateness and cost effectiveness of solutions.<br>4. Need to ensure the end result of improving water quality<br>5. Need to make sure TMDLs are realistic and achievable.<br>6. Need to make sure TMDLs are focused appropriately. | X | | | | | X | | W1<br>W1<br>W4<br><br>W1<br>W1<br>W1 |
| 37 | Greg Berry | City of Tigard | 1. Concerned that proposed TP standard is below background.<br>2. Does not account for differing species of phosphorus | | | | X | | | | P2<br>P22 |
| 38 | Jannine Jennings | USEPA | Comment T8. Believe that an adaptive management approach to implementation is important.<br>Comment T9. Recognize that much of the remaining impairments in the subbasin are related to impacts due to urban stormwater runoff.<br>Comment T10. Recommend that a table be added to beginning of Ch. 3 to summarize the water and times of applicability of each TMDL.<br>Comment T11. Modify TMDL summary tables.<br>Comment T12. Zero allocation interpretation<br>**Temperature**<br>Comment T13. Add sentence on p. 31 referencing Figs. 26-29<br>Comment T14. Explain why loading capacities downstream of RM 33 are not included.<br>Comment T15. Table 8: Labels,<br>Comment T16. form of allocations should be flow-based<br>Comment T17. increased/lethal temps/basis for MZ,<br>Comment T18. cumulative impact of 0.25 increase.<br>Comment T19. Table 9: Forestex needs an allocation, WLAs | X | X | X | X | X | X | | W1<br><br>W24<br><br><br>Done<br><br><br>Done<br>Done<br><br>Done<br><br>Done<br><br>T9A<br>T9A<br>T9A<br>T15 |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | should be in same units as in permits. | | | | | | | | T10 |
| | | | Comment T20. P.A-77 reference should be to A-51 | | | | | | | | Done |
| | | | Comment T21. P. A-172, Figure 143 – graph is incomplete | | | | | | | | Done |
| | | | **Bacteria** | | | | | | | | |
| | | | Comment T22. Table 11 – What are applicable streams? | | | | | | | | B27 |
| | | | Comment T23. P. 71 – list CAFOs as a distinct source. | | | | | | | | B28 |
| | | | Comment T24. P. 73 – Differing months defining season. Why different bases for design storms. | | | | | | | | B29 |
| | | | Comment T25. Table 16 – ODOT should be included as a DMA, Forest and ag lands under MS4/define runoff events. | | | | | | | | B30 |
| | | | Comment T26. Should be numeric WLAs for WWTPs. | | | | | | | | B31 |
| | | | **Dissolved Oxygen** | | | | | | | | **D42 – D54** |
| | | | Comment T27. Table 21 (p.78) – To what streams is this TMDL applicable? | | | | | | | | D42 |
| | | | Comment T28. P. 84 – note that chlorophyll a impairments addressed by TMDL. (not tribs – rwb) | | | | | | | | D43 |
| | | | Comment T29. P. 89 (and other) – Discussion of model calibration should note that the "minimum ¼ mile avg. site pot. shade density was used". | | | | | | | | D44 |
| | | | Comment T30. P.93 – Discrepancy between 1st para. (75% sat.) and last para. (90% sat). | | | | | | | | D45 |
| | | | Comment T31. P. 97 Is there a mechanism which will assure that SOD reductions at these levels will occur? | | | | | | | | D46 |
| | | | Comment T32. Forestex (p.99)- Need to specify which scenario is the allocation. | | | | | | | | D47 |
| | | | Comment T33. Table 29 – The LC should be a numeric value for SOD, allocations can be % red. | | | | | | | | D48 |
| | | | Comment T34. Is Scoggins May 1 – Oct31 or winter? | | | | | | | | D49 |
| | | | Comment T35. Why no ammonia WLAs for stormwater? | | | | | | | | D50 |
| | | | Comment T36. What about Chicken Cr. design concentrations? | | | | | | | | D51 |
| | | | | | | | | | | | D52 |
| | | | Comment T37. Which design concentrations apply to tribs? | | | | | | | | D53 |
| | | | Comment T38. P. 115 – Forestex allocations | | | | | | | | D54 |
| | | | Comment T39. P. 116 – MOS last bullet | | | | | | | | **P23-30** |
| | | | **pH and Chla TMDL** | | | | | | | | P23 |
| | | | Comment T40. What is the LC for other tribs? | | | | | | | | P24 |
| | | | Comment T41. References to tables 44 and 47 seem incorrect. | | | | | | | | P25 |
| | | | Comment T42. It should be stated how these concentartions will be incorporated into the NPDES permits. | | | | | | | | P26 |
| | | | Comment T43. It should be noted that these facilities do not add phophorus. | | | | | | | | P27 P28 |
| | | | Comment T44. P. 30 – Last line in Section 10 should refer to Section 4.4.13 | | | | | | | | P29 |
| | | | Comment T45. P.134 – Explain why year-round phosphorus loadings are being examined for LO. | | | | | | | | P30 |
| | | | Comment T46. Explain how seasonal variation evaluations were made for LO. | | | | | | | | |
| | | | Comment T47. Tables 49 and 51 – Define when the values for "Storm" and "Base Flow" events will be applied. | | | | | | | | W28 |
| | | | **WQMP** | | | | | | | | |
| | | | Comment T48. Comments are directed toward the applicable DMAs<br>a) Why have the DMAs not used info in the TMDL to provide more substance to this plan? | | | | | | | | |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | b) No discussion of, or commitment to, the development of benchmarks.<br>c) ODF and ODA questions.<br>d) Will info in Appendix H be used? | | | | | | | | |
| 39 | Kelli Grover | City of West Linn | **Temp:**<br>1. Attainment of system potential not necessary to support beneficial uses.<br>2. Language should be included acknowledging long time frame to see results due to increased riparian vegetation (both for DO and Temp).<br>**Bacteria:**<br>3. Draft TMDL does not detail why 406 is appropriate for beneficial use.<br>**Dissolved Oxygen:**<br>4. No proof of direct correlation between TVS and SOD.<br>5. No baseline data for TVS. Poses numerous problems. Should be a cutoff concentration.<br>6. Q regarding needed SOD reduction<br>**General:**<br>7. Supports adaptive management | X | X | X | | X | X | | T18 Done<br>T3<br><br><br>B1<br><br>D1<br>D2<br><br>D3<br><br>W1 |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | Sue Marshall | Tualatin River Keepers | **Phosphorus**<br>1. The proposed TMDL, by expressing p criteria as monthly medians and p allocations as monthly averages is not adequate (to achieve its stated chlorophyll-a objective.<br>2. The revision is a violation of anti-backsliding requirements of CWA section 303(d)(4).<br>3. Method of assessing background p levels fails to take into account residual effects of runoff.<br>4. Accounts of TBTAC and TBPAC report only the USA/DMA view of the proceedings.<br>5. Spreadsheets in App. C do not account for resideual concentrations of p.<br>6. Need to tabulate existing p loadings by source.<br>**Bacteria**<br>7. The decay rate fails to account for increased shading.<br>**Temperature**<br>8. The WQMP should address other strategies such as effluent recycling and spring protection.<br>**Fish**<br>9. Recognition of the extent of cold water habitat is important.<br>**Dissolved Oxygen**<br>10. The DO problem is a result of the failure to comply with (or enforce) the TMDL for p.<br>11. How could DO problems associated with the dam on Scoggins be considered natural?<br>**Biological Criteria**<br>12. A TMDL should be established for fine sediment.<br>13. Surrogates such as woody debris, refugia, etc. should be established within a TMDL.<br>**WQMP**<br>14. The WQMP does not provide reasonable assurance of compliance with the TMDL.<br>15. Concerns with point 6 under adaptive management – there is no definition or criteria for assessing the need to reopen the TMDL. Believe this in inconsistent with the CWA.<br>16. The impl. plans do not provide reasonable assurance.<br>17. The DMAs may not have adequate authority to implement the necessary management practices. Inclusion of local land use jurisdictions as co-permittees in MS4 permits.<br>18. The section on public involvement needs more specifics.<br>**Attached Memo from J. D. Smith**<br>**General**<br>19. All descriptions of TMDLs and related terms should be corrected to be consistent with existing federal regulation and Oregon administrative rule.<br>20. References to FACA report should not be included<br>**Presentation**<br>21. The organization of the TMDLs and its appendices is inconsistent and internally contradictory.<br>22. The graphics in Appendix A have typos, etc.<br>**Coordination of TMDLs**<br>23. The relationship between DO, SOD, TP, nitrogen, etc are only recognized only partially or are completely ignored. | X | X | X | X | X | X | X | P3<br>P4<br>P5<br>P6<br>P7<br>P8<br>B2<br>W7<br>D88<br>D4<br>W23<br>W23<br>W12<br>W1<br>W12<br>W13<br>Done<br>Done<br>Kept<br>Done<br>W14 |

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| | | | 24. Expected effects of one TMDL are not always considered in the development of another (Temp & Bact).<br>25. Control strategies (or form of allocations) are not coordinated between TMDLs.<br>**Municipal Stormwater Discharges**<br>26. Role of municipal discharges is obscured in the TMDL.<br>27. TMDLs fail to allocate identifiable pollutant loads to individual sources or jurisdictions.<br>**Temperature**<br>28. Terminology and typo errors<br>**Bacteria**<br>29. Die-off rates used in the bacteria TMDL do not account for lower temperatures and the increased shading called for by the TMDL for temperature.<br>30. The TMDL should be expressed to affirmatively prevent the use of chlorine disinfection as a means for its compliance.<br>31. The TMDL and its allocations should be expressed as bacterial numbers or mass loadings.<br>**Dissolved Oxygen**<br>32. The analysis of SOD sources confuses runoff with municipal and industrial storm sewer discharges.<br>33. Volatile solids loadings from sewers are readily determinable from NPDES permit applications documents and annual monitoring reports.<br>34. Tabulations of loads by source should be made.<br>35. Allocations should be in the form of loads.<br>**Phosphorus**<br>36. See #1<br>37. See #3<br>38. USGS allegations that sediments do not release phos while gw phos passes through the sediments.<br>39. See #2<br>40. See #5<br>41. BG levels of TP can only be determined by assessing headwaters, etc.<br>**Bio Criteria**<br>42. See #10 and #11<br>**WQMP**<br>43. See #12<br>44. The TMDLs need to include identifiable allocations to individual implementing jurisdictions. | | | | | | | | W14<br><br>W14<br><br><br><br><br><br><br><br><br><br>B2<br><br>B3<br><br>B4<br><br>D5<br><br>D6<br><br><br>D7<br>D8 |
| 41 | Jack McGowan | SOLV | 1. Restoring watersheds cannot be done by mandate or regulation alone.<br>2. USA has been committed to SOLV's programs contributing to watershed enhancement. | X | | | | | | | W2<br><br>T4 |
| 42 | Kathryn VanNatta | NW Pulp and Paper Assoc. | 1. Supports OFIC's comments and strongly emphasizes OFIC's suggestions on p. 2.<br>2. Supports comments of USA relating to point sources and on-the-ground application of the proposed TMDLs.<br>3. Supports the application of mixing zones in the temp TMDL<br>4. Supports the temp TMDL in that is recognizes natural background solar loadings.<br>5. Remains concerned with limitations of Heat Source model as explained previously.<br>6. Supports the use of DEQ's Temp Management Planning | X | X | | | | | X | See OFIC (59)<br>See USA (51)<br>T14<br>T18<br><br>See OFIC (59)<br>T38 |

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| | | | guidance as an interim step in process to est. TMDLs | | | | | | | | |
| 43 | Tyson Smith | NEDC | 1. A thorough analysis of the standards needs to be done | X | X | X | X | X | X | X | W26 |
| | | | 2. Consideration of beneficial uses | | | | | | | | W26 |
| | | | **Temperature** | | | | | | | | |
| | | | 3. Questions regarding the use of shade as surrogate | | | | | | | | T12 |
| | | | 4. Questions regarding the modeling including whether all anthropogenic sources were considered (including runoff and Hagg Lake) | | | | | | | | T13 |
| | | | 5. Questions regarding the use of mixing zones and the cumulative impact of point sources. | | | | | | | | T14,15 |
| | | | **Bacteria** | | | | | | | | |
| | | | 6. Model is limited: partial calibrations, only Hortonian flow, decay rate. | | | | | | | | B5 |
| | | | 7. No validation that meeting 126 will also meet 406. | | | | | | | | B6 |
| | | | **Dissolved Oxygen** | | | | | | | | |
| | | | 8. Questions regarding meeting the DO standard by meeting the temp standard. | | | | | | | | D9 |
| | | | 9. States that DEQ does not fully understand the TVS issue. | | | | | | | | D10 |
| | | | 10. States that extrapolation of modeling to other tribs is not valid. | | | | | | | | D11 |
| | | | **Phosphorus** | | | | | | | | |
| | | | 11. Concerned with movement to a less stringent TMDL – anti-backsliding. | | | | | | | | P4 |
| | | | 12. Questions regarding form of allocations. | | | | | | | | P9 |
| | | | 13. Questions regarding method for determining LC. | | | | | | | | P10 |
| | | | **Pollution vs. Pollutants** | | | | | | | | |
| | | | 14. TMDL should consider pollution, not just pollutants. | | | | | | | | W23 |
| | | | **Fish** | | | | | | | | |
| | | | 15. Should consider historic, not just current, habitat of salmonids. | | | | | | | | W20 |
| | | | 16. Questions regarding photo showing fish. 55F question. | | | | | | | | D16 |
| | | | 17. Questions regarding the TMDL's (specifically the temperature TMDL?) analysis of background condition related to hydrology and riparian conditions. | | | | | | | | T18 |
| | | | 18. Statement that WQMP does not describe all of the steps that need to be taken to achieve WQSs. | | | | | | | | W12 |
| | | | 19. The TMDL does not adequately address the time frame for WQS attainment. | | | | | | | | T3 |
| | | | 20. Questions use of surrogates. | | | | | | | | T18 |
| | | | 21. Lack of stream flow discussion | | | | | | | | T43 |
| | | | 22. The TMDL does not clearly delineate the allocations. | | | | | | | | P12 |
| | | | 23. The MOS must be quantified | | | | | | | | T63 |
| | | | 24. Biological criteria issues must be addressed within the TMDL | | | | | | | | W23 |
| | | | 25. Questions regarding adaptive management | | | | | | | | W1 |
| | | | 26. WQMP should focus on implementing the TMDL. | | | | | | | | |
| | | | 27. The WQMP should be more specific regarding implementation plans | | | | | | | | W12 |
| | | | 28. The WQMP should delineate appropriate regulatory mechanisms. | | | | | | | | W12 |
| | | | 29. DEQ should consult with NMFS regarding the TMDL and ESA implications. | | | | | | | | W15 |
| 44 | Mike Oswald | Mult. Co. DES | 1) TMDL does not demonstrate attainment of WQSs | X | X | X | X | X | X | | W27 |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
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| | | | 2)<br>a) DEQ should go to EQC for TMDL approval<br>b) Requests an "EQC approvable Compliance Order and Schedule to meet the TMDLs".<br>3) TMDL has inaccurate acreage areas.<br>4) Statutory authority<br>5) DMAs are not able to make connections from BMPs to numerical load reductions. Therefore numerical allocations as points of compliance are not appropriate.<br>6) Supports a Management Plan approach rather than TMDL<br>7) Definition of "reasonable assurance"<br>8) Basin not WQL as to TP<br>9) Target concentrations for runoff less than background<br>10) TP allocations are given to DMAs, and are questionable.<br>11) ODOT should be a DMA<br>12) Bacteria approach will not attain the desired results.<br>13) The Bacteria TMDL assumes roadways generate bacteria<br>14) Bacteria TMDL is inconsistent with OAR<br>15) TMDL does not recognize scientific complexity of bacteria, is not scientifically sound, and misuses criteria.<br>16) Data used to determine DO target levels are not sufficient.<br>17) Proposed TMDL approach does not use best available science. | | | | | | | | W16<br>W16<br>P11<br>T4, W12,13<br>W28<br>B7/T38<br>W12,P2<br>P1<br>P2<br>P12<br>P13<br>B8<br>B9<br>B7,12<br>B8,B14<br>D12<br>T16 |
| 45 | Laura Hill | Rock Cr. Watershed Partners | 1) Support proposed revisions to TP TMDL.<br>2) DO and Temperature TMDLs should include greater margin of safety which takes into account lack of knowledge about current cutthroat populations.<br>3) Recommend that WQMP include 3 types of monitoring.<br>4) Supports adaptive management and phased approach of WQMP.<br>5) Enforcement needs to be improved.<br>6) MOA: Listed streams should stay on list until WQSs are met. | X | X | | | X | X | X | Thanks<br>D19, T63<br>W17<br>W1<br>W9<br>W18 |
| 46 | Janet Gillaspie | ACWA | **Temperature**<br>1) Do not agree with meeting system potential when below numerical standard<br>2) Bact should follow OAR<br>3) Load Allocations: The TMDLs should be viewed as targets.<br>4) The TMDL should be general in nature | X | X | X | | | | | T2,T38, T41<br>B7<br>W12,28<br>W12,28 |
| 47 | Timothy Ewert | City Manager, Hillsboro | 1) General discussion regarding collaborative process<br>2) Concerns regarding assumptions in temp model.<br>3) Bacteria: concerns regarding past efforts. | X | X | X | X | | X | | W1,W2<br>T17<br>B11 |
| 48 | Ted Lorensen | OR. Dept. of Forestry | Temperature<br>1) System potential does not take into account natural disturbance to riparian vegetation and is therefor inconsistent with historical conditions.<br>2) Potential mature vegetation density<br>a) Unclear as to how potential veg. densities were determined<br>b) How does Heat Source calculates effective shade?<br>c) What is the senitivity of the temperature modeling to changes in pot. veg. densities? | | X | | | | | | T18<br>T19 |

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| | | | d) Ground-based data shoud be presented to evaluate the validity of the "shade calculator".<br>e) How does the TMDL protect and restore fish pop.s if system potential is not accurate?<br>3) WODIP accuracy questioned.<br>4) Proposed edits regarding cold-water refugia and thermal stratification.<br>5) Proposed edit to text of WQMP<br>6) Why lack of focus on flow modifications and channel width?<br>7) ODF recommendations on Temperature TMDL methodology. | | | | | | | | T23<br>T<br><br>T24<br><br>T18-25 |
| 49 | Ed Hoffman | Lake Oswego Corporation | 1) Tualatin River TMDL comments.<br>a) TMDL must continue to include Oswego Lake<br>b) LOC has no objections to the Tualatin Basin TMDLs<br>c) There is still a need for the phosphorus TMDL.<br>d) The TMDL/WQMP needs to make it mandatory for all agencies to not use phosphorus fertilizer products on grass.<br>2) Oswego Lake TMDL Comments<br>a) Still need for improvements in watershed.<br>b) The City of LO continues to discharge pollutants to the lake.<br>c) Sanitary overflows need to be addressed<br>d) LOC agrees with the annual loading period for the lake.<br>3) Comments on WQMP and monitoring<br>a) The timeframe for updating and implementing the city of LO's plan is too long.<br>b) The current monitoring plan for the city of LO is inadequate.<br>c) Phosphorus fertilizer products should be addressed in the TMDL.<br>d) The WQMP needs to be enforceable.<br>4) Compliance should be based on meeting the TMDL.<br>5) The discussion on enforcement (p. 10) and penalties should be more specific.<br>6) General Comments<br>a) Lake water quality improvements should not be used to determine compliance.<br>b) The solution is not dilution<br>c) Margin of safety values should be shown. | X | | | X | | X | X | <br>P42<br><br>P1<br>W7<br><br><br><br><br>P14<br><br>W19<br><br>W17<br><br>W7<br><br>W9<br><br>W9<br><br>W1<br><br>P15 |
| 50 | Ela Whelan | Clackamas Co. WES | Support comments by Wash and Mult. Co.<br>1) The WQMPs need to be adaptable as new info is available.<br>2) The County and SWMACC do not have the authority to address the temp. allocations. This section needs to be modified.<br>3) Bacteria- Due to lack of info regarding bacteria, the DMAs should craft bact mgmnt plans without numeric criteria.<br>4) Concerns with Phos. TMDL<br>5) Concerns with DO TMDL – The measure of safety for the DO TMDL is excessive and difficult to justify and therefore the mgmnt plan should include flexibility to accommodate new info.<br>6) WQMP<br>a) Def. of reasonable assurance as it relates to WQMPs | X | X | X | X | X | X | | <br>W1<br>T4, W13<br><br>B10, B12<br>P1<br>D13<br><br><br><br><br>W12 |

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| | | | b) Need more than one year to develop. | | | | | | | | W14,19 |
| 51 | Bill Gaffi | Unified Sewerage Agency | **Temperature**<br>1) DEQ should follow the OAR and require the development of a temperature management plan for the Tualatin River rather than establishing a TMDL.<br>2) The TMDL, as proposed, is overly prescriptive and significantly reduces the flexibility in developing implementation plans.<br>3) The TMDL, as proposed, does not adequately account for the DMAs legal and statutory authority to implement the requirements.<br>4) The proposed wasteload allocations would result in significant negative environmental and financial impacts (e.g., refrigerating wastewater treatment plant discharges with the resultant need for additional electric power generation, relocating the discharges to the Columbia River thereby reducing the flow in the Tualatin). The WLAs would redirect resources away from otherwise improving the overall health of the Tualatin River watershed.<br>5) The final TMDL should evaluate all anthropogenic activities, allowing credit to be given for cooling influences (e.g., discharges from Hagg Lake and Barney Reservoir).<br>6) Modeling omitted consideration of water withdrawal rights, groundwater inflows and stratification in the lower stretches.<br>7) To the extent that the draft TMDL requires control for "pollution" rather than “pollutants" it is not legally authorized.<br>BACTERIA<br>8) DEQ should follow the OAR and require the development of a bacteria management plan for the Tualatin River rather than establishing a TMDL.<br>9) The bacteria standards are scientifically uncertain, and err strongly on the side of safety; thus DEQ adopted them with the understanding that they would be used as actions levels which would trigger focused Bacteria Management Plans. (Numerical limits should not appear in the MS4 permits.)<br>10) The mainstem was improperly listed as water quality limited for bacteria, therefore a bacteria TMDL should not be developed for the mainstem Tualatin River, but rather the 303(d) should be corrected.<br>11) Bacteria control for stormwater could have detrimental environmental consequences such as dewatering streams.<br>12) Inappropriate allocation of the summer base flow for both the summer and winter allocations.<br>a) The winter base flows used leads to an unnecessarily large MOS<br>b) There is a summer base flow error for the Middle subbasin.<br>c) Question regarding base flow for all subbasins (See comment 50, bottom of page 34)<br>d) USA proposes that DEQ work with USA and other DMAs to develop alternative and technically defensibel estimates of summer and winter baseflows for each | X | X | X | X | X | X | X | T38<br>T39<br>T40, 4<br>T41<br>T42<br>T43<br>T44<br>**B13 – B21**<br>B7,12, 13<br>B14<br>B15<br>B16<br>B17 |

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| | | | subbasin. | | | | | | | | B18 |
| | | | 13) USA proposes that DEQ work cooperatively with USA and other DMAs to identify the most appropriate allocation approach for bacteria for this watershed (refers to Rock Cr. being the most stringent). | | | | | | | | B19 |
| | | | 14) DEQ should not apply the 30-day log mean of 126 organisms/100 ml as the target concentration for individual storm events. | | | | | | | | B20 |
| | | | 15) The Draft TMDL has failed to show that runoff has significantly higher bacteria levels. | | | | | | | | B21 |
| | | | 16) DEQ has failed to provide required fiscal impact information regarding the proposed bacteria TMDL. | | | | | | | | **D26–41** |
| | | | **Dissolved Oxygen** | | | | | | | | |
| | | | 17) The Final TMDL's control strategies must be targeted to address the right pollutants, as well as the right sources, release mechanisms, transport mechanisms, and accumulation patterns. | | | | | | | | D26 D27 |
| | | | 18) The Draft TMDL is erroneously based on the assumption that organic matter associated with erosion products is a major component of sediment oxygen demand. | | | | | | | | D28 |
| | | | 19) The Final TMDL's regulatory requirements must be expressed in terms of reducing the discharge of the actual materials that affect dissolved oxygen. | | | | | | | | D29 |
| | | | 20) The USA's progress should be tracked on the basis of the efforts they undertake to control settleable organic solids but not the sediment oxygen demand or dissolved oxygen conditions in the river. | | | | | | | | D30 |
| | | | 21) The data that have been used as the basis for the source identification and problem definition in the Draft TMDL were obtained using sampling techniques that are not capable of providing credible information on the organic fractions of settleable solids in storm drains, creeks or rivers. | | | | | | | | D31 |
| | | | 22) WLAs for the wastewater treatment facilities should reflect a tiered discharge scenario to account for allowable daily, weekly and monthly median conditions. | | | | | | | | D32 |
| | | | 23) The WLAs for the wastewater treatment facilities should be tied to river flow and not applicable when river flows exceed 350 cfs. | | | | | | | | D33 |
| | | | 24) Monitoring protocols that are appropriate to the target pollutants need to be developed. | | | | | | | | D34 |
| | | | 25) The Tualatin Subbasin is a highly complex/managed waterbody with dissolved oxygen legacy issues. | | | | | | | | D35 |
| | | | 26) The Tualatin Subbasin is primarily water quality limited for cool water species. | | | | | | | | D36 |
| | | | 27) The TMDL compliance period needs to be reflected in the allocation table. | | | | | | | | D37 |
| | | | 28) Representative streams should be used to determine allocations. | | | | | | | | D38 |
| | | | 29) Water quality modeling was excessively conservative. | | | | | | | | D39 |
| | | | 30) The draft temperature TMDL and the draft DO TMDL may contain requirements that are in conflict. | | | | | | | | D40 |
| | | | 31) Use management plans but not numerical limits in MS4 permits. | | | | | | | | D41 |
| | | | 32) DEQ has failed to provide required fiscal impact | | | | | | | | |

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| | | | information regarding the proposed DO TMDL. | | | | | | | | |
| | | | **Phosphorus** | | | | | | | | P31 |
| | | | 33) The proposed phosphorus TMDL will require substantial additional investment in measures to reduce phosphorus even though the beneficial uses it addresses are no longer impaired. These investments will not produce environmental benefit and will divert resources away from other critical programs. (See P-1) | | | | | | | | P32 |
| | | | 34) DEQ must declare victory regarding phosphorus in the Tualatin River and withdraw the TMDL to preserve the integrity of the TMDL program. (See P-1) | | | | | | | | P33 |
| | | | 35) DEQ must also insure that current phosphorus control measures are kept in place as a foundation upon which to restore watershed health through future efforts addressing temperature, bacteria and DO. (See P-1) | | | | | | | | P34 |
| | | | 36) The derivation of mainstem Tualatin River background conditions has incorrect assumptions that underestimate loading capacities. | | | | | | | | P35 |
| | | | 37) Modeling approach does not properly account for baseflows | | | | | | | | P36 |
| | | | 38) The pH standard has been improperly applied to the Tualatin River in the area of the Lake Oswego diversion dam. | | | | | | | | P37 |
| | | | 39) Discrepancies in the background concentrations for mainstem and tributaries | | | | | | | | P38 |
| | | | 40) Stormwater runoff is not a significant contributor of phosphorus during the algal growing season. | | | | | | | | P39 |
| | | | 41) Lack of a load allocation for anthropogenic sources and improper application of a margin of safety. | | | | | | | | P40 |
| | | | 42) Chlorophyll *a* and phosphorus relationship in the mainstem. | | | | | | | | P41 |
| | | | 43) Oversimplification of the modeling approach could impact compliance elements. | | | | | | | | P42 |
| | | | 44) Oswego Lake is not part of the Tualatin River basin and should not be included in the Tualatin Subbasin TMDL. | | | | | | | | P43 |
| | | | 45) If DEQ nonetheless decides to promulgate a revised total phosphorus TMDL, it should not impose enforceable numeric limitations on stormwater discharges governed by MS4 stormwater permits. | | | | | | | | |
| | | | **WQMP** | | | | | | | | B49,D40 |
| | | | 46) Use Management Plans but not numerical limits in MS4 stormwater permits | | | | | | | | W28 |
| | | | 47) There is insufficient knowledge to mandate specific management strategies related to stormwater discharges | | | | | | | | W1 |
| | | | 48) The Final TMDL needs to allow for a flexible, adaptive management approach | | | | | | | | T4, |
| | | | 49) DMAs may not have full authorities for implementation. Specifically, stormwater authorities have limited authority to manage riparian areas. | | | | | | | | W13<br>B21,D41 |
| | | | 50) The Draft TMDL lacks sufficient fiscal impact analysis. | | | | | | | | W3 |
| | | | 51) DMAs need the flexibility to use a holistic watershed approach to solve the problems identified by the TMDLs | | | | | | | | W19 |
| | | | 52) Timeline for preparing the implementation plan should be flexible. USA has stated that it could take from 12-24 months, depending on details of final TMDL. | | | | | | | | Done |
| | | | 53) The proposed date for the annual reports is in the middle of the TMDL season (September 30). A more appropriate date | | | | | | | | |

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| | | | is January 31.<br>**Other**<br>54) The life stage timing patterns shown in the TMDL and Appendix F are conservative.<br>55) Coho are not indigenous to the Tualatin Subbasin and therefore DEQ should not designate spawning criteria directed toward coho salmon spawning areas.<br>56) The TMDL documents do not provide data to confirm designation of Scoggins Creek and the upper Tualatin for spawning habitat. | | | | | | | | W20<br>W21<br>W22 |
| 52 | Marvin Lewallen | Weyerhaeuser Co. | 1) Support NWPP, OFIC and USA's comments.<br>2) 303(d) listings: Believe that the great number of temperature listings is due to the "inappropriateness of how the water quality standard is written".<br>3) Temperature<br>a) Why are load allocations based on highest stream temps and lowest flows when the don't necessarily happen at the same time.<br>b) Does DEQ expect point sources to reduce temperatures at times when the temp standard is not violated? (See TMDL section 4.1.7)<br>4) Urge DEQ to reassess how the department is allocating resources regarding TMDLs. | | X | | | | | | T5<br>T6<br>T7 |
| 53 | Spencer Bobli | Maxim | Concerns regarding Temp TMDL allocations specific to Maxim and Fujitsu | | X | | | | | | T8 |
| 54 | Joe Keating | OR Chapter Sierra Club | Same as attachments to Tualatin Riverkeepers comments **(SEE 40 – 17 through 42 above)** | X | X | X | X | X | X | X | |
| 55 | Andrew Harris | City of Lake Oswego | 1) General<br>a) p. 5 Revise last paragraph to include Oswego Lake basin<br>b) p.9 Revise 1st P., last sentence to recognize that implementation to achieve the WEA goals commenced years ago and continues<br>c) p. 12 change all references from LO drainage basin to Oswego Lake<br>2) Temp TMDL<br>a) Why are allowable effluent temperatures in Table 9 so high?<br>b) Why aren't other measures that affect stream morphology allowed as surrogate measures.<br>c) Figure 20: Please identify sites of Ball and Carter Creeks.<br>3) Phosphorus TMDL<br>a) Table 46 does not give load allocations for several sources, assuming no in-stream sources of phosphorus in the TMDL season. This may limit management options for reducing phosphorus.<br>b) The city should be able to revise values in TMDL if new data is available (refers to background values).<br>c) P. 136 – may be some calculation errors<br>d) Change OTAK date references to 1992 (p. 136).<br>e) P. 138 – what is the data source for the 0.326 value.<br>f) Include references<br>4) WQMP<br>a) Recommend that DEQ adopt a process that requires | | X | | X | | X | | T9A<br>T13<br>P16<br>P17<br>P18<br>P19<br>P20<br>P21<br>W25 |

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| | | | certainty that the TMDLs and WQMPs will be reviewed and adjusted at any time when new evidence justifies a change.<br>b) Explain what is meant by providing Reasonable Assurance that management measures will meet allocations (p.21).<br>c) P. 24 Coordinate the timing of all report to be the same.<br>d) P. 24 Clearly state and define what compliance means in the context of the TMDL program. | | | | | | | | W12<br>Done<br>W12 |
| 56 | Rick Kepler | ODFW | Comments regarding Appendix F<br>1) ODFW fish distribution info may underestimate the type and distribution of fish presence.<br>2) ODFW is updating its fish distribution maps (anticipate completion within two years).<br>3) Current steelhead distribution may be less than maps imply and Cutthroat may be more widespread.<br>4) ODFW would not recommend reducing the range of distribution displayed by the maps without conclusive, long-term surveys.<br>5) Temperature<br>a) Support system potential conditions as a goal.<br>b) Restoration of flows and reconnecting flood plains would also address temperature.<br>6) ODFW supports SOD and DO TMDL.<br>7) Sedimentation needs to be addressed in the future. | X | X | | | X | | X | W20<br>W20<br>W20<br>W20<br>T19<br>W23 |
| 57 | John Rosenburger | Washington County | **General**<br>1) The TMDL does not demonstrate how WQSs will be met.<br>2) DEQ should go to EQC for TMDL approval.<br>3) The TMDL does not address industrial stormwater discharges.<br>4) Statutory restrictions on County authority do not allow WQMPs as DEQ proposes.<br>5) The County cannot demonstrate compliance with numerical allocations as the allocations are so broad-based.<br>6) Supports a Management Plan approach rather than a TMDL<br>7) The TMDL's definition of "reasonable assurance" is different than Congress'.<br>**Phosphorus**<br>8) The Tualatin Basin is no longer water quality limited as to Total Phosphorus.<br>9) Target concentrations (for phosphorus) are less than background levels.<br>10) The allocations of phosphorus are to DMAs instead of stream segments, and are questionable.<br>**Bacteria**<br>11) Bacteria approach will not attain the desired results<br>12) The Bacteria TMDL assumes roadways generate bacteria<br>13) DEQ's approach to the bacteria TMDL is inconsistent with the OARs.<br>14) The TMDL does not recognize the scientific complexity of bacteria, is not scientifically sound, and uses criteria in ways not intended under OAR.<br>**Dissolved Oxygen**<br>15) The DO TMDL is not a realistic application of theory.<br>16) The data used to determine the DO target levels is not | X | | | X | | X | X | W27<br>W16<br>T4, W12,13<br>W28<br>B7,T38 W12,P2<br>P1<br>P2<br>P11,12<br>B8<br>B9<br>B7, B12<br>B8,14<br>D14<br>D12 |

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| | | | sufficient and therefore the target levels are arbitrary.<br>17) A percent reduction standard for DO is arbitrary and vague.<br>**Temperature**<br>18) The TMDL did not use best available science.<br>19) DEQ cannot rely on Washington County to restore riparian area on private lands.<br>**Other**<br>20) The acreage areas for Wash. Co. are not correctly stated in the proposed TMDL. | | | | | | | | D15<br><br>T16<br>T4<br><br>P11 |
| 58 | Dean Marriott | City of Portland | **Phosphorus**<br>1) DEQ did not use currently available data/reports that show the Tualatin Basin is no longer water quality limited due to total phosphorus:<br>a) The pH criteria is being met<br>i) Dissolved Oxygen essentially being met, this was not a concern of the 1988 total phosphorus TMDL, and dissolved oxygen problems, if they do occur, are not due to high levels of total phosphorus or high levels of algal growth. There is a draft dissolved oxygen TMDL to deal with the problems that led to low dissolved oxygen, especially in the tributaries.<br>ii) The naturally occurring total phosphorus levels in the Tualatin Basin are too high to allow control of algae to meet the chlorophyll *a* guidance level of 15 µg/L by total phosphorus.<br>iii) The chlorophyll *a* action level should be increased to reflect naturally occurring levels of total phosphorus<br>-OR-<br>iv) A narrative standard should be developed that recognizes that chlorophyll *a* cannot be controlled to the level of the statewide guidance level of 15 µg/L.<br>♦ DEQ's proposed narrative standard that ties chlorophyll a guidance level attainment to meeting total phosphorus TMDLs decouples the science from the regulation.<br>**2) DEQ and DMAs need to declare victory on the total phosphorus TMDL**<br>a) Set new TMDLs so that they reflect background plus an allocation for anthropogenic<br>-OR-<br>b) Eliminate the TMDL and set up a maintenance plan for the WWTPs and DMAs that commits them to maintaining current levels of control.<br>-AND-<br>c) Develop a new chlorophyll a guidance level<br>3) DEQ bases its total phosphorus draft TMDL recommendations on the guidance provided by the TB_TAC and TB_PAC. This is acceptable to a limited degree. Since the TB_TAC disbanded before it could evaluate the impacts of setting the nonpoint source total phosphorus to background plus an allowance for anthropogenic, it is not | X | X | X | X | X | X | X | **P51-72**<br>P52<br><br>P53<br><br>P54 |

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| | | | correct to suggest that they would have supported the current draft TMDLs. Setting the current draft TMDLs will not result in any change in the chlorophyll *a* levels, therefore, they are not water quality based. Improving water quality is the basis for water quality driven TMDLS. | | | | | | | | |
| | | | 4) Tributary background concentrations due to groundwater are very similar to the TB_TAC values, except for Dairy Creek, which is lower than recommended by the TB_TAC. | | | | | | | | P55 |
| | | | 5) TB_TAC/PAC recommended 'background plus anthropogenic' and not 'background equals anthropogenic'. | | | | | | | | P56 |
| | | | 6) TB_TAC/PAC did not evaluate river response to background TP. | | | | | | | | P57 |
| | | | 7) Target concentrations for runoff are background minus a MOS. This means runoff would have to be cleaned to levels less than background. | | | | | | | | P58 |
| | | | 8) Although the text states that the allocations allow for some anthropogenic effects, there is no documentation to show this. | | | | | | | | P59 |
| | | | 9) Background phosphorus will prevent attainment of 15 µg/L chlorophyll a action level bacteria. Thus, the chlorophyll a action level needs to be changed. | | | | | | | | P60 |
| | | | 10) Aesthetics is no longer a problem according to the DEQ's own assessment. | | | | | | | | P61 |
| | | | 11) DEQ proposed change to chlorophyll a guidance level couples chlorophyll a and TP legally when there is no scientific relationship. | | | | | | | | P62 |
| | | | 12) DEQ should couple chlorophyll a compliance with pH compliance since they are scientifically linked. | | | | | | | | P63 |
| | | | 13) Dissolved Oxygen is not directly linked to TP as is assumed. | | | | | | | | P64 |
| | | | 14) Need to know how wasteload allocations and load allocations were calculated. | | | | | | | | P65 |
| | | | 15) No tributaries are listed for chlorophyll a on 303(d) list. | | | | | | | | P66 |
| | | | 16) No environmental benefit from TP control in stormwater. | | | | | | | | P67 |
| | | | 17) Mean chlorophyll a levels are not affected at background levels of TP. | | | | | | | | P68 |
| | | | 18) DEQ should incorporate information from the EQC required February and June 1999 reports. | | | | | | | | P69 |
| | | | 19) Should maintain current level of WWTP permits and current levels of BMPS. | | | | | | | | P70 |
| | | | 20) Numeric controls on stormwater are virtually impossible to implement due to the extreme variability. | | | | | | | | P71 |
| | | | 21) Tributaries should no longer have TMDLs as they do not have pH or DO problems linked to phosphorus. | | | | | | | | P72 |
| | | | Page 131 & 132: | | | | | | | | |
| | | | 22) Target tributary concentrations for Fanno Creek needs to be equal to or greater than background concentrations—not vice versa. | | | | | | | | P73 |
| | | | **Dissolved Oxygen** | | | | | | | | **D55 – D84** |
| | | | 23) DEQ does not use flexibility offered by continuous data even though sufficient data is available (three-tiered DO standard vs. one-tiered). | | | | | | | | D55 |
| | | | 24) Total volatile solids (TVS) is a poor choice as secondary surrogate, control measures should be designed to control settleable portions not total. | | | | | | | | D56 |

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| | | | 25) Load allocations and wasteload allocations as percent load reductions without load baseline is not useful. | | | | | | | | D57 |
| | | | 26) Science does not support numeric controls on stormwater. | | | | | | | | D58 |
| | | | 27) DO model uses estimated output from temperature model (bathymetry, travel time, etc.) which is questionable. | | | | | | | | D59 |
| | | | 28) How were channel processes considered in linking sediment oxygen demand to DO, especially in the case of steep gradient streams, where long-term sediment retention may not be very prevalent? | | | | | | | | D60 |
| | | | Fish Habitat: | | | | | | | | |
| | | | 29) ODFW provided information, but interpretation was done by DEQ. Unsure information was interpreted correctly. | | | | | | | | D61 |
| | | | 30) TMDL should be responding to 303(d) list not changing listing criteria (i.e. changing best uses). | | | | | | | | D62 |
| | | | Biological Criteria: | | | | | | | | |
| | | | 31) DMAs should not be required to develop management plans that address these problems unless TMDLs are established. | | | | | | | | D63 |
| | | | 32) Not sure what (and how) survey were used to develop the biological criteria and not sure how the criteria were applied. | | | | | | | | D64 |
| | | | 33) Page D-16: Correction: change “100 m buffer height and width” to “100 ft buffer height and width”. | | | | | | | | D65 |
| | | | 34) Page D-17: Figure 6 – The fact that system potential temperature decreases downstream to below 16°C is questionable considering the fact that groundwater influx was not included in the model. | | | | | | | | D66 |
| | | | 35) Page D-22: Figures 17 to 28 do not show modeling results for upper reaches of Fanno Creek. | | | | | | | | D67 |
| | | | 36) Page 78: Incorrect reference: Clean Water Act section 303(D)(1) refers to heat load, not DO, and does not address whether MOS is implicit or explicit. | | | | | | | | D68 |
| | | | 37) Page 83: The 303(d) listing is for cool-water, yet DEQ is using cold-water habitat delineation criteria for the proposed TMDL. The biological criteria are not clear for this change. | | | | | | | | D69 |
| | | | 38) Page 85: Table 24: sediment oxygen demand measurements were conducted outside the critical DO period. Extremely high variability in sediment oxygen demand measurements makes using a median value across all streams questionable. Due to the high variability, the number of sediment oxygen demand measurements is statistically insufficient as model input. Sediment oxygen demand is clearly not homogenous across the stream bottom and in addition was only measured where organic bottom sediments were present. The percent coverage of organic bottom sediments is a critical step in modeling the impact of sediment oxygen demand on DO. | | | | | | | | D70 |
| | | | 39) Page 89: Translation of sediment oxygen demand to DO consumption in mg/L is missing – it would allow comparison w/ other sources. It is unclear how the model was calibrated, i.e. were DO measurements outside the critical DO time period utilized and what maximum temperature was used? | | | | | | | | D71 |
| | | | 40) Page 93: Changing the target DO criterion is an inappropriate way of expressing a MOS. This change could be misconstrued as a new DO standard. | | | | | | | | D72 |
| | | | 41) Expressing a loading capacity (LC) as percent reduction is | | | | | | | | D73 |

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| | | | not supported by the definition of load capacity.<br>42) Defining load allocation or wasteload allocation as percent reduction of volatile solids equates to a prescriptive TMDL that does not allow adaptive management.<br>43) The model was calibrated using a critical low-flow day when DO levels are expected to at or near their minimum. What is the rationale for this approach?<br>Page 96:<br>44) The model was calibrated using a critical July, low-flow day. Do not agree with this method of calibration, as it does not reflect water quality standards or 'typical' summer conditions.<br>Page 101:<br>45) In table-29, DEQ proposes a 50% reduction in TVS in Fanno Creek. However, on page 103 under Urban Runoff, DEQ estimates total suspended solids contributed by Fanno Creek to be 2.4 million pounds. DEQ does not know what the TVS of the 2.4 million pounds is. If the amount of TVS in the 2.4 million-pound estimate is not known, what is the rationale for 50% reduction in table 29?<br>46) The connection between total solids or TSS, (total) volatile solids (TVS), and sediment oxygen demand is much more complex than presented. Specifically, the following relationship appear questionable:<br>♦ TSS and TVS that results in sediment oxygen demand: TSS is in most cases very different from settleable solids and only the organic fraction attached to settleable solids can contribute to sediment oxygen demand<br>♦ TVS and sediment oxygen demand: Organic material introduced to stream via erosion and runoff is in many cases very stable and not very likely to contribute significantly to sediment oxygen demand.<br>47) Since the actual source of sediment oxygen demand (or the surrogate TVS) is unknown, a TMDL should not be established until the pollutant source is known.<br>48) Referenced study by Suppnick (1992) is much more comprehensive than DEQ's approach and includes agricultural runoff, streambank erosion, bed load transport, etc.<br>49) Establishing a load allocation or wasteload allocation based on the reduction of a pollutant that is ill defined, is not scientifically defensible.<br>50) A percent reduction in TVS without a baseline is not very useful.<br>51) Page 111: Basing sediment oxygen demand on a very limited number of TSS measurements and estimates without knowing the fraction of TVS in TSS is scientifically not defensible.<br>52) Page 114: Justification for using percent reduction in TVS as load allocation or wasteload allocation is questionable.<br>53) Page 115: Does the riparian vegetation planted to reduce stream temperature result in TVS reduction above the 20 to 50 percent reduction set as load allocation or wasteload allocation?<br>54) Page116: Since the MOS increased the target criterion does | | | | | | | | D74<br>D75<br>D76<br>D77<br>D78<br>D79<br>D80<br>D81<br>D82<br>D83<br>D84<br>D85<br>D86 |

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| | | | that mean (1) a new standard was established and (2) in order to meet the TMDL, the new target criterion has to be met? | | | | | | | | |
| | | | **Bacteria** | | | | | | | | |
| | | | 55) Exceedances of the bacteria standard should be addressed via a bacteria management plan per OAR to reduce anthropogenic sources to the maximum extent practicable not a TMDL that is supposed to meet a specific numeric limit. | | | | | | | | **B32-61** B32 |
| | | | 56) Log mean of 126 CFU/100 ml is not appropriate standard to show compliance during runoff periods. | | | | | | | | B33 |
| | | | 57) MS4 bacteria samples are not event mean concentrations but 'grabs' just like stream samples. | | | | | | | | B34 |
| | | | 58) 406 CFU/100 ml standard works for WWTP where they can correct disinfection problems and resample thereby avoiding a violation. Resampling stormwater runoff during the same storm event is not possible on the other hand. | | | | | | | | B35 |
| | | | 59) The model is too simplistic and uses criteria in ways for which it is not intended, nor scientifically sound. | | | | | | | | B36 |
| | | | 60) The TMDL does not provide a good understanding of the sources and fate of bacteria. | | | | | | | | B37 |
| | | | 61) There is limited scientific information on the impact of BMPs on bacteria reductions. | | | | | | | | B38 |
| | | | 62) Numeric controls on stormwater are virtually impossible to implement due to the extreme variability. | | | | | | | | B39 |
| | | | 63) Page B-1: Is the rational method the correct method for determining storm runoff? | | | | | | | | B39 |
| | | | 64) Page B-2:Probable error: Curve number for residential land use is lower than for pasture for all soil groups. | | | | | | | | B40 |
| | | | 65) Page B-4: None of the estimates of bacteria concentration are as high as the concentration (36000 *E. coli*/100 mL) used for model calibration (Page 5). For the model calibration, the high from page 4 should be used. Use consistent units for bacterial counts. | | | | | | | | B41 |
| | | | 66) Page B-4:Assumptions for septic system effluent discharge are questionable. It is very unlikely that 100% of leaking septic system effluent reaches the stream without any treatment. | | | | | | | | B42 |
| | | | 67) Page B-5:The *E. coli* concentration used in the Fanno Creek calibration seems especially high - 36,000 cfu/100 mL. Verify data (and the methodology used by the lab) from USGS. | | | | | | | | B43 |
| | | | 68) Page B-5:It is incorrect that 93.5% of Fanno Creek Watershed is in residential land use. There is significant forest canopy and park land use. | | | | | | | | B44 |
| | | | 69) Pages B-5 through B-11:Model calibration: difference between measured runoff and instream concentrations could be due to growth of bacteria in sediment, biofilms, etc. | | | | | | | | B45 |
| | | | 70) Deducing land use bacteria concentrations from instream concentrations may have a large error. How can you distinguish among different land uses without outfall concentrations (Tables 6 and 7)? | | | | | | | | B46 |
| | | | 71) The difference between measured and modeled *E. coli* concentrations shows significant error (Tables 8 and 9). | | | | | | | | B47 |
| | | | 72) Modeling the entire basin based on two storm events in two | | | | | | | | |

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| | | | watersheds appears questionable. | | | | | | | | B48 |
| | | | 73) Page B-6:Wasteload allocations include MS4 permits - stormwater. By definition, wasteload allocation is the amount of pollutant that a point source contributes to the stream. Stormwater is technically a non-point source (*sic*) even though it is generally defined as a nonpoint source. What are the implications for regulatory issues, including MS4 permits, Stormwater permits, end of pipe discharges, etc. | | | | | | | | B49 |
| | | | 74) Page B-11:The Margin of Safety appears large especially during the summer season when dry periods greatly exceed storm event periods. | | | | | | | | B50 |
| | | | 75) Page B-12:Why did you set an allocation for agriculture during the summer when the storm event the modeling is based on did not show any runoff from cropland and pastures? | | | | | | | | B51 |
| | | | 76) Page 70:On page #70 in figure #46 of the "draft Tualatin…Load" document dated August 2000, what source data was used to generate the figure? | | | | | | | | B52 |
| | | | 77) Page 72: It is inappropriate to apply the 126 CFU/100 mL criterion to a minimum of five samples taken during storm events. A storm event is usually short-lived—much less than 30 days and computing the log mean over a short time period may be biased toward higher values. | | | | | | | | B53 |
| | | | 78) Page 73: The event based, unit load model does not take into account the potential growth of bacteria in stream sediments, biofilms, etc. | | | | | | | | B54 |
| | | | 79) Page 74: Why was the Water Quality Standard of 126 CFU/100 mL used to calibrate the model? Was the model output a log-mean of five samples or was it an individual concentration? It appears that by using the 126 CFU/100 ml standard a huge implicit MOS was created. | | | | | | | | B55 |
| | | | 80) Page 75 How can the TMDL establish a stormwater concentrations at 3500 but still require achievement of an in-stream concentration of 406 CFU/100 mL without allowing for a mixed zone? | | | | | | | | B56 |
| | | | 81) How were the winter and summer load allocations developed? Verify calculations. | | | | | | | | B57 |
| | | | 82) Why were all land uses assigned the same load allocation? | | | | | | | | B58 |
| | | | 83) Do not agree with assumption that 100% of failed septic tank effluent would flow to river. No sanitary survey info available. What is basis for this assumption? | | | | | | | | B59 |
| | | | 84) The definition of Waste Load Allocation (wasteload allocation) is incorrect. It should say: "A wasteload allocation is the amount of pollutant that point sources can contribute to a stream as their portion of the load capacity." | | | | | | | | B60 |
| | | | 85) Page 76:The definition of load allocation (load allocation) is incorrect. It should say: "A load allocation is the amount of pollutant that natural plus non-point sources can contribute to a stream as their portion of the load capacity." | | | | | | | | B61 |
| | | | **Temperature** | | | | | | | | |
| | | | 86) "According to OAR 340-41, compliance with the temperature standard was meant to be achieved through implementation of an adaptive temperature management rather than a numeric limit. The second is a more effective | | | | | | | | **T45–62** T45 |

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| | | | path."<br>87) "Establishing a system potential below the standard is essentially setting a new standard."<br>88) "System potential calculations do not take into account site constraints such as existing development.' | | | | | | | | T46 |
| | | | 89) "Due to limited data on travel times in the tributaries, the tributary model runs may be flawed." | | | | | | | | T47 |
| | | | 90) "Temperature was modeled for the hottest part of the summer. This is not when the fish are spawning. Therefore, it cannot be used to determine spawning requirements. The model should be calibrated for the hottest 7-day period during the spawning season." | | | | | | | | T48<br>T49 |
| | | | 91) "What is the historic basis for applying the ecoregion concept when calculating shade percentages?" | | | | | | | | |
| | | | 92) "Channel morphology description does not accurately portray streams in headwater areas (Page A-31)." | | | | | | | | T50 |
| | | | 93) "Williams Control, Inc. is not in Portland (Figure A-9)." | | | | | | | | T51 |
| | | | 94) "Fanno Creek Temperature Data collected by the City of Portland are not shown in Figure A-27." | | | | | | | | T52 |
| | | | 95) "Page A-54: Table A-12 – Sites are not consistent with figure A-28 on page A-53." | | | | | | | | T53 |
| | | | 96) "Page A-204: Most graphs starting with Figure A-178 started at RM 9.0. Where is the information for RM 14 to RM 9? This is information critical to the City of Portland to prepare management strategies." | | | | | | | | T54<br>T55 |
| | | | 97) "Page A-217: Achieving system potential for the conditions presented is unrealistic in a developed watershed. It is not possible to return riparian vegetation to pre-human disturbance conditions. According to OAR 340-41, point source only needs to achieve no measurable increase in surface water temperature, if the temperature is above 64°F. As soon as temperature is below 64°F, the load capacity, thermal point source discharges can be allocated." | | | | | | | | T56 |
| | | | 98) "Page 17: Figure 5 – Cannot assume that all land in an 'urban' setting is developed." | | | | | | | | |
| | | | 99) "Page 27: "Elevated summertime stream temperature attributed to sources in the Tualatin River subbasin result from riparian vegetation disturbance." This statement is too simplistic and does not consider withdrawal of water, channel modification, reduced groundwater recharge, etc." | | | | | | | | T57<br>T58 |
| | | | 100) "Page 37: "System potential temperatures during the critical condition in late July result when the nonpoint source loading capacity is achieved…" The distinction between nonpoint and point source load capacity is artificial and not supported by the definition of load capacity in 40 CFR 130.2." | | | | | | | | T59 |
| | | | 101) "Page 39: Table 8 – Wasteload allocations are not equitable since they are based on local system potential and not on the temperature standard. Wasteload allocation (expressed in max. effluent temperature) should not be above the instantaneous lethal temperature for salmonids of 92°F." | | | | | | | | T60 |
| | | | 102) "Page 40: If 100% of the load capacity is allocated to natural sources how is it possible to have load capacity for point sources as indicated by allowable effluent | | | | | | | | T61 |

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| | | | temperatures above the temperature standard or system potential?"<br>103) "Page 41: Limiting the management of thermal loading to restoring and preserving riparian vegetation amounts to a prescriptive TMDL which will not allow for other management options such as flow augmentation, channel restoration, reduction in water use, etc. | | | | | | | | T62 |
| 59 | James McCauley | Oregon Forest Industries Council | OFIC recommends that the final TMDL include:<br>1. Recognition that forested riparian areas are dynamic and that shade standards must reflect spatial and temporal variability present.<br>2. Recognition that stream temperature dynamics equilibrates to the local thermal conditions, and upstream thermal influences have downstream effects over a very limited time and distance.<br>3. Evaluate information submitted by Oregon Department of Forestry to use in modifying the final TMDL and WQMP. | | | | | | | | T18<br>T27<br>T18-25 |
| 60 | Stuart Rounds | USGS | 3 Documents: 2 from 10/6/2000 and 1 from 10/24/2000 Only comments labeled "Very Important" and "Significant" are summarized here. Advisory comments are not summarized.<br><br>10/24/2000 Letter<br>General<br>V. Important<br>1) USGS comments are necessarily focused on the TMDLs short comings.<br>2) Although the comments may question details of analyses, it does not mean that the general conclusions are incorrect.<br>Significant<br>3) Table 1 7Q10 flow statistics are questionable.<br>**Phosphorus**<br>V. Important<br>4) Certain facts suggest that the tp TMDL may longer be necessary:<br>a) USGS has previously made the case that current phosphorus control, in conjunction with improved flow management, has been sufficient to eliminate violation of max pH standard<br>b) DO compliance has improved due to current levels of phosphorus control, improved flow management, and ammonia control at the WWTPs. Increased controls on phosphorus may reduce peak algal population further and may reduce SOD downstream, but effects would be small. The controls on SOD in the DO TMDL are proposed to be sufficient to control DO in the mainstem.<br>c) The draft total phosphorus criteria is being met.<br>5) The proposed criteria for chl-a appears to remove the link between the standard and the beneficial use it is supposed to protect. Propose that a chl-a level which ensures compliance with the pH standard be adopted.<br>6) Decreasing the flow in the Oswego Canal would benefit wq in both OL and the Tualatin River.<br>7) Allocations are below background<br>Significant | X | X | X | X | X | X | X | P44<br>P45<br>P46<br>P47 |

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| | | | 8) P.118 pH violations usually occur in June, July and Aug. | | | | | | | | P48 |
| | | | 9) P. 123 Statements attributed to USGS are true, but need to state the 15 ug/L would not be met. | | | | | | | | P49 |
| | | | 10) Factors other than p affect chl-a. | | | | | | | | P50 |
| | | | 11) SOD reductions should address DO. | | | | | | | | P51 |
| | | | **Temperature** | | | | | | | | |
| | | | Very Important | | | | | | | | |
| | | | 12) Question regarding interpretation of the standard | | | | | | | | T26 |
| | | | 13) Anthropogenic impacts other than shading are not addressed in the TMDL, in particular, the cooling effect of Hagg Lake augmentation flows. | | | | | | | | |
| | | | 14) A-78 states that lower river was not modeled by DEQ. | | | | | | | | T29 |
| | | | 15) Widths graphed in figure A-41 do not always correlate with USGS cress-sectional data. | | | | | | | | T30 |
| | | | 16) The velocities and mean depths used in the temp model for the reservor reach are not accurate. | | | | | | | | T31 |
| | | | 17) Concerns regarding the accuracy of the simulated velocities and depths on the tribs. | | | | | | | | T32 |
| | | | 18) USGS model for the lower mainstem is available. | | | | | | | | T33 |
| | | | Significant | | | | | | | | |
| | | | 19) Other (better?) calibration data is available for the lower mainstem. | | | | | | | | T34 |
| | | | 20) Question regarding the use of 7Q10 flows which do not correlate with system potential temperatures. Also, 7Q10 for Durham WWTP was based on W. Linn Gage, which does not include L. Oswego flows. | | | | | | | | T35 |
| | | | 21) Figure A-36 includes incorrect data (was this data used as model input) | | | | | | | | T36 |
| | | | 22) Question regarding 55 degree criterion (a misunderstanding of our criterion) | | | | | | | | T37 |
| | | | **Dissolved Oxygen** | | | | | | | | |
| | | | Very Important | | | | | | | | |
| | | | 23) If spawning does not occur in July, should the cold-water DO criteria apply during this month? | | | | | | | | D16 |
| | | | 24) Comments regarding ammonia design concentrations and referring to Oct. 6 letter. | | | | | | | | D17 |
| | | | 25) Comments regarding ammonia assimilative capacity and referring to Oct. 6 letter. | | | | | | | | D18 |
| | | | 26) The MOS in the tributary DO TMDL is incorporated as an increase to the target criteria. This results in a nonlinear decrease necessary in SOD**.** | | | | | | | | D19 |
| | | | 27) The day modeled for the DO TMDL was one of the hottest days of the year, which represents the worst possible combination of conditions for DO and should provide a significant margin of safety. | | | | | | | | D20 |
| | | | 28) DO modeling on tributaries was relatively simple and few data were available for calibration. | | | | | | | | D21 |
| | | | 29) USGS will be producing a report on the soruces and composition of organic matter in the next 6 – 9 months. Control strategies should be flexible to allow DMA to take advantage of the results. | | | | | | | | D22 |
| | | | Significant | | | | | | | | |
| | | | 30) On page 2, the statement that USGS modeling work shows that both ammonia loads and SOD must be reduced further during the critical portions of the years is not exactly | | | | | | | | D23 |

| # | From: | Affiliation | Summary of Comments | General | TemP | Bact | Phos | DO | WQMP | Other | Answer # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | correct.<br>31) On page 105 the text states that the low DO concentrations measured at Stafford in early September of both 1997 and 1998 were due in part to algal activity. This may be true, but the extent of the impact of algal activity has not been quantified.<br>32) Section 4.3.9.3 asserts that leaves deposited during the fall will be mostly exported from the basin during the winter. The fraction that is scoured from the sediments and removed during winter high flows is unknown**.**<br>**Bacteria**<br>Very Important<br>33) Question regarding the verification of runoff coefficients.<br>34) Model has uncertainties and should be used only qualitatively. The general conclusions appear appropriate, but the "allocations (should) be used only as general targets rather than specific allocations".<br>Significant<br>35) Meeting the 126 criterion will not necessarily lead to meeting the 406 criterion.<br>36) The reasoning for choosing the winter design storm needs to be clarified.<br>37) It is unclear that the Rational Method can be accurately used to predict total storm flow volumes. With calibration, it might be used to generate estimates of storm flow volumes, but a greater uncertainty should be expected.<br>**General**<br>Need flexibility to incorporate new science. | | | | | | | | D24<br>D25<br>B22<br>B23<br>B24<br>B25<br>B26<br>W1 |

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# RESPONSES TO COMMENTS ON THE DRAFT BACTERIA TMDL

**Comment B1. Draft TMDL does not detail why 406 is appropriate for beneficial use.**
**Response:** As stated in OAR 340-41-445 (2)(e)(A) the bacteria criterion for the Tualatin subbasin is: a 30-day log mean of 126 *E. coli* organisms per 100 ml, based on a minimum of five samples; and no single sample shall exceed 406 *E coli* organisms per 100 ml. The criterion is based on EPA's bacteria criteria, published in 1986 (Ambient Water Quality Criteria for Bacteria-1986, EPA/5-84-002). To develop the bacteria criterion, EPA conducted several studies of the rate of gastrointestinal illness at beaches with and without contamination sources. *E coli* values were associated with the illness rates. The geometric mean was calculated to correspond to 8 or fewer gastrointestinal illnesses per 1000 swimmers. Noncompliance with the criteria is also indicated by any single bacteria sample exceeding 406 *E coli* organisms per 100 ml. The single sample limits are based on the geometric mean limit and approximation of a normal distribution of observed values with a 90% confidence limit.

**Comment B2. The decay rate fails to account for increased shading and decreased temperatures that will result from the temperature TMDL.**
**Response:** Bacteria and virus die-off is a function of sunlight, temperature, salinity, predation, settling, resuspension and aftergrowth. Typically, bacteria die-off is modeled as a net first order decay as follows (Principles of Surface Water Quality Modeling and Control, Robert Thomann and John Mueller, 1987, Harper and Row, New York):

$$K_B = K_{B1} + K_{BI} + K_{BS} - K_a$$

Where:
$K_B$ = net first order decay rate
$K_{B1}$ = basic death rate as a function of temperature, salinity, predation
$K_{BI}$ = death rate due to sunlight
$K_{BS}$ = net loss (gain) due to settling (resuspension)
$K_a$ = aftergrowth rate

Because of the lack of explicit data, DEQ used a simple first order decay rate adjusted for temperature. Although lower radiation would reduce decay rates, DEQ believes that a simple first order decay rate best reflects the available information.

The effects of temperature on the decay rate can be quantified with the following equation: $(k)_T = (k)_{20}(\Theta)^{(T-20)}$ where T is in C°, $(K)_T$ is the rate at T°C, $(K)_{20}$ is the rate at 20°C and Θ is the temperature adjustment factor (Thomann and Mueller). Typical values for Θ are 1.022 to 1.024. Decreased temperatures in the Tualatin Basin are expected as a result of increased shading. To address the impact of decreased temperature on the bacteria decay rates, average current condition temperatures and allocated temperatures were estimated from the graphs in the draft TMDL (Figures 31-37). The graphs display the maximum daily temperature. The post allocation temperature and resulting decay rates are used in the final bacteria TMDL.

**Comment B3. The TMDL should be expressed to affirmatively prevent the use of chlorine disinfection.**
**Response:** TMDLs identify the parameters of concern and the level of control needed to achieve standards. The means for achieving the TMDLs will be described in the WQMPs. A great deal of flexibility for reducing bacterial levels in the stream can be incorporated into the WQMPs. We assume that the comment is alluding to the possible negative impacts of the discharge of residual chlorine. For discharges under an NPDES permit (such as most urban runoff in the subbasin), the permitting process is the appropriate mechanism to address these discharges.

**Comment B4. The TMDL and its allocations should be expressed as bacterial numbers or mass loadings.**

**Response:** We agree that giving the bacteria allocations in the form of bacterial loads will provide more flexibility for the dischargers while still ensuring the attainment of water quality standards. The allocation portion of the Final Bacteria TMDL has been modified to address this issue.

**Comment B5. The bacteria model is limited: partial calibrations, only hortonian flow, decay rate may not have been properly adjusted.**

**Response:** The bacteria model is based on accepted approaches for estimating runoff volumes. The Soil Conservation Service (SCS) curve number and rational method both predict overland flow. A recorded storm hydrograph includes Hortonian overland flow, subsurface flow, and saturation overland flow. The difference between the modeled Hortonian overland flow and the flow recorded at multiple gages in the basin is simply referred to as "baseflow" in the model. Values for baseflow were estimated by hydrograph separation for several summer and winter storms in each of the 5$^{th}$ field watersheds. The "baseflow" estimates were added to the modeled runoff to account for all of the flow contributing to the hydrograph. The decay rate was taken from literature values for instream *E Coli* decay. The decay rate was adjusted for temperature using temperatures recorded in the Tualatin Subbasin.

**Comment B6. The theory that meeting 126 will also meet the 406 standard is not validated.**

**Response:** Please see response to comment B1. Additionally, examination of instream *E coli* data collected by DEQ and USGS in the Tualatin Subbasin indicates that when the geomean of a sample set is reduced to 126 *E coli*, the "no single sample greater than 406 *E coli*" is generally met. Those values that exceed 406 are within 0.5 log of 406. According to the DEQ data quality matrix, a precision of +/- 0.5 log is required for duplicate samples, so the values are not fundamentally different.

**Comment B7. DEQ should be consistent and use a management plan based approach for the Tualatin River bacteria TMDL as stated in the OAR.**
**Summary of Comments: DEQ regulations require the development of bacteria management plans when water quality standards for bacteria are exceeded. OAR 340-041-0026(3)(I). Federal TMDL regulations make clear that a state is not required to develop a TMDL if it takes other steps to ensure compliance with water quality standards (see 65 Federal Register at 43666). In this case, DEQ has already concluded that a bacteria management plan can achieve compliance with water quality standards (Draft TMDL Appendix I, pg. 15). A TMDL, therefore, is not required.**
**If DEQ nonetheless decides to establish a TMDL, it should require the implementation of a Bacteria Management Plan, as specified by the OAR. This is particularly important since the current water quality standards were not developed for stormwater. When the bacteria criterion was evaluated the DEQ through the 1992 – 1994 Triennial Review process, the policy committee recommended to DEQ, DEQ adopted, and EPA approved a criterion that triggered the development of a bacteria management plan to limit bacterial contamination, if the numeric criterion were found to be exceeded. The policy committee felt that there were too many questions about the development of the numeric criteria by EPA to use the number to define a violation.**

**Response:** DEQ disagrees that a bacteria TMDL is not required. It is clear under federal definitions that bacteria are considered a pollutant and would require a TMDL. There is nothing inconsistent with how Oregon rules read in that a management plan would be required to implement control measures in order to meet allocations in the bacteria TMDL.

OAR 340-41-0026(3)(I) reads as follows:

> "In waterbodies designated by the Department as water-quality limited for bacteria, and in accordance with priorities established by the Department, development and implementation of a bacteria management plan shall be required of those sources that the Department determines to be contributing to the problem. The Department may determine that a plan is not necessary for a particular stream segment or segments within a water-quality limited basin based on the contribution of the segment(s) to the problem. The bacteria management plans will identify the technologies, BMPs and/or measures and approaches to be implemented by point and nonpoint sources to limit bacterial contamination. For point sources, their National Pollutant Discharge Elimination System permit is their bacteria management plan. For nonpoint sources, the bacteria management plan will be developed by designated management agencies (DMAs) which will identify the appropriate BMPs or measures and approaches."

While OAR 340-41-0026(3)(I) does not specifically call for the development of a TMDL for bacteria, it is clear that EPA considers that bacteria are considered a pollutant for which TMDLs should be developed. This can be found in EPA's definition of pollutant[1], in EPA's early TMDL guidance (e.g. "Guidance for Water Quality-based Decisions: The TMDL Process" EPA440/4-91-001) and in EPA's recent clarification (Federal Register Volume 65, Number 135, page 43592) on the relationship between pollutants and pollution for purposes of section 303(d). EPA states that:

> "Of the top 15 categories of impairment identified on the 1998 section 303(d) lists, 11 categories are directly or indirectly associated with pollutants: sediments, pathogens, nutrients, metals, low dissolved oxygen, temperature, pH, pesticides, mercury, organics and ammonia."

The TMDL would therefore serve as the target upon which bacteria management plans should be based in order to achieve the standard. OAR 340-41-0026(3)(I) is consistent with Implementation Plan requirements as identified in the February 2000 Memorandum of Agreement between EPA and DEQ regarding implementation of Section 303(d) of the CWA.

**Comment B8. The approach to a new bacteria TMDL will not attain the desired result. Under the scenario presented in the TMDL, stormwater would have to be chlorinated. This is not feasible and could have detrimental impacts on the environment.**

**Response:** TMDLs identify the parameters of concern and the level of control needed to achieve standards. The means for achieving the TMDLs is left to the WQMPs. A great deal of flexibility for reducing bacterial levels in the stream can be incorporated into the WQMPs. We disagree that there is only one method of bacteria control for stormwater and believe it is premature to conclude that chlorination is necessary. If, upon implementing all other feasible control measures, it is determined that chlorination is the only viable control mechanism, then DEQ may address the issue through the adaptive management processes outlined in the TMDL (see Section 2.3.2 of the Draft TMDL and the WQMP).

**Comment B9. The TMDL assumes roadways are generating bacteria.**

**Response:** DEQ recognizes that roads do not generate bacteria. However, based on sampling required under the MS4 permits, it is clear that bacteria from road runoff contribute to violations of instream bacteria criteria. As such, the contribution of bacteria from road runoff must be controlled. The ultimate source of the bacteria is obviously something other than asphalt, but the existence of the asphalt (or other impervious surfaces) and any stormwater appurtenances are most likely creating a pathway for the bacteria to reach the stream before natural die-off can occur.

[1] The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water

**Comment B10. Due to lack of information on bacterial sources, the TMDL should not establish limits but should allow for the continued gathering of information to better understand the watershed and DMAs should develop bacterial management plans without numeric bacterial standards.**

**Response:** The Department believes that TMDLs need to be developed (as discussed in B7 above). The TMDL, by federal definition, needs to be a "calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards" (see EPA website). The Department believes that management plans can be developed to gain a better understanding of bacterial sources while addressing known or suspected sources.

**Comment B11. How will the TMDL help to control diffuse sources that haven't been controllable in the past?**

**Response:** We acknowledge that there have been problems with bacteria within the subbasin and that in many areas there has been little response to the problem. This is why a bacteria TMDL is necessary. The bacteria TMDL identifies all known or suspected sources, but it does not identify how sources can be controlled. Rather, the TMDL determines the extent of a problem on a subbasin basis and allocates the loads necessary to achieve water quality standards. With the adoption of the bacteria TMDL, implementation plans will be required of storm water management agencies. It is through these plans, using the numbers within the TMDL for targets, that specific control activities will be developed and implemented.

**Comment B12. Due to uncertainties, DEQ should not establish numeric limits, but should develop plans as required under OAR. The model has uncertainties and should be used only qualitatively. The general conclusions appear appropriate, but the allocations should be used only as general targets rather than specific allocations.**

**Response:** The bacteria modeling provides a quantitative assessment using available data. Where uncertainty exists, margins of safety were provided. This is consistent with EPA policy and guidance and TMDL practice. We therefore disagree that the TMDL is so uncertain that numeric limits should not be provided. We consider uncertainties as we implement an "adaptive management" approach (see section 2.3.2 of the TMDL).

In addition:

EPA is clear in their guidance (*Guidance for Water Quality-based Decisions: The TMDL Process*, EPA440/4-91-001, April 1991, pg. 2 under Policies and Principals) that uncertainties or lack of information should not be used to delay development of TMDLs or implementation of water quality-based controls:

> "Lack of information about certain types of pollution problems (for example, those associated with nonpoint sources or with certain toxic pollutants) should not be used as a reason to delay implementation of water-quality based controls. When developed according to a phased approach, the TMDL can be used to establish load reductions where there is impairment due to nonpoint sources or where there is a lack of data or adequate modeling. EPA regulations provide that load allocations for nonpoint sources may be based on "gross allotments" (40CFR 130.2(g)) depending on the availability of data and appropriate techniques for predicting loads. … If standards are not attained, a TMDL revision is required. Data collected through monitoring would then be useful in revising the TMDL. While this phased approach requires additional monitoring of the waterbody to evaluate the effectiveness of nonpoint source management measures or more stringent effluent limitations, it does not delay the establishment of such control mechanisms where there is a lack of information."

This principal was discussed in the 1996 Georgia Court Case (Sierra Club et al. V John Hankinson et al; Civil Action 1:94-cv-2501-MHS; U. S. District Court, Northern District of Georgia, Atlanta Division):

> "The tight deadlines for submission of TMDLs demonstrate a congressional intent that TMDLs be established promptly. While these tight deadlines might mean that initially established TMDLs would be based on less than ideal data, that fact alone was considered and addressed by Congress, as demonstrated by the statutory direction to use "a margin of safety which takes into account any lack of knowledge" §1313(d)(1)(C).

Also, please see response to comment B7, above.

**Comment B13. DEQ should follow the OAR and require the development of a bacteria management plan for the Tualatin River rather than establishing a TMDL.**

**Response:** Please see response to comment B7, above.

**Comment B14. The bacteria standards are scientifically uncertain, and erred strongly on the side of safety; thus DEQ adopted them with the understanding that they would be used as action levels which would trigger focused Bacteria Management Plans. (Numerical limits should not appear in the MS4 permits.)**

**Response:** Please see the response to comment B7, above.

**Comment B15. The mainstem was improperly listed as water quality limited for bacteria. Therefore a bacteria TMDL should not be developed for the mainstem Tualatin River, but rather the 303(d) List should be corrected.**
**The Clean Water Act Section 303(d)(1)(C) authorizes the development of TMDLs only for waters that are not attaining water quality standards and are designated as water quality limited under section 303(d)(1)(A). See 33 U.S.C. §1313(d); *Dioxin/Organochlorine Center v. Clarke,* 57 F.3d 1517, 1527 (9th Cir. 1995). Because the mainstem Tualatin is not currently in violation of Oregon's water quality standard for bacteria, no TMDL is warranted.**

**Response:** While greater than 10% of the bacteria samples collected in the Tualatin River since the Water Year 1987 did not exceed the listing criteria and thus the listing criteria were not met, exceedences of the bacteria standard do occur in the Tualatin (please see Section 4.2.5 of the Draft TMDL for an assessment of the mainstem Tualatin River). In addition, 25 tributaries to the Tualatin did exceed the bacteria standards and the Department has completed the TMDLs for bacteria to address these listings on a subbasin basis. Reduction in bacterial loads in the tributaries should also reduce the occasional peak values that cause standard exceedances in the mainstem. The listing status for bacteria in the Tualatin mainstem will be reviewed in the next 303(d) listing cycle.

**Comment B16. Bacteria control for stormwater could have detrimental environmental consequences such as dewatering streams.**

**Response:** See the response to comment B8, above.

**Comment B17. Inappropriate use of the summer baseflows in determining both the summer and winter allocations. The winter base flows used leads to an unnecessarily large MOS. An alternative and technically defensible means of estimating baseflows needs to be developed.**

**Response:** The Final TMDL contains allocations were based on new modeling analyses, which utilized both summer and winter baseflow estimates. The baseflows had previously been calculated differently for the subbasins depending on the availability of data. The model now

includes summer and winter baseflow estimates from continuous hydrographs. In addition, DEQ feels that the hydrograph separation method is appropriate to determine baseflow values.

**Comment B18. USA proposes that DEQ work cooperatively with USA and other DMAs to identify the most appropriate allocation approach for bacteria for this watershed (refers to Rock Cr. being the most stringent).**

**Response:** DEQ has revised the proposed allocations so they ensure attainment of the geometric mean of 126 *E coli* organisms per 100 ml at the outlet of each 5th field watershed. Modifications to the allocations have been made in the Final TMDL. These modifications give specific allocations for each 5th field watershed. The Department will continue to work cooperatively with the DMAs and others in the basin to track progress in meeting the TMDLs and to modify implementation plans and the TMDLs, if needed.

**Comment B19. DEQ should not apply the 30-day log mean of 126 organisms/100 ml as the target concentration for individual storm events.**

**Response:** As discussed in the response to comment B6, the Department believes that by achieving an event mean concentration of 126 organisms/100 ml, the 406 organism/100 ml will also be met. In addition, the modeling approach estimated the bacteria loads generated during a storm event. However, the instream concentrations are not just a function of the duration of a rainfall event, but also the travel time for bacteria through the system. For this reason, the bacteria allocations address instream concentrations during the storm event and the following dry weather, that corresponds to the travel time through the system. Additionally, as stated in the draft TMDL, the margin of safety is not explicitly defined. Setting the allocations to meet 126 *E coli* organisms per 100 ml after a storm event is a conservative assumption.

**Comment B20. The Draft TMDL has failed to show that runoff has significantly higher bacteria levels.**

**Response:** This section of the TMDL has been modified to clarify the results of the runoff vs. non-runoff period analyses. This clarification shows that runoff has significantly higher bacteria levels than baseflow.

**Comment B21. DEQ has failed to provide required fiscal impact information regarding the proposed bacteria TMDL.**

**Response**: ORS 183.335(2)(b)(E) directs the Department on requirements for Notice of its intended actions prior to adoption, amendment and repeal of any rule. This is not a rule making action, therefore these requirements do not apply. In the February 2000 Memorandum of Agreement between EPA and DEQ, the Department indicated that a discussion of cost and funding is to be provided in the Implementation Plans and the Department would expect DMAs to develop this information as part of their detailed Implementation Plans. Given the variety of implementation options that can be pursued, this is the most appropriate point for providing the fiscal impact.

**Comment B22. The methods used in the TMDL to estimate runoff are based on empirical relations. The results from these methods must be calibrated and independently verified. None of the results were verified by comparison to an independent test data set.**

**Response:** An independent test data set was unavailable for verification of the model. As part of an adaptive management approach for the basin, additional data will be collected and used in reviewing and, if needed, modifying the TMDL.

**Comment B23. Model has uncertainties and should be used only qualitatively. The general conclusions appear appropriate, but the "allocations (should) be used only as general targets rather than specific allocations".**

**Response:** Please see response to comment B12, above.

**Comment B24. Meeting the 126 criterion will not necessarily lead to meeting the 406 criterion.**

**Response:** See response to comment B1 and comment B6.

**Comment B25. The reasoning for choosing the winter design storm needs to be clarified.**

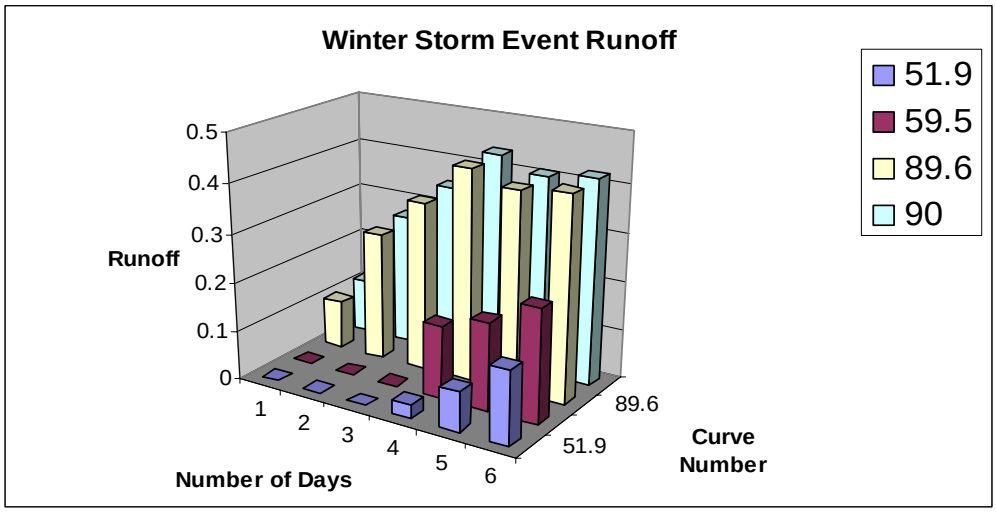
**Response:** Using daily precipitation data as recorded at the Beaverton gage (period of record 1972-1999) DEQ calculated the cumulative precipitation volumes for storms of 1 - 6 days in length. A frequency analysis was conducted on the values recorded for each storm length. The runoff was calculated for each of the 90th percentile precipitation values, by the following equation:

$$runoff = \frac{precipitation. - 0.2S}{\#days}$$

where S= storage (inches) and is a function of the curve number (CN) by the following equation:

$$S = \frac{1000}{CN} - 10$$

Using CN values for saturated antecedent moisture conditions, the runoff was calculated for each precipitation. Runoff was not generated for pervious land uses, i.e. forestry and agriculture, until the precipitation corresponding to a 4-day event was used in the calculation. The following graph illustrates this point:




To simulate conditions in which all land uses contributed runoff, the 4-day event and its corresponding total precipitation (at the 90th percentile) was used in the winter allocations.

**Comment B26. It is unclear that the Rational Method can be accurately used to predict total storm flow volumes. With calibration, it might be used to generate estimates of storm flow volumes, but a greater uncertainty should be expected.**

**Response:** The rational method generates peak flow per storm event. In the bacteria TMDL, the peak flow was accumulated to estimate a storm volume. Using the data that was available (i.e. precipitation, land uses and total storm hydrograph) the rational method is DEQ's best estimate of storm volume for areas within the urban growth boundary.

**Comment B27. Table 11 – Is this TMDL applicable only to listed streams as noted in Table 11 or to all stream segments in the subbasin as noted elsewhere in the document?**

**Response:** This TMDL is applicable to all stream segments in the subbasin. Table 11 has been modified to reflect this.

**Comment B28. P. 71 – It appears that CAFOs are included in the grouping of permitted sites other than WWTPs. It is recommended that CAFOs be listed as a distinct source.**

**Response:** In the Final TMDL, CAFOs have been listed as a distinct source.

**Comment B29. P. 73 – Differing months defining season. Why different bases for design storms.**

**Response:** Regarding the differing months defining the seasons, this is addressed in Section 4.2.10.2 of the Draft TMDL (and will also be included in the Final TMDL). Regarding the different bases for the design storms, please see the response to comment B25, above.

**Comment B30. Table 16 – ODOT should be included as a DMA. If there are no forest or ag lands under MS4 permits, they should not be listed. Please define runoff events.**

**Response:** Table 16 has been modified in the Final TMDL to address these issues. (It has also been modified to include all of the land uses and associated bacteria concentrations input during the allocation modeling).

**Comment B31. Numeric WLAs should be provided for the WWTPs.**

**Response:** The appropriate table in the Final TMDL (Table 18 in the Draft) has been modified to include numeric WLAs for the WWTPs.

**Comment B32. Exceedances of the bacteria standard should be addressed via a bacteria management plan per OAR to reduce anthropogenic sources to the maximum extent practicable not a TMDL that is supposed to meet a specific numeric limit.**

**Response:** Please see the response to comment B7, above.

**Comment B33. Log mean of 126 CFU/100 ml is not appropriate standard to show compliance during runoff periods.**

**Response:** Please see responses to comments B19 and B6.

**Comment B34. MS4 bacteria samples are not event mean concentrations but 'grabs' just like stream samples.**

**Response:** The samples collected under the MS4 permits have been grab samples. The TMDL adopts the use of event mean samples to measure effectiveness of the BMPs chosen to attain the allocations. DEQ expects that multiple grab samples will be collected during the storm for the land uses described in the TMDL. Additionally, estimates of flow associated with each grab sample will be required to calculate the event mean concentration.

**Comment B35. 406 CFU/100 ml standard works for WWTP where they can correct disinfection problems and resample thereby avoiding a violation. Resampling stormwater runoff during the same storm event is not possible on the other hand.**

**Response:** The allocations given within the TMDL are expected to be used as guidance in the development and evaluation of implementation plans. It is expected that compliance will be shown through the development, evaluation, and implementation of these plans. If sampling shows that allocations are not being met, then the plans will need to be reassessed and modified.

**Comment B36. The model is too simplistic and uses criteria in ways for which it is not intended, nor scientifically sound.**

**Response:** Please see the responses to comments B5, B7 and B12, above.

**Comment B37. The TMDL does not provide a good understanding of the sources and fate of bacteria.**

**Response:** We believe that the TMDL provides as much detail on the sources and fate of bacteria as is possible through the analyses of available data and the current scientific knowledge regarding bacteria.

**Comment B38. There is limited scientific information on the impact of BMPs on bacteria reductions.**

**Response:** Please see the response to comments B8, above.

**Comment B39. Numeric controls on stormwater are virtually impossible to implement due to the extreme variability.**

**Response:** The Department recognizes that there will be challenges in reducing bacterial loads from storm water and believes that an adaptive management approach as outlined in several places within the TMDL (and see response to comment W1) will allow for modifications to be made as the WQMPs are being implemented.

Page B-1:

**Is the rational method the correct method for determining storm runoff?**

**Response:** The bacteria model uses a combination of the rational method and the SCS curve number to estimate runoff volumes for the storm events. Both methods are accepted methods to estimate runoff. Details of each model can be found in many hydrology references, and DEQ referenced the sources for the calculations.

Page B-2:

**Comment B40. Probable error: Curve number for residential land use is lower than for pasture for all soil groups.**

**Response:** Table 2 on page 2 of Appendix B cites example curve numbers for land uses. In the table the curve numbers should be for average moisture conditions with good vegetative cover. However, the curve numbers listed for pasture in the draft TMDL were for conditions with poor vegetative cover. The curve numbers have been corrected in the table and are less than those for residential. The correct curve numbers were used for all model runs.

Page B-4:

**Comment B41. None of the estimates of bacteria concentration are as high as the concentration (36000 *E. coli*/100 mL) used for model calibration (Page 5). For the model calibration, the high from page 4 should be used. Use consistent units for bacterial counts.**

**Response:** The bacteria concentrations listed on page 4 of Appendix B are estimates of bacteria concentrations associated with bacteria sources. Geometric means were calculated from individual instream samples. During calibration, the model was run to meet the geometric mean values. The paragraph on page 5 (Appendix B) was written to clarify that it is likely that the runoff concentrations are higher than have previously been reported under the MS4 permits.

As stated in Standard Methods, units for bacterial counts vary with the method of analysis:

> "It is customary to report results of the coliform test by the multiple-tube fermentation procedure as a Most Probable Number (MPN) index. This is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the laboratory examination; it is not an actual enumeration. By contrast, direct plating methods such as the membrane filter procedure permit a direct count of coliform

colonies. In both procedures coliform density is reported conventionally as the MPN or membrane filter count per 100 mL."

(APHA. 1989. Standard Methods for the Examination of Water and Wastewater. (17th edition.) Clesceri, L.S., A. E. Greenberg, and R. R.Trussel (Eds.), Washington, D.C. pp. 9-1.)

On page B-4 of the Final TMDL the units have been changed to reflect the method of analysis.

Page B-4:

**Comment B42. Assumptions for septic system effluent discharge are questionable. It is very unlikely that 100% of leaking septic system effluent reaches the stream without any treatment.**

**Response:** Comprehensive sanitary surveys have not been conducted in the Tualatin Subbasin. According to DEQ on-site staff, an estimate of an 8% failure rate is appropriate as an approximation (Dennis Illingworth, ODEQ, personal communication). The estimate of 100% of the septic system effluent leaving the property was a conservative estimate. However, overland decay is applied to sources away from the stream, so some treatment is assumed before the effluent reaches the receiving water.

Page B-5:

**Comment B43. The *E. coli* concentration used in the Fanno Creek calibration seems especially high - 36,000 cfu/100 mL. Verify data (and the methodology used by the lab) from USGS.**

**Response:** A geometric mean was calculated from individual samples collected over the storm at each site. The model was calibrated to the geometric mean. The data provided by USGS does contain Quality Control remark codes. Some of the values are listed as "Q-questionable value-poor quality control." These values were not used in the calculation of the geometric mean. However, the sample collected at Fanno Creek at 56th on 6/24/98 at 10:10 had no such remark code, and the value of 36000 E coli MF/100 ml was used in the calculation of the site geometric mean.

Page B-5:

**Comment B44. It is incorrect that 93.5% of Fanno Creek Watershed is in residential land use. There is significant forest canopy and park land use.**

**Response:** The gage on Fanno Creek at 56th is located in the Sylvan Creek Upper watershed. This watershed was delineated by DEQ to allow for flow calibration. According to land use data collected from Metro Regional Land Information System (RLIS) 1999 Regional Zone and Regional Land Use Plan, the Sylvan Creek Upper Watershed has approximately 94% residential land use, 2% commercial land use, and 4% opens space.

Pages B-5 through B-11:

**Comment B45. Model calibration: difference between measured runoff and instream concentrations could be due to growth of bacteria in sediment, biofilms, etc.**

**Response:** While we acknowledge that the suspension and deposition of sediments, etc. may influence bacterial levels, there are no data or other quantitative information that allow us to assess this influence. Additionally, the ultimate source of the bacteria is not the sediment, but runoff and other bacterial sources. Therefore, we have given allocations to known sources of bacteria using the best available science and data.

**Comment B46. Deducing land use bacteria concentrations from instream concentrations may have a large error. How can you distinguish among different land uses without outfall concentrations (Tables 6 and 7)?**

**Response:** As discussed on page 4 of the draft TMDL, DEQ used data provided in MS4 reports and from DEQ sampling in the Tualatin and Nestucca River Subbasin to develop estimates of bacteria concentrations per land use. The data DEQ collected were flow weighted averages from

outfall data, and therefore represent the average contribution of the source over the storm. Future data collection efforts may allow us to better characterize impacts, but the data used represent the best available data currently at our disposal.

**Comment B47. The difference between measured and modeled *E. coli* concentrations shows significant error (Tables 8 and 9).**

**Response:** Estimates of error for the modeled storm average concentration vs. measured geometric mean are included in Tables 8 and 9. As stated in the draft TMDL, the larger error lower in both basins may be due to higher runoff concentrations in residential areas and/or the presence of unidentified sources.

Table 8:

| Oct 99 storm | | | | |
|---|---|---|---|---|
| **Instream Sampling Location** | **Measured E Coli Geomean** | **Modeled E Coli storm average** | **ABS** | **% ERROR** |
| Gales Creek at hwy. 6 | 40 | 55 | 0.315789474 | -0.375 |
| Gales Creek at Parson Road | 798 | 821 | 0.0284126 | -0.028822055 |
| Gales Creek u/s Ritchie Road | 1289 | 250 | 1.35022742 | 0.806051202 |

Table 9:

| June 98 storm | | | | |
|---|---|---|---|---|
| **Instream Sampling Location** | **Measured E Coli Geomean** | **Modeled E Coli storm average** | **ABS** | **% ERROR** |
| Fanno Creek at 56th | 10363 | 9837 | 0.052079208 | 0.050757503 |
| Fanno Creek near Allen | 5303 | 7922 | 0.396068053 | -0.493871394 |
| Fanno Creek at Durham | 4041 | 1509 | 0.912432432 | 0.62657758 |

**Comment B48. Modeling the entire basin based on two storm events in two watersheds appears questionable.**

**Response:** Two storm events were chosen for model calibration: the Gales Creek October 1999 event and the Fanno Creek June 1998 event. These events were chosen because of the availability of bacteria data and flow data. The calibrations were completed to demonstrate the applicability of the modeling approach to runoff and point sources. The allocations are based on precipitation patterns that would result in the most water quality impact in the basin. Runoff concentrations were chosen to meet the bacteria criterion and are independent of the calibration results.

Page B-6:

**Comment B49. Wasteload allocations include MS4 permits - stormwater. By definition, wasteload allocation is the amount of pollutant that a point source contributes to the stream. Stormwater is technically a non-point source (*sic*) even though it is generally defined as a nonpoint source. What are the implications for regulatory issues, including MS4 permits, Stormwater permits, end of pipe discharges, etc.**

**Response:** The Department believes that wasteload allocations (WLAs) need to be incorporated into permits and, as MS4 permits are NPDES permits, WLA need to be incorporated into these permits. The WLAs will serve as targets for development of storm water management plans and will not be an end of pipe number. The specifics of how the TMDL will be incorporated into the MS4 permits will be determined during the NPDES permit process.

Page B-11:

**Comment B50. The Margin of Safety appears large especially during the summer season when dry periods greatly exceed storm event periods.**

**Response:** The summer allocations modeled with the runoff method are applicable to summer storm events that occur most frequently. Dry weather periods are allocated separately in the TMDL.

Page B-12:

**Comment B51. Why did you set an allocation for agriculture during the summer when the storm event the modeling is based on did not show any runoff from cropland and pastures?**

**Response:** While the model did not predict any runoff from these land uses, there remains the possibility that some small quantities of runoff may occur. Therefore, these sources are given allocations.

Page 70:

**Comment B52. On page #70 in figure #46 of the "draft Tualatin…Load" document dated August 2000, what source data was used to generate the figure?**

**Response:** This figure is based on USA water quality data from the USEPA's STORET database, and precipitation data from the Beaverton station 2 SSW (available from the Oregon Climate Service). The text in the Final TMDL has been modified to include these references.

Page 72:

**Comment B53. It is inappropriate to apply the 126 CFU/100 mL criterion to a minimum of five samples taken during storm events. A storm event is usually short-lived—much less than 30 days and computing the log mean over a short time period may be biased toward higher values.**

**Response:** Please see response to comment B19.

Page 73:

**Comment B54. The event based, unit load model does not take into account the potential growth of bacteria in stream sediments, biofilms, etc.**

**Response:** Please see response to comment B46.

Page 74:

**Comment B55. Why was the Water Quality Standard of 126 CFU/100 mL used to calibrate the model? Was the model output a log-mean of five samples or was it an individual concentration? It appears that by using the 126 CFU/100 ml standard a huge implicit MOS was created.**

**Response:** See the response to B19 regarding the use of the 126 *E coli* organisms per 100 ml for model calibration. The model uses a steady state assumption and is appropriate for average conditions over a time period. The model approximates a mean value that is close to the geometric mean of the criterion. As stated in the draft TMDL, the margin of safety is not explicitly defined. Setting the allocations to meet 126 *E coli* organisms per 100 ml after a storm event is a conservative assumption.

Page 75

**Comment B56. How can the TMDL establish a stormwater concentrations at 3500 but still require achievement of an in-stream concentration of 406 CFU/100 mL without allowing for a mixed zone?**

**Response:** In the draft TMDL the allocations were set to meet 126 *E coli* organisms per 100 ml at the mouth of the 5$^{th}$ field watersheds. The runoff concentrations were set to allow the criterion to be met with instream dilution and decay. Also, please see response to comment B6.

**Comment B57. How were the winter and summer load allocations developed? Verify calculations.**

**Response:** The model approach is discussed in Appendix B. Selection of the winter storm size is discussed in response to comment B25.

**Comment B58. Why were all land uses assigned the same load allocation?**

**Response:** According to EPA "Guidance for Water Quality -based Decisions: The TMDL Process" (EPA 440/4-91-001), various methods are appropriate to allocate loads. Three common methods are: equal percent removal, equal effluent concentrations, and a hybrid method. In the

hybrid method, the criteria for waste reduction may not be the same from one source to the next. Often, a proportionality rule may be assigned that requires a percent removal to be proportional to the input source loading or flow rate. In the draft TMDL, equal effluent concentrations were used.

**Comment B59. Do not agree with assumption that 100% of failed septic tank effluent would flow to river. No sanitary survey info available. What is basis for this assumption?**

**Response:** Please see response to comment B42.

**Comment B60. The definition of Waste Load Allocation (wasteload allocation) is incorrect. It should say: "A wasteload allocation is the amount of pollutant that point sources can contribute to a stream as their portion of the load capacity."**

**Response:** We agree. This has been corrected in the Final TMDL.

Page 76:

**Comment B61. The definition of load allocation (load allocation) is incorrect. It should say: "A load allocation is the amount of pollutant that natural plus non-point sources can contribute to a stream as their portion of the load capacity."**

**Response:** We agree. This has been corrected in the Final TMDL.

**Comment B62. Are waterfowl and pet influences included in model?**

**Response:** Waterfowl and pet influences are not separated from other sources. Waterfowl and pets would most likely contribute to the load from open spaces and residential land uses. Any contribution from animals is implicit in the allocation for the land uses.

## RESPONSES TO COMMENT ON THE DRAFT DISSOLVED OXYGEN TMDL

**Comment D1. There is no proof of a direct correlation between TVS and SOD.**
**Response:** We agree that the exact correlation between total volatile solids and sediment oxygen demand within the Tualatin Subbasin is not known. We have made modifications to the TMDL which will help to address this issue (see the response to comment D25a, below). We feel that the estimate of the "one-to-one" correlation that is presented in the Final TMDL (based on the percent reduction of the mass of settleable volatile solids to the percent reduction of the SOD rate) is valid at this time. The basis for this is outlined within the TMDL. The response to comment D22, below, details how we expect to incorporate new knowledge on this subject into the TMDLs and WQMPs over time.

**Comment D2. There is no baseline data for TVS. This poses numerous problems. There should be a cutoff concentration where controls are not necessary.**
**Response:** We agree that there is a lack of baseline data for volatile solids. DEQ will allow flexibility in the WQMPs for management agencies to make reasonable and supportable decisions regarding this issue. This may include giving higher priorities to sources with known high volatile solids loads, allowing time for sampling of other sources, etc.

**Comment D3. The DO modeling indicates that only the lower portion (river mile [RM] 0 to RM 11) of Gales Creek needs to have SOD reduced. Yet the TMDL calls for TVS reductions within the entire watershed (this also applies to several other creeks).**
**Response:** Since the SOD rates in the lower portions of the tributary streams (where most of the SOD rates were measured) are a function of the upstream loading of volatile solids, it stands to reason that all upstream sources of volatile solids will need to be addressed. For example, if a large source of volatile solids exists at RM 14 of Gales Creek, it will not only have an impact on that specific portion of Gales Creek, but the entire creek downstream. For this reason, the entire 5$^{th}$-field watershed is included in the TMDL.

**Comment D4. How can DO problems associated with Scoggins Dam be considered natural?**
**Response:** The draft TMDL (on p.99) states: "If it is found that the DO levels in the dam releases are natural, or that they cannot be aerated to increase DO concentrations, the lower DO levels in Scoggins Cr. may be considered natural". This does not mean that problems associated with the dam will be considered natural, but that waters released at the dam may have naturally low DO levels (we do not know if this is true or not, it remains to be seen). Generally, water from dams will increase in DO following release.

**Comment D5. The analysis of SOD sources confuses runoff with municipal and industrial storm sewer discharges.**
**Response:** The volatile solids source assessment section of the draft TMDL (Section 4.3.6), has been changed to clarify this issue.

**Comment D6. TVS loadings from storm sewers are readily determinable from NPDES permit application documents and annual monitoring reports.**
**Comment D7. Tabulations of loads by source should be made.**
**Comment D8. Allocations should be in the form of loads.**
**Response to comments D6 through D8:** Unfortunately, neither the NPDES permit application documents nor the annual monitoring reports include information on volatile solids (volatile solids are not a reportable monitoring parameter) concentrations or loads. Because of this, current volatile solids loads are not known and therefore allocations in the form of loads are not possible.

It is expected that future monitoring will document the volatile solids concentrations and loads allowing this information to be included in the second iteration of the TMDL.

**Comment D9.** **Summary of the Issue: The DO standard should be met through means that directly affect the DO, rather than simply relying on the achievement of other standards to reach attainment.**
**Summary of Concerns: The analysis of DO loading is based on the idea that a reduction in temperature is a requirement if the applicable standards are to be met. Draft TMDL at 89. However, the necessary increase in DO should be achieved through means that directly affect the DO level, rather than simply relying on the achievement of other standards to reach attainment. Furthermore, there are other types of oxygen demand that affect DO and should be included.**

**Response:** The Department analyzed factors that affect dissolved oxygen in water bodies (draft TMDL at 83-101 and Appendix D). These factors include nitrification, carbonaceous biochemical oxygen demand (CBOD) within the water column, algal growth, sediment oxygen demand (SOD) and temperature. Based on analysis using the QUAL2E (USEPA, 1987) modeling framework and available data, temperature and SOD were found to be the major contributors to the DO deficit in the system. Therefore, the TMDLs for DO in the tributaries targeted these two parameters. The Department intends to review progress in achieving the TMDL and implementing the WQMPs on a five-year cycle. If new information becomes available indicating that the TMDL should be modified, that information will be incorporated at that time.

**Comment D10.** **DEQ does not demonstrate a complete understanding of the TVS mechanism.**

**Response:** See the responses to comments D1 and D2, above.

**Comment D11.** **Extrapolation of modeling to other tributaries is not valid.**

**Response:** DEQ feels that this extrapolation is justifiable since the grouped streams and their watersheds share similar aquatic habitat designations and land use patterns and therefore would be expected to have similar target criteria and relative pollutant loadings. Also, the modeling that DEQ performed covered three of the four major tributaries within the Tualatin Subbasin. This represents a significant portion of the subbasin and gives an adequate representation of current conditions and required pollutant reductions for the tributaries.

**Comment D12.** **The data used to determine DO target levels are insufficient. In particular:**

- **the SOD, DO and volatile solids measurements were done in different years and in some cases different seasons.**
- **It is essential to include a sensitivity analysis for a model, in particular if it is the basis for a compliance standard.**
- **SOD measurements were conducted outside the critical DO time period. Extremely variable SOD measurements were taken together to come up with a 'median' value across all streams. The high variability in measurements makes the relatively low number of SOD measurements statistically insufficient as model input.**

**Response:** We disagree. The data used in the DO modeling on the tributary streams included USGS-collected SOD data for each stream modeled. These data are the best available scientific data for SOD in the Tualatin Subbasin. These data were all collected in the season modeled (all data were collected either in July or August, the days modeled were at the end of July). All of the dissolved oxygen data used as input to the model were also collected during this period (the data was collected between July and September).

We agree that it would be ideal to have SOD data for several months of several years at numerous places along each tributary. Unfortunately, this quantity of SOD data is not available for the Tualatin or any other watershed in the Northwestern US (that we are aware of). The lack

of this data does not necessarily mean that "good science" was not used. It is common in water quality modeling to select SOD rates that are based on limited data. (For example, the USGS modeling of the mainstem Tualatin River, which is considered to be among the best water quality modeling efforts in the state, uses data from the same sampling effort. This model also encompasses time periods and stream reaches that are different from those of the SOD monitoring data.)

Sensitivity analyses were completed for the model. All parameters expected to impact DO were first analyzed in order to determine possible impact and those that were – primarily temperature and SOD – were used in sensitivity analyses.

While DEQ feels that both the best available data and the best available science were used in this TMDL, we do acknowledge that future data collection and analyses will most likely give us better insight to this problem. The TMDL addresses how this information may be incorporated in the section on adaptive management (Section 2.3.2.1 of the Draft TMDL) and within the WQMP.

**Comment D13. It is not clear that SOD is the source of the low dissolved oxygen levels that have been observed. MOS is excessive and difficult to justify. Due to the uncertainties in the DO TMDL, WQMP needs to be flexible.**

**Response:** The modeling efforts presented in the draft TMDL showed that SOD is a source of low dissolved oxygen levels in the tributaries. It is not the only sink of DO on the tributaries, but it is one of the larger ones. The modeling within the TMDL shows that reductions in the tributary SOD rates, in conjunction with decreased water temperatures, will increase DO levels to levels which attain the water quality criteria.

We agree that there are uncertainties in the DO TMDL, and therefore have included a margin of safety. This margin of safety is explicit through an increase in the target criteria used for dissolved oxygen. We also agree that a certain amount of flexibility should be given in the development of the WQMPs and as new information becomes known. The TMDL addresses how this information may be incorporated in the section on adaptive management (Section 2.3.2.1 of the Draft TMDL) and within the WQMP.

**Comment D14. The TMDL is not based on a realistic application of theory.**

**Response:** See response to comments D1 and D2, above.

**Comment D15. A percent reduction of TVS is arbitrary and vague due to:**

**(a) the lack of confidence in the numbers;**
**(b) the lack of a baseline;**
**(c) a percent reduction is unclear.**

**Response:**

a) As documented in the draft TMDL and in the responses above, we feel that the draft TMDL uses the best available data and science to derive the allocations.
b) See response to comment D1, above.
c) We agree that the percent reduction in volatile solids as explained in Section 4.3.9.2 of the draft TMDL was unclear. In order to clarify this issue we have added to this section.

**Comment D16. If spawning does not occur in July, should the cold-water DO criteria apply during this month?**

**Summary of Concerns: According to the water temperature analysis performed by ODEQ, the tributaries listed as providing cold-water habitat could not meet the cold-water temperature criteria of 55ºF, at least on July 27th of 1999. Does it make sense to hold these same streams to a cold-water criteria for DO for that same time period? Or would it make more sense to use the cool-water DO criteria, at least during mid-summer when cold-water habitat is not supported? Obviously, this comment**

**questions the interpretation of a designated beneficial use and its associated water-quality standards.**

**Response:** A separate DO and temperature criteria applies to waters where spawning occurs, during times of spawning through until fry emergence from the gravels. During the summer months, spawning does not occur between July and September (Figure 4, Appendix F). The temperature criteria that is exceeded in the basin is for salmonid rearing.

Dissolved Oxygen has several criteria that could apply during for water bodies during non-spawning periods. These include warm, cool and cold-water criteria. The Department applies the warm-water criteria only in waters where Salmonid Fish Rearing and Salmonid Fish Spawning are not a list beneficial use as shown in Tables 1-19 of OAR 340-41. The warm-water criteria would not apply to the Tualatin as it is shown for Salmonid Fish Rearing and Spawning in Table 6 of OAR 340-41.

The Department generally applied the cool-water dissolved oxygen criteria for much of the Tualatin Basin (especially in the areas that were shown as "most typical" in the Willamette Valley Ecoregion based on the original Ecoregions described in "Ecoregions of the Pacific Northwest (James Omernik and A Gallant, 1986, EPA/600/3-86/033). However, for waters where salmonid spawning occurs and in waters outside the "most typical" areas, the Department applied the cold water dissolved oxygen criteria. The definitions for cold-water and cool-water are as follows (from OAR 340-41-006):

> (51) "Cold-Water Aquatic Life" — The aquatic communities that are physiologically restricted to cold water, composed of one or more species sensitive to reduced oxygen levels. Including but not limited to *Salmonidae* and cold-water invertebrates.
> (52) "Cool-Water Aquatic Life" — The aquatic communities that are physiologically restricted to cool waters, composed of one or more species having dissolved oxygen requirements believed similar to the cold-water communities. Including but not limited to *Cottida*e, *Osmerida*e, *Acipenserida*e, and sensitive *Centrarchidae* such as the small-mouth bass.
> (53) "Warm-Water Aquatic Life" — The aquatic communities that are adapted to warm-water conditions and do not contain either cold- or cool-water species.

Therefore, the Department applied the cool-water dissolved oxygen criteria to most of the lower Tualatin River and lower portions of Dairy, Rock and Beaverton Creeks as shown in Figure 6 in Appendix F. Cold-water dissolved oxygen criteria were applied to the upper portion of the basins and to Fanno, Gales and Scoggins Creeks. The Department is currently working on refining information for where and when certain beneficial uses occur (e.g. cool/cold water, spawning) and has refine this information through consultation with ODFW while developing the TMDLs for the Tualatin Subbasin.

**Comment D17. Regarding the ammonia WLAs for the WWTPs, please refer to the Oct. 6 letter from the USGS in which the results from USGS model simulations were summarized to provide insight into the ammonia assimilative capacity of the Tualatin River on Monthly, weekly, and daily time frames. The design concentrations given in the TMDL may be too high in May and June, and using those design concentrations as daily maximum limits appears to be unnecessarily restrictive.**

**Response:** The comments include, by reference, the comments within one of two letters dated October 6, 2000, from the USGS to DEQ. The first part of this letter explained USGS model simulations using the wasteload allocation design concentrations from the Draft TMDL. However, instead of basing these wasteloads on the monthly median instream flows, the USGS based them on the median flows of the preceding 30-day period. DEQ feels that this is inappropriate, since the 30-day period prior to the day of discharge is not representative of conditions on the day of

discharge. While using the monthly median flow may involve the forecasting of flows, this is reasonable for a highly regulated system like the Tualatin during the summer months (and is the basis for the WLAs in the current permits). As such, the design concentrations and related criteria will remain unchanged (with the exception of the USGS recommended cap of 30 mg/L ammonia concentration cap on WWTP effluent).

The second part of this letter explained USGS model simulations with various spikes – both 1-day spikes and 7-day spikes. It was found that -day spikes of 50% greater than the average monthly WLA, and 7-day spikes of 30% greater than the average WLA would not result in additional violations of the DO criteria ("as long as the mean ammonia load is no greater than that specified by the (WLA) over a period twice the duration of the spike"). This is considered an appropriate addition to the ammonia WLAs and has been included in the Final TMDL.

**Comment D18. Comments regarding ammonia assimilative capacity of the mainstem during the summer to winter transition period and referring to Oct. 6 letter.**

**Response:** The comments include, by reference, the comments within one of two letters dated October 6, 2000 from the USGS to DEQ. These comments present an analysis of the ammonia assimilative capacity of the mainstem Tualatin River during periods of increasing flow in the late summer and fall. A critical differentiating element of this analysis, compared with the analysis in the Draft TMDL, is that it considers median river flows over a 7-day period (previous to the discharge day) as opposed to median river flows over a 30-day period centered on the discharge day.

The result is that the USGS analysis of assimilative capacity better reflects the possibility of rapidly rising flows, which coincide with increasing assimilative capacities of the river. Based on this analysis, a median flow (at Farmington) over a 7-day period (previous to the day of discharge) of 350 cfs was found by the USGS to be a reasonable estimate of when the WWTPs could begin to lose nitrification while still meeting the DO criteria (for the September 1 – November 15 period). This is considered an appropriate addition to the ammonia WLAs and has been included in the Final TMDL.

**Comment D19. The MOS in the tributary DO TMDL is incorporated as an increase to the target criteria. This results in a nonlinear decrease necessary in SOD.**

**Response:** We understand that the increases in target criteria results in a nonlinear decrease in necessary SOD reductions. However, since an increase in DO concentrations is the goal of the TMDL and the allocations, we feel that incorporating the margins of safety into the DO target criteria is justified. The magnitude of the MOS is justified by the fact that the measured dissolved oxygen values used within the modeling effort are not measured during the most critical period of the year. See Response to Comment B12 for a further discussion on the MOS.

**Comment D20. The day modeled for the DO TMDL was one of the hottest days of the year, which represents the worst possible combination of conditions for DO and should provide a significant margin of safety.**

**Response:** We agree that this is the most critical day - this is why this day was chosen. The goal of the TMDL is to meet the water quality standards at all applicable times. The margin of safety has to consider meeting the standard on the critical day, as well as all other days. By showing compliance on the most critical day, by default we show compliance for the entire year. See Response to Comment B12 for a further discussion on the MOS.

**Comment D21. DO modeling on tributaries was relatively simple and few data were available for calibration.**

**Response:** The modeling performed for DO was appropriate for the amount of data available. The modeling for the DO portion of the draft TMDL was actually two-fold: The Heatsource model

to determine system potential temperatures (which have a strong influence on the solubility of DO in water) and a QUAL-2E model to determine DO values. While the accuracy would improve if diurnal DO and groundwater data were available, we were able to utilize an extremely large amount of other data for the streams. These data included shade and vegetation measurements (which impact water temperature); aerial infrared and instream temperature measurements; stream cross-section and velocity data; SOD data from the USGS; and several years' worth of DO data. All of these data were used to determine the appropriate allocations necessary to achieve the DO standard. If more data is collected in the future, it can be utilized to further refine our knowledge of the mechanisms affecting DO and incorporated into future iterations of the TMDL, as appropriate.

**Comment D22. USGS will be producing a report on the sources and composition of organic matter in the next 6-9 months. Control Strategies should be flexible to allow DMAs to take advantage of the results.**

**Response:** This report should be timely to assist in the development and refinement of Water Quality Management Plans for DMAs. The Department will be working with management agencies to ensure that these plans are developed within one year of the TMDL approval.

The Department has adopted an adaptive management approach for implementation. This approach requires the management agencies to develop benchmarks for interim measures leading to the attainment of TMDLs. These interim measures will be used to measure progress. Where implementation of the WQMP or effectiveness of management techniques are found inadequate, the Department expects DMAs to revise the components of the WQMP to address these deficiencies. This would include taking into account new information, as it becomes available. The Department also intends to review progress on the TMDL and the WQMP on a five-year basis. DEQ will consider reopening the TMDL should new information become available indicating that the TMDL or its associated surrogates need to be modified.

**Comment D23. On page 2, the statement that USGS modeling work shows that both ammonia loads and SOD must be reduced further during the critical portions of the years is not exactly correct.**

**Response:** We agree that the statement could be more clear and have clarified it in the text.

**Comment D24. On page 105 the text states that the low DO concentrations measured at Stafford in early September of both 1997 and 1998 were due in part to algal activity. This may be true, but the extent of the impact of algal activity has not been quantified.**

**Response:** We agree with the statement. However, we feel that the text within the TMDL is accurate. The text on page 105 reads (in part): "This may be explained by a number of factors such as longer residence times … and the impacts of algal activity". This text does not state that the impact of algal activity has been quantified, or that it is even definite, only that it may be one explanation for the low DO concentrations.

**Comment D25. Section 4.3.9.3 asserts that leaves deposited during the fall will be mostly exported from the basin during the winter. The fraction that is scoured from the sediments and removed during winter high flows is unknown.**

**Response:** We agree that the exact mechanisms of sediment deposition and removal are not known within the Tualatin Subbasin. What we do know is that stream velocities, which directly impact sediment scouring, are greatest during the rainy season. Because of this, organic material deposited during the fall and early winter has a greater probability of being removed from the stream bottoms than organic material deposited during the spring and summer. This was the basis for establishing the TMDL season from May through October.

However, if new information leads to the determination that the TMDL season needs to be extended, then the TMDL may be modified as explained in Section 2.3.2.1 of the Draft TMDL.

**Comment D26. The Final TMDL's control strategies must be targeted to address the right pollutants, as well as the right sources, release mechanisms, transport mechanisms, and accumulation patterns.**

**(a) The materials that lead to SOD have not been characterized or identified. Only the settleable fraction of total volatile solids (TVS) could contribute to SOD, but there are no data to estimate what portion of TVS is settleable.**

**(b) Information from ongoing USGS studies of sources of SOD should be used to target sources as soon as it is available.**

**(c) It is necessary to better understand how organic materials move into the stream and add to SOD.**

**(d) The decay rate of the settleable solids needs to be determined. Since this information is not now known, it follows that none of the oxygen sag model results can be determined as reliable.**

**Response:**

(a) We agree that only the settleable fraction of total volatile solids contribute to SOD. Modifications have been made to the TMDL to address this. We understand that the management agencies have not been monitoring for volatile solids and therefore do not have a characterization of their discharges related to them. We expect that these characterizations will be part of the DMA's implementation plans.

(b) We agree that information from USGS and any other study should be used to target SOD sources when available.

(c) We also agree that a better understanding of mechanisms leading to SOD are important and we expect that future studies will contribute to this understanding. However, we do know that settleable solids are contributing to SOD in the tributaries, and that there are anthropogenic sources of these solids which are within our control. We must use this information to start to address the pollutant sources while we refine our knowledge of the system.

(d) There appear to be two issues addressed with this comment. The first issue is that we do not know how long it will take for SOD to decrease once the sources of SOD have been reduced. This is true, once we have controls in place, SOD will have to be monitored to determine its response. The second issue appears to be questioning whether we have adequate information on oxygen consumption by the sediments. We disagree with this. A significant amount of SOD data has been collected throughout the basin by the USGS. See the response to comment D12, above.

**Comment D27. The Draft TMDL is erroneously based on the assumption that organic matter associated with erosion products is a major component of sediment oxygen demand.**

**Response:** The Draft TMDL is based on the premise that organic matter of all origins, not just erosion products, are a major component of SOD. We do not feel that this is in error.

**Comment D28. The Final TMDL's regulatory requirements must be expressed in terms of reducing the discharge of the actual materials that affect dissolved oxygen.**

**Response:** The TMDL includes allocations that call for the reduction of thermal loading and settleable volatile solids. As detailed within the TMDL, these are the pollutants affecting dissolved oxygen.

**Comment D29. The USA's progress should be tracked on the basis of the efforts they undertake to control settleable organic solids but not the sediment oxygen demand or dissolved oxygen conditions in the river.**

**Response:** The Final TMDL gives allocations for two pollutants that affect dissolved oxygen: thermal loading (leading to increased water temperatures), and settleable volatile solids (leading to increased SOD). The TMDL gives evidence based on the best available data and science as

to why the reduction of these pollutants, to the levels indicated by the allocations, will result in achieving the dissolved oxygen standards. The methods for tracking progress in achieving these allocations will be delineated within the implementation plans.

**Comment D30. The data that have been used as the basis for the source identification and problem definition in the Draft TMDL were obtained using sampling techniques that are not capable of providing credible information on the organic fractions of settleable solids in storm drains, creeks or rivers.**

**Response:** The amount of settleable volatile solids contributed by various sources has not been quantified due to the lack of available data. This does not impact the problem definition, which essentially states that SOD needs to be reduced, that volatile solids are the pollutant leading to SOD, and that sources of volatile solids need to be addressed. The issue that the amounts of volatile solids contributed by specific sources have not been identified has been addressed by giving the allocations in the form of percent reductions. The response to comment D2, above, explains how DEQ will allow flexibility to work with any problems that may arise from this situation.

**Comment D31. WLAs for the wastewater treatment facilities should reflect a tiered discharge scenario to account for allowable daily, weekly and monthly median conditions.**

**Response:** Please see response to comment D17

**Comment D32. The WLAs for the wastewater treatment facilities should be tied to river flow and not applicable when river flows exceed 350 cfs.**

**Response:** Please see response to comment D18

**Comment D33. Monitoring protocols that are appropriate to the target pollutants need to be developed: The Final TMDL should explicitly describe the information shortfalls that constrain the analyses used therein and explicitly define the need for better information.**

**Response:** This is addressed at the end of Section 4.3.9 of the Final TMDL.

**Comment D34. The Tualatin Subbasin is a highly complex/managed waterbody with dissolved oxygen legacy issues. The Draft TMDL reflects DEQ's general knowledge of the subbasin's complexities, but it is clear that some pertinent temporal and spatial conditions were not considered in enough detail when the models were run.**

**Response:** See response to comment D21, above.

**Comment D35. The Tualatin Subbasin is primarily water quality limited for cool water species. The Draft TMDL has some stream designations that differ from the 1998 DEQ 303(d) designations.**

**Response:** 303(d) listings were based on general knowledge of the basin and a general interpretation of the Dissolved Oxygen Standard that was agreed upon with EPA at the time of standard approval. The Department is currently working on refining information for where and when certain beneficial uses occur (e.g. cool/cold water, spawning) and will also refine this information through consultation with ODFW when TMDLs are being developed or permits are being renewed.

Dissolved Oxygen has several criteria that could apply during for water bodies during non-spawning periods. These include warm, cool and cold-water criteria. The Department applies the warm-water criteria only in waters where Salmonid Fish Rearing and Salmonid Fish Spawning are not a list beneficial use as shown in Tables 1-19 of OAR 340-41. The warm-water criteria would not apply to the Tualatin as it is shown for Salmonid Fish Rearing and Spawning in Table 6 of OAR 340-41.

The Department generally applied the cool-water dissolved oxygen criteria for much of the Tualatin Basin (especially in the areas that were shown as "most typical" in the Willamette Valley Ecoregion based on the original Ecoregions described in "Ecoregions of the Pacific Northwest (James Omernik and A Gallant, 1986, EPA/600/3-86/033). However, for waters where salmonid spawning occurs and in waters outside the "most typical" areas, the Department applied the cold water dissolved oxygen criteria. The definitions for cold-water and cool-water are as follows (from OAR 340-41-006):

> (51) "Cold-Water Aquatic Life" — The aquatic communities that are physiologically restricted to cold water, composed of one or more species sensitive to reduced oxygen levels. Including but not limited to *Salmonidae* and cold-water invertebrates.
> (52) "Cool-Water Aquatic Life" — The aquatic communities that are physiologically restricted to cool waters, composed of one or more species having dissolved oxygen requirements believed similar to the cold-water communities. Including but not limited to *Cottida*e, *Osmerida*e, *Acipenserida*e, and sensitive *Centrarchidae* such as the small-mouth bass.
> (53) "Warm-Water Aquatic Life" — The aquatic communities that are adapted to warm-water conditions and do not contain either cold- or cool-water species.

Therefore, the Department applied the cool-water dissolved oxygen criteria to most of the lower Tualatin River and lower portions of Dairy, Rock and Beaverton Creeks as shown in Figure 6. Cold-water dissolved oxygen criteria were applied to the upper portion of the basins and to Fanno, Gales and Scoggins Creeks.

**Comment D36. The TMDL compliance period needs to be reflected in the allocation table.**

Response: Modifications have been made in the Final TMDL's allocation table to address this.

**Comment D37. Representative streams should be used to determine allocations. The decision to use large streams to represent smaller streams is inappropriate.**

**Response:** See response to comment D11.

**Comment D38. Water quality modeling was excessively conservative. The modeling targeted a critical July low-flow day, the modeling did not capture diurnal fluctuations in DO, and the large margins of safety were applied.**

**Response:** As explained in the response to several of the comments above, the DO TMDL was based on the best data and technical analyses available. However, it is also acknowledged that these data and analyses are by no means exact and contain uncertainties. These uncertainties (which were also highlighted in many of the comments contained here) require that we provide adequate margins of safety (CWA 303(d)(1)(C)). DEQ feels that the margins of safety that were applied within the DO TMDL are appropriate given the uncertainty regarding the relationship between effluent limitations and water quality.

**Comment D39. The draft temperature TMDL and the draft DO TMDL may contain requirements that are in conflict. The organic loads from the trees necessary to achieve the temperature allocations will increase SOD. This places emphasis on the need for increased flows on the tributaries.**

**Response:** The draft TMDL addresses the loadings of this nature in Section 4.3.9.3. It is acknowledged that there is some uncertainty regarding this issue and this is taken into account through the margins of safety in the TMDL. If new information arises regarding this issue, or if tributary flows can be increased, the TMDL may be modified as explained in Section 2.3.2.1 of the Draft TMDL. (Also, see the responses to comment D22.). In addition, the Department realizes that certain implementation practices that address one TMDL parameter could negatively

affect another TMDL parameter (for example, stormwater detention ponds that would reduce bacteria loads to a stream may cause some heating). The Department believes that the best place to address these concerns is in the development of detailed implementation plans as there are a variety of ways that management measures can be implemented and will work with DMAs during this process.

**Comment D40. Use management plans but not numerical limits in MS4 permits.**
**Response:** The Department believes that wasteload allocations (WLAs) need to be incorporated into permits and, as MS4 permits are NPDES permits, WLA need to be incorporated into these permits. The WLAs will serve as targets for development of storm water management plans and will not be an end of pipe number. The specifics of how the TMDL will be incorporated into the MS4 permits will be determined during the NPDES permit process.

**Comment D41. DEQ has failed to provide required fiscal impact information regarding the proposed DO TMDL.**
**Response:** ORS 183.335(2)(b)(E) directs the Department on requirements for notice of its intended actions prior to adoption, amendment, and repeal of any rule. This is not a rule making action, therefore these requirements do not apply. In the February 2000 Memorandum of Agreement between EPA and DEQ, the Department indicated that a discussion of cost and funding is to be provided in the Implementation Plans and the Department would expect DMAs to develop this information as part of their detailed Implementation Plans.

**Comment D42. Table 21, page 78: Is this TMDL applicable only to listed streams as noted in Table 21 and on p. 82 or to all streams segments in the subbasin as noted elsewhere in the document?**
**Response:** This TMDL is applicable to all stream segments in the subbasin. Both Table 21 and the text in Section 4.3.2.1 (p. 82) have been modified to reflect this.

**Comment D43. P. 84 – It may be helpful to note that chlorophyll a impairments addressed in the phosphorus TMDL.**
**Response:** This has been noted in the final TMDL.

**Comment D44. Model Calibration, p. 89: It appears that the minimum quarter-mile average site potential shade density was utilized in this (and later) model calibrations. This should be specified in the TMDL document during the discussion of modeling for each stream.**

**Comment D45. P.93 – Discrepancy between 1st paragraph (75% sat.) and last paragraph (90% sat).**
**Response:** 75% saturation was the boundary and tributary percent saturation used for the current condition calibration. 90% saturation was the boundary and tributary percent saturation used for the design scenario of system potential vegetation and 50% SOD reduction. The text has been modified in the Final TMDL to clarify this.

**Comment D46. P. 97 Is there a mechanism that will assure that SOD reductions at these levels will occur?**
**Response:** The mechanisms to address SOD reductions are discussed in sections 4.3.4.8, 4.3.5, 4.3.6, 4.3.8 and 4.3.9.

**Comment D47. Forestex (p.99)- Need to specify which scenario is the allocation.**
**Response:** This has been done through modifications to the text in Sections 4.3.4.7.4 and 4.3.9.3 in the Final TMDL.

**Comment D48. Table 29 – The LC should be a numeric value for SOD, allocations can be % red.**

**Response:** The final TMDL has been modified to address this.

**Comment D49. Is the season of application for Scoggins Creek also May 1 – Oct 31?**
**Response:** The TMDL season for Scoggins Creek is year-round. From May 1 – Oct 31 the portion of the TMDL relating to SOD applies, from Nov. 1 – April 30 the portion of the TMDL which is in Section 4.3.4.7 applies. The TMDL has been modified to clarify this.

**Comment D50. There are no ammonia wasteload allocations for stormwater. Is this intentional?**
**Response:** Yes. The committees formed by DEQ to provide advice on the TMDL modifications determined that ammonia sources other than the wastewater treatment plants are relatively insignificant. Based on this, DEQ determined that wasteload allocations for stormwater were unnecessary at this time and that the dissolved oxygen standard would be met through the allocations provided.

**Comment D51. What about Chicken Cr. design concentrations?**
**Comment D52. Which design concentrations apply to tributaries?**
**Response to comments 49 and 50:** While the original ammonia TMDL contained a load allocation for Chicken Creek, it has been decided that this very small creek is not a significant source of ammonia. The sources of ammonia which were determined to be significant (and thus were given design concentrations and allocations) were: the mainstem Tualatin River upstream of Rock Creek, Rock Creek, Durham Wastewater Treatment Plant, Rock Creek Wastewater Treatment Plant, and Fanno Creek. The allocations and design concentrations apply to discharges from each of the major tributary streams (the allocations and design concentrations for the mainstem Tualatin River upstream of Rock Creek encompasses the discharges from Gales, Dairy, and Scoggins Creeks).

**Comment D53. P. 115 – As noted in comment D45, an allocation needs to be identified for Scoggins Creek. It is also suggested that the document include information on the process that would be utilized to revise this portion of the TMDL if studies found that the alternate allocation was appropriate.**
**Response:** Please see response to comment D45.

**Comment D54. P. 116 – MOS for Sept. – Nov. 15, last bullet: Note the mechanism through which the tributary DO levels will be increased over that utilized in the modeling.**
**Response:** Clarifications to this portion of the TMDL have been made.

**Comment D55. DEQ does not use flexibility offered by continuous data even though sufficient data is available (three-tiered DO standard vs. one-tiered).**
**Response:** Since there was no continuous dissolved oxygen data available for the tributaries, the tiered DO standard does not apply.

**Comment D56. Total volatile solids (TVS) is a poor choice as secondary surrogate, control measures should be designed to control settleable portions not total.**
**Response:** Please see response to comment D24, above.

**Comment D57. Load allocations and wasteload allocations as percent load reductions without load baseline is not useful.**
**Response:** Please see response to comment D2, above.

**Comment D58. Science does not support numeric controls on stormwater.**
**Response:** Please see response to comment D40, above.

**Comment D59. DO model uses estimated output from temperature model (bathymetry, travel time, etc.) which is questionable.**

**Response:** For issues regarding the validity of the temperature modeling, please see the responses to comments on the temperature TMDL.

**Comment D60. How were channel processes considered in linking sediment oxygen demand to DO, especially in the case of steep gradient streams, where long-term sediment retention may not be very prevalent?**

**Response:** With the exception of upper Gales Creek, stream reaches with large gradients were not modeled. For Gales Creek, the modeling runs used to determine the allocations held the SOD values at calibration levels for the upper creek. It should be noted that settleable volatile solids, entering in steep gradient reaches, might not be causing a problem in those reaches but could contribute to the SOD flatter gradient areas (also see response to D25 and D26).

**Fish Habitat:**

**Comment D61. ODFW provided information, but interpretation was done by DEQ. Unsure information was interpreted correctly.**

**Response:** As presented in Appendix F of the TMDL, DEQ used all of the data available on fish habitat in the basin to interpret both the temperature and dissolved oxygen standards. We feel that this analysis, which has been reviewed by ODFW, is accurate.

**Comment D62. TMDL should be responding to 303(d) list not changing listing criteria (i.e. changing best uses).**

**Response:** Please see the response to comment D35, above.

**Biological Criteria:**

**Comment D63. DMAs should not be required to develop management plans that address these problems unless TMDLs are established.**

**Response:** DMA's management plans would not be required by DEQ to address pollution concerns that are not related to TMDLs (which address pollutants). However, in EPA's recent clarification (Federal Register Volume 65, Number 135, page 43592), EPA has clarified that implementation plans for all impaired waterbodies must be based on a "goal" of attaining and maintaining the applicable water quality standards as expeditiously as practicable. In addition, it is very likely that these will be addressed under the management plans in a number of ways:

- Many of the practices and considerations needed to address the TMDL pollutant concerns will address the additional concerns identified in the Biological Criteria document. For example, practices that address removal of volatile solids and bacteria in storm water can address the flashy runoff associated with urban stormwater. Many of these practices will address the volume, timing and quality of runoff. Similarly, additional tree planting along streams will provide habitat for aquatic life.
- DMAs have indicated and have been pursuing the need to address problems using a holistic watershed approach where factors such as flow and habitat can be addressed. These currently are included in many of the watershed plans that have developed in the basin.
- Many of the management plans that are being developed will address additional ESA concerns. Again, many of the factors such as flow and habitat will need to be addressed under the ESA.

**Comment D64. Not sure what (and how) surveys were used to develop the biological criteria and not sure how the criteria were applied.**

**Response:** Surveys that were used are described in detail in: Ward, David L. June 1995. *Distribution of Fish and Crayfish and Measurement of Available Habitat in the Tualatin River Basin - Final Report of Research.* Oregon Department of Fish and Wildlife and Unified Sewerage Agency. 68 p. How the surveys data was interpreted relative to the biological criteria standard (OAR 340-41-027) is described in detail in Appendix H of the Draft Tualatin Subbasin TMDL.

**Comment D65. Page D-16: Correction: change "100 m buffer height and width" to "100 ft buffer height and width".**

**Response:** This has been corrected in the final document.

**Comment D66. Page D-17: Figure 6 – The fact that system potential temperature decreases downstream to below 16°C is questionable considering the fact that groundwater influx was not included in the model.**

**Response:** For a more detailed discussion regarding the temperature analyses performed for Fanno Creek, see pages A-198 through A-219 of the Draft TMDL.

**Comment D67. Page D-22: Figures 17 to 28 do not show modeling results for upper reaches of Fanno Creek.**

**Response:** Due to the technical difficulty of modeling very low volume streams, the upper reaches of Fanno Creek that are referred to were not modeled. All modeled reaches are shown.

**Comment D68. Page 78: Incorrect reference: Clean Water Act section 303(D)(1) refers to heat load, not DO, and does not address whether MOS is implicit or explicit.**

**Response:** We disagree that CWA Section 303(d)(1) refers only to heat load, it refers to all pollutants. We agree that it does not address whether the MOS is implicit or explicit, but neither is this stated here (on page 78 of the draft TMDL).

**Comment D69. Page 83: The 303(d) listing is for cool-water, yet DEQ is using cold-water habitat delineation criteria for the proposed TMDL. The biological criteria are not clear for this change.**

**Response:** Please see response to comment D16 and D35, above.

**Comment D70. Page 85: Table 24: Sediment oxygen demand measurements were conducted outside the critical DO period. Extremely high variability in sediment oxygen demand measurements makes using a median value across all streams questionable. Due to the high variability, the number of sediment oxygen demand measurements is statistically insufficient as model input. Sediment oxygen demand is clearly not homogenous across the stream bottom and in addition was only measured where organic bottom sediments were present. The percent coverage of organic bottom sediments is a critical step in modeling the impact of sediment oxygen demand on DO.**

**Response:** We disagree with the statement that the SOD measurements were conducted outside of the critical DO period. The critical DO period is in the summer, and the DO and temperature modeling was performed for the end of July. As shown in Table 24 of the Draft TMDL, the SOD measurements were all taken in either July or August (the critical period).

We agree that the SOD data is quite variable, as is typical of SOD data. Therefore, the median wasn't used. Instead, the $25^{th}$ and $75^{th}$ percentiles were used to establish a calibration range. The SOD used in each of the models was determined via the calibration process.

**Comment D71. Page 89: Translation of sediment oxygen demand to DO consumption in mg/L is missing – it would allow comparison w/ other sources. It is unclear how the model was calibrated, i.e. were DO measurements outside the critical DO time period utilized and what maximum temperature was used?**

**Response:** An oxygen deficit component analysis was not provided in the report, but is available in the model output. DEQ can provide this output upon request.

**Comment D72. Page 93: Changing the target DO criterion is an inappropriate way of expressing a MOS. This change could be misconstrued as a new DO standard.**

**Response:** EPA requires that margins of safety be included in TMDLs, as required by the Clean Water Act. However, it allows considerable flexibility in the methodology to use. Designing a TMDL to meet a conservative target is an acceptable method for providing a margin of safety.

**Comment D73. Expressing a loading capacity (LC) as percent reduction is not supported by the definition of load capacity.**

**Response:** According to EPA guidance (Guidance for Water Quality-based Decisions: The TMDL Process; EPA 440/4-91-001; April 1991; pg2) "EPA regulations provide that load allocations for nonpoint source's may be based on "gross allotments" (40 CFR 130.2(g)) depending on the availability of data and appropriate techniques for predicting loads. This allows for a phased approach where control mechanisms can be established while additional monitoring can occur.

**Comment D74. Defining load allocation or wasteload allocation as percent reduction of volatile solids equates to a prescriptive TMDL that does not allow adaptive management.**

**Response:** The TMDL is not prescriptive relative to the management practices required. However, per the Clean Water Act, it is necessarily prescriptive relative to the reduction of pollutants required. Adaptive management is incorporated into the TMDL (See section 2.3.2.1 of the Draft TMDL) as well as the WQMP.

**Comment D75. The model was calibrated using a critical low-flow day when DO levels are expected to be at or near their minimum. What is the rationale for this approach?**

**Response:** DO standards must be met at all times. Minimum DO concentrations generally occur during summer days of high temperature and low flow. Hence, modeling was performed for such a condition in order to insure that DO standards will be met at all times.

Page 96:

**Comment D76. The model was calibrated using a critical July, low-flow day. Do not agree with this method of calibration, as it does not reflect water quality standards or 'typical' summer conditions.**

**Response:** The goal of the TMDL is not to just meet water quality standards during typical conditions, but to meet water quality standards at all applicable times. Please see response to comment D20, above.

Page 101:

**Comment D77. In Table-29, DEQ proposes a 50% reduction in TVS in Fanno Creek. However, on page 103 under Urban Runoff, DEQ estimates total suspended solids contributed by Fanno Creek to be 2.4 million pounds. DEQ does not know what portion of the 2.4 million pounds are TVS. If the amount of TVS in the 2.4 million-pound estimate is not known, what is the rationale for 50% reduction in Table 29?**

**Response:** The rationale for the percent reductions in Table 29 is given in Section 4.3.4.8 of the Draft TMDL. (In the Final TMDL the discussion has been moved to 4.3.4.9.) The rationale for the percent reductions in volatile solids is that these reductions are presumed to result in a similar reduction in SOD. The percent SOD reductions were determined through modeling of the tributary streams.

**Comment D78. The connection between total solids or TSS, (total) volatile solids (TVS), and sediment oxygen demand is much more complex than presented. Specifically, the following relationship appear questionable:**

- **TSS and TVS that results in sediment oxygen demand: TSS is in most cases very different from settleable solids and only the organic fraction attached to settleable solids can contribute to sediment oxygen demand**
- **TVS and sediment oxygen demand: Organic material introduced to stream via erosion and runoff is in many cases very stable** and not very likely to contribute significantly to sediment oxygen demand.

**Response:** It is acknowledged that only the settleable organics will lead to SOD. Please see response to comment D26, above. While it may be true that not all settleable volatile material will readily contribute to SOD, there is no data within the basin to provide us with a better measurement of how material will impact SOD. Until better data is available, we feel that allocations in the form of settleable volatile solids are appropriate.

**Comment D79. Since the actual source of sediment oxygen demand (or the surrogate TVS) is unknown, a TMDL should not be established until the pollutant source is known.**

**Response:** While we do not currently have adequate data to quantify volatile solids being delivered to the streams, the sources of volatile solids have been identified (see Section 4.3.6 of the Draft TMDL).

**Comment D80. Referenced study by Suppnick (1992) is much more comprehensive than DEQ's approach and includes agricultural runoff, streambank erosion, bed load transport, etc.**

**Response:** The referenced study had available data for erosion, bed load transport, etc. Lacking this data, DEQ developed the most appropriate TMDL possible (this included utilizing data and analyses that were not present in the referenced study – such as detailed temperature analyses).

**Comment D81. Establishing a load allocation or wasteload allocation based on the reduction of a pollutant that is ill defined is not scientifically defensible.**

**Response:** Establishing an allocation based on the reduction of a pollutant is an acceptable method that has been used within other TMDLs. We feel that its use within this TMDL is also appropriate.

**Comment D82. A percent reduction in TVS without a baseline is not very useful.**

**Response:** Please see the response to comment D2, above.

**Comment D83. Page 111: Basing sediment oxygen demand on a very limited number of TSS measurements and estimates without knowing the fraction of TVS in TSS is scientifically not defensible.**

**Response:** The SOD was based on actual SOD values measured by the USGS. TSS was not utilized. As discussed in the response to D12 and W1, better information will be incorporated, as it becomes available.

**Comment D84. Page 114: Justification for using percent reduction in TVS as load allocation or wasteload allocation is questionable.**

**Response:** See the response to comment D79, above.

**Comment D85. Page 115: Does the riparian vegetation planted to reduce stream temperature result in TVS reduction above the 20 to 50 percent reduction set as load allocation or wasteload allocation?**

**Response:** This is not known. However, an assessment of volatile solids sources was made in Section 4.3.6 of the Draft TMDL. Within this assessment, it is observed that instream and near-stream erosion is not expected to contribute as significant amounts of labile organic material

during the TMDL season as upland sources. This indicates that instream or near-stream source reduction alone will not be adequate.

**Comment D86. Page116: Since the MOS increased the target criterion does that mean (1) a new standard was established and (2) in order to meet the TMDL, the new target criterion has to be met?**

**Response:** No. The margins of safety were developed to address unknowns within the development of the TMDL. New standards have not been established. The target of the TMDL is to achieve the applicable DO standards.

**Comment D87. Has there been a significant change in the amount of sedimentation since different crops and cover crops have been used in the basin**

**Response:** The type of monitoring needed to make that determination has not been done. This will be an item that will be discussed and possibly addressed when developing the annual monitoring plan with the Department of Agriculture.

**Comment D88. The DO problem is a result of the failure to comply with or enforce the TMDL for phosphorus**

**Response:** The existing phosphorus TMDL was developed to address DO problems in the mainstem. Much has been accomplished under the implementation plans for this TMDL as can be seen in the data collected in recent years as described in the TMDL. The Department believes that it will be more effective addressing sources of SOD in the tributaries directly through a new TMDL to address the DO problems that these streams are experiencing. It is likely that measures to address the SOD and settleable volatile solids in the tributaries will likely reduce the phosphorus concentrations as well.

## RESPONSE TO COMMENTS ON THE DRAFT PHOSPHORUS TMDL

**Comment P1.** **<u>Summary of the Issue:</u> The TMDL for Phosphorus is no longer needed as the problems that it was intended to address have been solved (pH standard is met, uses are protected and nuisance phytoplankton growth rule was intended a trigger for identifying waters where phytoplankton may impair beneficial uses).**

**Specific Comments:**

- **DEQ must declare victory regarding phosphorus in the Tualatin River and withdraw the TMDL to preserve the integrity of the TMDL program.**
- **DEQ must also insure that current phosphorus control measures are kept in place as a foundation upon which to restore watershed health through future efforts addressing temperature, bacteria and DO.**
- **Certain facts suggest that the phosphorus TMDL may no longer be necessary:**
  **a) USGS has previously made the case that current phosphorus control, in conjunction with improved flow management, has been sufficient to eliminate violation of max pH standard**
  **b) DO compliance has improved due to current levels of phosphorus control, improved flow management, and ammonia control at the WWTPs. Increased controls on phosphorus may reduce peak algal population further and may reduce SOD downstream, but effects would be small. The controls on SOD in the DO TMDL are proposed to be sufficient to control DO in the mainstem.**
  **c) The draft total phosphorus criteria is being met.**

<u>Response:</u> Much has been accomplished under the existing TMDL for phosphorus. No pH standard exceedances have been measured since 1997 and peak chlorophyll a values have been reduced in the lower river due to controls on phosphorus and flow management for water quality purposes.

However, the Department believes that proper course of action is to modify the existing phosphorus TMDL for the following reasons:

1. <u>Federal Rules require a TMDL:</u> Section 303(d)(1)(A) requires that "Each State shall identify those waters within its boundaries for which the effluent limitations required by section 301(b)(1)(A) and (B) are not stringent enough to implement any water quality standard applicable to such waters…" Section 303(d)(1)(C) requires that "Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 304(a)(2) as suitable for such calculations…"

   Under §130.7 (b) (1), "Each State shall identify those water quality limited segments still requiring TMDLs within its boundaries for which:
   (i) Technology-based effluent limitations required by section 301(b), 306, 307 or other section of the Act;
   (ii) More stringent effluent limitations (including prohibitions) required by either state or local authority preserved by section 510 of the Act, or Federal authority (law, regulation, or treaty); and
   (iii) Other pollution control requirements (e.g. best management practices) required by local, State, or Federal authority are not stringent enough to implement any water quality standards (WQS) applicable to such waters.

Water Quality Limited Segments are defined under §130.2 as "Any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after the application of the technology-based effluent limitations required by sections 301(b) and 306 of the Act. Oregon defined water quality limited under OAR 340-41-006(30), including "(b) A receiving stream which achieves and is expected to continue to achieve instream water quality standard but utilizes higher than standard technology to protect beneficial uses."

The Tualatin River was originally listed as water quality limited and a TMDL was developed for phosphorus to address elevated pH levels and algal blooms both in the lower Tualatin River and in Lake Oswego. To achieve the WLAs assigned under the TMDL, USA was required to utilize higher than standard technology to remove phosphorus at their Wastewater Treatment Plants. The Department believes that a TMDL is still required under federal rules, as the Tualatin would still be considered Water Quality Limited under definitions above. The Department is then faced with a choice of leaving the existing TMDL, which EPA has approved, in effect or modifying the existing TMDL to take into account new data and information on the river. The Department has chosen the latter course of action.

2. A TMDL is needed as a basis for establishing the loading capacity and allocating the loads among sources: Much has been accomplished on the Tualatin River since the development of the original TMDLs. This has included development of programs to address phosphorus and other pollutant loads, load reductions especially from point sources and management of flow for water quality purposes. In fact, some treatment facilities are discharging at levels far below their current wasteload allocation for phosphorus. In addition, a great deal has been learned about the river system. Based on much of this experience, the Tualatin Basin Policy Advisory Committee, in January 1998, made recommendations to the Department for modifying the TMDLs for ammonia and phosphorus.

   It will be important to maintain controls on phosphorus contributions in order to continue to meet the pH standard in the lower Tualatin, especially given the expected population growth in the basin which could lead to discharges from point sources using all of their wasteload allocations and for differing climatic and flow regimes that may be experienced. In addition, algal activity may contribute to Sediment Oxygen Demand that appears to affect dissolved oxygen concentrations in the lower river in early September (the extent of the contribution has not been quantified). The clearest mechanism under the Clean Water Act, given a variety of point and nonpoint sources in the basin, is through the TMDL and WLA/LA. While other methods for maintaining the controls could be and have been explored, they come back to looking very much like a TMDL. Given that a TMDL for phosphorus has been established and approved by EPA, we feel the best course of action is to modify the existing TMDL to take into account new information that has been developed in the Tualatin.

3. Lake Oswego still experiences pH problems and phosphorus controls are still needed: Lake Oswego has a water right for power generation purposes for water from the Tualatin. Lake Oswego is water quality limited for pH and dissolved oxygen and a TMDL was developed for phosphorus and to address nuisance aquatic growth in the lake in 1988. Subsequent management plans for the lake have been developed and implemented. The amount of water diverted from the Tualatin has been reduced considerably, improvements have been made within the watershed and a number of other lake management techniques (such as aeration, nutrient inactivation) have been implemented due to the TMDL and its management plan. Recent data collected by the Lake Oswego Corporation indicates that the lake is still not achieving the pH or DO standard. The phosphorus TMDL for the lake has been modified in this TMDL review based on new information regarding background phosphorus

concentrations in the Tualatin. Phosphorus limits for the water from the Tualatin are needed as part of the Lake Oswego TMDL.

## Comment P2. Why is the proposed phosphorus standard below background?

**Response:** There appears to be some confusion regarding this matter, probably due to where the margin of safety for background was included in the TMDL. The phosphorus load allocations (Tables 45 & 46) included margins of safety below what was calculated as "background" (Tables 43 & 44). These margins of safety are necessary because of the probability that the estimated "background" values are slightly higher than true background. This is due to the fact that anthropogenic sources are not accounted for in the methodology used to estimate background concentrations. (These probable sources include sedimentary releases of phosphorus, illicit discharges of phosphorus, etc.). Since the MOS is necessary to account for uncertainties related to the estimated background concentrations, the MOS should have been included in the values for the estimated background concentrations. This has been corrected in the Final TMDL. (Also, see the response to question P5 below.)

**Comment P3. The proposed TMDL, by expressing phosphorus criteria as monthly medians and phosphorus allocations as monthly averages, is not adequate (to achieve its stated chlorophyll-a objective).**

**Response:** The expressions of total phosphorus within the TMDL for runoff allocations are based on achieving the goal of attaining background levels of phosphorus in the Tualatin River. Since these background levels are estimated as median seasonal values, it is appropriate for the runoff allocations to be based on values that are expressed in a similar manner. The allocations for the wastewater treatment plants (WWTPs), which are expected to have less fluctuation in discharge concentrations due to the nature of WWTPs, are expressed as monthly medians.

**Comment P4. Summary of the Issue: The revision of the Phosphorus TMDL is a violation of anti-backsliding requirements of CWA sections 303(d)(4).**

Specific Comments: NEDC is concerned that DEQ is prematurely declaring a victory over the phosphorus problem in the basin, and is particularly concerned with what appears to be a movement towards a less stringent phosphorus TMDL. Lake Oswego Corporation has gone to great lengths to address algae growth in Oswego Lake during the summer, installing aerators, proposing a city ordinance to reduce the use of phosphorus in domestic and commercial fertilizers, and has also in recent years closed the lake to swimming due to blue-green algal blooms and the threat of *microcystis*. These are precisely the types of measures that should be emphasized in ongoing efforts to address phosphorus-related concerns. The proposed phosphorus TMDL revision runs contrary to these ongoing efforts, and appears to conflict with the anti-backsliding requirements of CWA section 303(d)(4).

**Response:** The Department disagrees and believes that it has addressed the anti-backsliding requirements of the CWA and Oregon's anti-degradation policy.

Section 303(d)(4) reads as follows:

> (4) Limitations on Revision of Certain Effluent Limitations.
> (A) Standard not attained – For waters identified under paragraph (1)(A) *[303(d) List]* where the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.

> (B) Standard Attained – For waters identified under paragraph (1)(A) *[303(d) List]* where the quality of such waters equals or exceeds levels necessary to protect the designated use for such waters or otherwise required by applicable water quality standards, and effluent limitation based on a total maximum daily load or other waste load allocation established under this section, or any water quality standard established under this section, or any other permitting standard may be revised only if such revision is subject to and consistent with the antidegradation policy established under this section.

OAR 340-41-026(1)(a) is the Antidegradation Policy for Surface Waters in Oregon. OAR 340-41-026(1)(a)(C) is the portion of the policy that applies to Water Quality Limited Waters and directs the Department to manage water quality according to section (3) of the rule (the Tualatin River would be considered Water Quality Limited for phosphorus under OAR 340-41-006(30)(b)).

Section (3) of the rule directs the following:

> (a) In allowing new or increased discharged loads, the Commission or Department shall make the following findings:
> (A) The new or increased discharged load would not cause water quality standards to be violated;
> (B) The new or increased discharged load would not unacceptably threaten or impair any recognized beneficial uses. In making this determination, the Commission or Department may rely upon the presumption that if the numeric criteria established to protect specific uses are met the beneficial uses they were designed to protect are protected. In making this determination the Commission or Department may also evaluate other state and federal agency data that would provide information on potential impacts to beneficial uses for which the numeric criteria have not been set;
> (C) The new or increased discharged load shall not be granted if the receiving stream is classified as being water quality limited under OAR 340-041-0006(30)(a), unless:
> (i) The pollutant parameters associated with the proposed discharge are unrelated either directly or indirectly to the parameter(s) causing the receiving stream to violate water quality standards and being designated water quality limited; or
> (ii) Total maximum daily loads (TMDLs), waste load allocations (WLAs) load allocations (LAs), and the reserve capacity have been established for the water quality limited receiving stream; and compliance plans under which enforcement action can be taken have been established; and there will be sufficient reserve capacity to assimilate the increased load under the established TMDL at the time of discharge; or…

The Tualatin Basin Policy Advisory Committee recommended to the Department that load allocations be increased to account for actual background concentrations based on new information. The Department believes that this increased load allowed under the TMDL will not cause standards to be violated (OAR 340-41-026(3)(a)(A)) and would protect the beneficial uses as the loading capacity is near but slightly under current conditions where standards are being met (OAR 340-41-026(3)(a)(B)). In addition, the increase in loading is being established under a TMDL so concerns related to OAR 340-41-026(3)(a)(C)(ii) would also be addressed.

**Comment P5. The method of assessing background phosphorus levels fails to take into account residual effects of runoff.**

**Response:** We acknowledge that, while we attempted to minimize the residual impacts of runoff (releases from sediment) and other anthropogenic sources on the assessment of background phosphorus levels, the resulting values possibly do reflect some of these impacts. For this reason, margins of safety were included to give what is considered a more accurate value for background phosphorus concentrations. (Also, see the response to comment P2, above.)

**Comment P6. Accounts of TBTAC and TBPAC report only the USA/DMA view of the proceedings.**

**Response:** DEQ participated in both the Tualatin Basin Technical Advisory Committee (TBTAC) and the Tualatin Basin Policy Advisory Committee (TBPAC), and read all reports by and to these committees. TBPAC and all other subcommittees reported to the TBPAC, which in turn reviewed the other committee and subcommittee reports and gave recommendations to DEQ. It has been DEQ's intention to directly apply only the recommendations given by TBPAC to DEQ. The draft phosphorus TMDL reflects this intention and only refers to the TBPAC recommendations. (The draft dissolved oxygen TMDL does reference the TBTAC Modeling Subcommittee report with regard to dissolved oxygen impacts due to ammonia. This is considered a relatively uncontroversial technical issue.)

**Comment P7. Spreadsheets in Appendix C do not account for residual concentrations of P.**

**Response:** See response to comment P5, above.

**Comment P8. The existing phosphorus loadings need to be tabulated by source.**

**Response:** While the existing phosphorus loading from urban runoff sources and the wastewater treatment plants may be readily estimated, loadings coming from nonpoint sources such as agricultural runoff, forestry runoff, rural runoff and groundwater are more difficult to estimate and therefore have not been tabulated. This is primarily the result of a lack of data on these sources – a problem which may be addressed through future monitoring efforts.

**Comment P9. The phosphorus loadings should be expressed with specific requirements as to timing, etc.**

**Response:** It is DEQ's intent that the allocations for runoff sources presented in Table 46 of the draft TMDL will be used as a basis for the development of implementation plans. These allocations are expressed as pounds per day averaged over the TMDL season and are based on the target concentrations presented in Table 45 of the draft TMDL. This expression of the loadings is considered appropriate for the purpose of providing a design value upon which to develop a management plan.

**Comment P10. The increased load allocations in the TMDL appear to be developed because the current allocations were not attainable with the current management plan.**

**Response:** The increased load allocations were not developed because of the failure of any management plan, but were rather developed because new scientific information became available subsequent to the development of the original phosphorus TMDL. This subject is more fully discussed within Section 4.4 of the draft TMDL.

**Comment P11. The TMDL has inaccurate acreage areas and allocations for Multnomah County.**

**Response:** The allocations for all areas have been reviewed, the only modifications found necessary were the inclusion of ODOT allocations. Since these allocations were previously included with other DMA allocations in the draft TMDL, DMA allocations may have decreased slightly. Loads were allocated to specific management agency based on specific parameters. These are outlined in Appendix C-8 of the final TMDL document. In addition, the formula for the allocations has been added to the TMDLs so that adjustments DMAs areas can be made.

**Comment P12. Allocations of phosphorus are given to DMAs and not stream segments.**

**Response:** It is appropriate to give allocations to management agencies, not stream segments. To assist with the development of management plans, however, the DMA allocations have also been broken down by 5$^{th}$-field watershed. In addition, EPA has indicated that the expression of the allocations can be modified (without getting additional approval) as long as they are consistent with the assumptions and requirements of the approved WLA.

**Comment P13. The Oregon Department of Transportation (ODOT) is not listed as a designated management agency (DMA), but should be.**

**Response:** We agree. Since ODOT is the responsible management agency for several large highways in the basin that are contributing pollutants, they are a DMA. The Final TMDL includes loads for ODOT.

**Comment P14. Comment: Sewer overflows are being pumped into the Blue Heron Canal. Approximately 54,000 gallons of raw sewage entered the Lake in 1998 and 1999 from three different storm events and probably close to a million gallons over the past 10 years. This is not only a phosphorus problem but also a bacteria problem and health hazard. The Blue Heron canal has problems with low Dissolved Oxygen all winter and zero DO during the summer – an aeration system was added in the summer of 2000. While the City of Lake Oswego has defined the problem and alternative solutions, it has yet added a project in its Capital Improvement Plan to solve the capacity problem. The TMDL/WQMP should address this issue.**

**Response:** The Department is aware of the sanitary sewer overflows to Lake Oswego and has been working with the City of Lake Oswego to get them corrected. OAR 340-41-120(13)(b) states that "Facilities with separate sanitary and storm sewers existing on January 10, 1996, and which currently experience sanitary sewer overflows due to inflow and infiltration problems, shall submit an acceptable plan to the Department at the first renewal, which describes actions that will be taken to assure compliance with the discharge prohibition by January 1, 2010. Where discharges occur to a receiving stream with sensitive beneficial uses, the Department may negotiate a more aggressive schedule for discharge elimination."

The phosphorus TMDL does not allow for a loading from this source so it needs to be eliminated. The City of Lake Oswego has been working with the City of Portland, DEQ and others (including the Lake Oswego Corporation through a local task force) to address the issue of sewer overflows to Lake Oswego. Options were developed in early 2000. Further analysis is currently being conducted on the existing Lake interceptor. Based on the findings, decisions on funding the necessary mitigation will then be made. Addressing the sanitary sewer overflows as a priority component will be added to the City's WQMP.

**Comment P15. The margin of safety values should be shown within each TMDL.**
**Response:** While explicit margins of safety are quantified numerically in some of the TMDLs, margins of safety may also be implicitly added through such actions as conservative assumptions. Implicit margins of safety can rarely be quantified. Modifications to the phosphorus TMDL have been made to clarify the margins of safety. (See the response to comment P2, above.)

**Comment P16. Table 46 does not give load allocations for several sources, assuming no instream sources of phosphorus in the TMDL season. This may limit management options for reducing phosphorus.**
**Response:** The load allocation for instream (riparian bank erosion) sources of phosphorus is given in section 4.4.11 as a narrative allocation (we are now including specific load allocations in BTU but using shade as a surrogate). Temperature allocations call for riparian enhancement that will address instream phosphorus. (I.e., the TMDL calls for management measures addressing both runoff and instream sources of phosphorus.)

**Comment P17. The DMAs should be able to revise the values (allocations, etc.) in the TMDL if new data is available (this comment was referring to the determination of background levels for Oswego Lake).**
**Response:** While DEQ encourages the DMAs and others to examine the TMDLs in the light of new data, any revisions to the TMDLs will have to be performed through a public process and approved by the EPA. In Oregon, DEQ is the agency charged with developing and modifying TMDLs.

**Comment P18. P.136 – there may be some calculation errors.**
**Response:** The draft TMDL references Table 6.4 in the OTAK, Inc. report (as opposed to Table 6.5, which estimates flows under one of the recommended management scenarios). The values cited in the draft TMDL are averages of the values given for Alternative I and Alternative II in Table 6.4. Alternative I is for 1992 flows. Alternative II is for fully built out flows. DEQ estimated that current (year 2000) flows are midway between these two values.

**Comment P19. Change OTAK date references on p. 136.**
**Response:** The appropriate change has been made.

**Comment P20. P. 138 – what is the data source for the 0.326 value.**
**Response:** The source is storm water sampling data collected from Springbrook Creek by the Lake Oswego Corporation and SRI. This information has been included in the text of the Final TMDL.

**Comment P21. Include references (see Comment #55-3f)**
**Response:** The phosphorus TMDL references are included at the end of the phosphorus TMDL (Draft TMDL p. 141). These references have been updated to include data sources for phosphorus numbers in the Oswego Lake portion of the TMDL.

**Comment P22. The TMDL does not account for differing species of phosphorus.**
**Response:** The draft TMDL gives allocations in the form of total phosphorus (TP), the primary limiting nutrient for algal growth in the Tualatin Basin and Oswego Lake. The original phosphorus TMDL addressed total phosphorus also, as do most other phosphorus control programs of which we are aware. The reason for this is that, although dissolved inorganic P is the form most immediately bioavailable, phosphorus is a very dynamic element. Particulate P, which is not a readily bioavailable form of P, may release orthophosphate to solution once it enters the water column. (This is a very well documented mechanism - see, for example, Correll, 1998). By only targeting specific species of P we would be ignoring these dynamics and would not be ensuring that this nutrient is limited for algal growth.

**Comment P23. What is the loading capacity for tributaries not specifically listed in Table 43 of the draft TMDL?**
**Response:** This table has been updated to include loading capacities for these streams.

**Comment P24. References to tables 44 and 47 seem incorrect.**
**Response:** Both of these references (on p. 130 & 133) have been corrected to both refer to Table 45. The title of Table 45 has also been corrected to indicate that the listed concentrations also represent wasteload allocations for all point sources other than MS4s and WWTPs.

**Comment P25. It should be stated how these concentrations will be incorporated into the NPDES permits.**
**Response:** This has been incorporated into section 4.4.10.4

**Comment P26. It should be noted that these facilities do not add phosphorus.**
Loadings from other permitted sources was set at background as indicated in the TMDL.

**Comment P27. P. 130 – Last line in Section 10 should refer to Section 4.4.13**
**Response:** Correction has been made.

**Comment P28. P.134 – Explain why year-round phosphorus loadings are being examined for LO.**
**Response:** A new section (4.4.13.5) has been added to the TMDL addressing seasonal variation in Oswego Lake.

**Comment P29. Explain how seasonal variation evaluations were made for LO.**
**Response:** See response to comment P28, above.

**Comment P30. Tables 49 and 51 – Define when the values for "Storm" and "Base Flow" events will be applied.**
**Response:** Two sentences have been added above Table 51 explaining this.

**Comment P31. The proposed phosphorus TMDL will require substantial additional investment in measures to reduce phosphorus even though the beneficial uses it addresses are no longer impaired. These investments will not produce environmental benefit and will divert resources away from other critical programs.**
**Response:** (Also, see response to comment P1, above)
The proposed phosphorus TMDL is less restrictive than the current TMDL by targeting a 0.1-0.11 mg/l total phosphorus concentration in the lower Tualatin rather than 0.07 mg/l total phosphorus. The increase in the total phosphorus target is based on higher background concentrations found in tributaries.

In determining wasteload allocations, the Department chose to assign loads at the background concentrations. Wastewater treatment plants are currently discharging at levels well below their allocation. Storm water discharges are currently discharging at levels that are above their allocation. Credit can be given for low phosphorus flow augmentation that USA controls from Hagg Lake. This sets up an effluent-trading scenario that could be pursued.

While additional reduction in stormwater discharge concentrations of phosphorus would still be needed, the Department believes that by addressing bacterial and total volatile solids contributions, additional reductions in phosphorus concentrations will also occur. There are strong correlations between total phosphorus and total suspended solids.

**Comment P32. DEQ must declare victory regarding phosphorus in the Tualatin River and withdraw the TMDL to preserve the integrity of the TMDL program.**
**Response:** See response to comment P1, above.

**Comment P33. DEQ must also insure that current phosphorus control measures are kept in place as a foundation upon which to restore watershed health through future efforts addressing temperature, bacteria and DO.**
**Response:** See response to comment P1, above.

**Comment P34. The derivation of mainstem Tualatin River background conditions has incorrect assumptions that underestimate loading capacities.**

**a) The actual flow augmentation water should have been used, not 37 cfs for all three years.**
**Response:** The spreadsheets have been rerun using the actual numbers (which are, by our calculations 55, 34, and 43 cfs for 1991, 1993 and 1994, respectively).

**b) The method for estimating the WWTP discharge concentrations is inconsistent.**
**Response:** We agree. The purpose of the spreadsheet, as stated in Appendix C-5, was to estimate the concentrations that would result on the mainstem of the Tualatin River due to background conditions. Insertion of the WWTP discharges into the spreadsheet leads to estimates of background conditions that are inaccurate. This is because with the WWTP discharges, the river has much higher flows than what would be observed due to background conditions. These higher flows would impact the mass balance and give estimated background concentrations of phosphorus that are lower than they should be.
To correct this issue, the WWTP flows in the spreadsheets used to estimate background were set at zero (Figures 4, 5, and 6 of Appendix C-5). This process is also explained in Appendix C-5 of the Final TMDL document.

**c) The tributaries were not actually set to loading capacities as indicated in Appendix C-5 (p. 9).**

**Response:** This has been addressed through actions taken to clarify the issue of allocations below background (See response to comment P2, above).

**d) The background concentration for Chicken Creek should be the same as the loading capacity (0.15 mg/L) for Cedar Creek.**

**Response:** This has been addressed through actions taken to clarify the issue of allocations below background (See response to comment P2, above).

**e) Footnote 2 in Appendix C-5 (p.9) indicates that Baker, McFee, and Christianson Creeks should have similar groundwater concentrations as Burris Creek.**

**Response:** This has been addressed through actions taken to clarify the issue of allocations below background (See response to comment P2, above).

**f) The corrections above result in different background levels than given in the Draft TMDL.**

**Response:** This is true, with the correct values used in the spreadsheets (Figures 4, 5, and 6 of Appendix C-5), the estimated background concentrations of total phosphorus on the mainstem have changed. These new estimates, which should more accurately reflect background conditions, have been inserted into the appropriate sections of Final TMDL.

**g) The draft TMDL WLAs for the WWTPs are below background.**

**Response:** This has been corrected as detailed above.

**Comment P35. The modeling approach used to determine the mass phosphorus wasteload allocations for MS4s does not properly account for baseflows.**

**Response:** The purpose of the modeling was to determine the WLAs for MS4s, which excludes instream loads from baseflows. Baseflow allocations are given as concentrations in Table 44 of the Draft TMDL. The load allocation for riparian bank erosion is addressed in Section 4.4.11 of the Draft TMDL.

**Comment P36. Summary of the Issue: The pH standard has been improperly applied to the Tualatin River in the area of the Lake Oswego diversion dam.**

Specific Comments: The pH standard includes an exception which states the following:

> "Waters impounded by dams existing on January 1, 1996, which have pHs that exceed the criteria shall not be considered to be in violation of the standard if DEQ determines that the exceedance would not occur without the impoundment and that all practicable measures have been taken to bring the pH in the impounded waters into compliance with the criteria…"
>
> As noted in the TMDL document, only the lower mainstem of the Tualatin River was listed for pH, which includes the Lake Oswego diversion dam. The TMDL should include an assessment whether the pH exceedances are due to Lake Oswego diversion dam and whether the exception specified above applies to this segment of the Tualatin River.

**Response:** It should be pointed out that the original phosphorus TMDL that was developed to address pH and nuisance aquatic growth conditions was developed in 1988 and addressed the pH standard that were in effect at that time. The exception listed above was added to the pH standard in 1996. Therefore, the Department did not do an assessment on the influence of the dam relative to pH in the original TMDL.

As shown by the recent data collected by USGS at the Oswego Diversion Dam (Station 14207200, River Mile 3.4), the lower river has been in substantial compliance with the pH standard since 1996 with one exceedance recorded in 1997. It appears that the reduction in phosphorus through implementation of "practicable measures" (i.e. phosphorus controls implemented under the TMDL and flow management) have been effective in achieving the pH standard. The Department does not currently list the Tualatin as being water quality limited for pH.

In the future, further evaluation on the impact of the Lake Oswego diversion dam may occur, especially as part of the temperature management plans for the basin.

**Comment P37. Discrepancies in the background concentrations for mainstem and tributaries.**

**Response:** This is addressed through the responses to questions P34 a-g above.

**Comment P38. Stormwater runoff is not a significant contributor of phosphorus during the algal growing season.**

**Response:** We disagree. Appendix C-8 of the Draft TMDL presents the average seasonal rainfall during the TMDL season for the Tualatin Basin. For urban areas, rainfall greater that 0.10 inches per day has been estimated by USA to result in runoff. For other areas, it may take greater rainfall to produce runoff. Both Appendix C-6 and Appendix C-7 further analyze runoff during the season, with Appendix C-6 providing USA monitoring data showing that runoff from most urban land uses are greater than the estimated background concentrations. This information shows that during an average rainfall year, approximately 15 percent of the days between May 1 and October 31 have enough rainfall to produce runoff, most of which has greater concentrations than is estimated to be background for the basin.

The timing of these rain events can be very sporadic, with parts of the basin receiving rainfall, as other parts remain dry. The long residence time typical of the basin in the summer months (even during rainfall events large enough to produce runoff) results in the possibility of impacts from runoff events remaining long after rainfall has occurred.

While different subcommittees of the Tualatin Basin Policy Advisory Committee (TBPAC) gave varying accounts of the impact of stormwater, these subcommittees reported to TBPAC who gave their recommendations to DEQ. These recommendations are included in Appendix C-1 and do not include references to stormwater not contributing to algal problems in the Tualatin.

**Comment P39. Lack of a load allocation for anthropogenic sources and improper application of a margin of safety due to allocations being below background.**

**Response:** The issue of allocations being below background is addressed in the response to comment P2, above. We feel that allocations, when viewed in the form of loads, have been given above background to account for some human influence. It is true that the recommendations made by TBPAC are unclear as to whether the recommendation (see Appendix C-1 in the Draft TMDL) was referring to an increased allocation in the form of concentrations or loads. It is our understanding that there was considerable debate about the subject on the committee, and that no consensus was achieved

**Comment P40. Chlorophyll *a* and phosphorus relationship in the mainstem: The Draft TMDL suggests a reliance on the Tualatin Basin Policy and Technical Advisory Committees for direction on the development (of the TMDL). However, these committees were disbanded to expedite the reissuance of the TMDLs before they could consider the phosphorus to chlorophyll *a* relationship on the mainstem. Information on the total phosphorus to chlorophyll *a* relationship can be found in numerous USGS documents and EQC required reports.**

**Response:** The Tualatin Basin Policy Advisory Committee (TBPAC) worked for a considerable amount of time to produce recommendations to DEQ on the development of a revised phosphorus TMDL. These recommendations, which were finalized and presented to DEQ in January of 1998, represent the consensus of the committee on a very controversial subject. In developing the draft phosphorus TMDL, DEQ reviewed the recommendations made by the TBPAC as well as numerous other technical and non-technical documents related to the phosphorus/chlorophyll a relationship. Since some of these documents contrasted sharply in their view of this relationship, it was the task of DEQ to work with the official recommendations of the TBPAC and the results of other studies and reports to develop an appropriate TMDL. The resulting draft TMDL incorporates the best available data and science on the subject.

**Comment P41. Oversimplification of the modeling approach could impact compliance elements.**

**Response:** We feel that the method for determining allocations for runoff sources (Appendix C-8) is as accurate as currently possible. However, we do acknowledge that no precise determination method exists. For this reason (and others), we have included margins of safety (as required under the Clean Water Act).

**Comment P42. Summary of the Issue: Oswego Lake is not part of the Tualatin River basin and should not be included in the Tualatin Subbasin TMDL.**

Specific comments:

- Oswego Lake was created from Sucker Creek (now called Oswego Creek), that drained to the Willamette River. The only interconnection with the Tualatin River is a man-made intake channel (Oswego Canal) that allows Oswego Lake to divert water under a valid water right for hydroelectric power generation. The use of their water right does not provide for protection of water quality as a water right holder. Therefore, the total phosphorus TMDL for Oswego Lake should be disconnected from the Tualatin River.
- Figure 66 on page 137 shows that even with only a small fraction of Lake Oswego Corporation's water right being claimed, the majority of the lake's summertime phosphorus load is imported through the Oswego Canal. The USGS does not dispute the fact that the holder of that water right is perfectly entitled to claim their entire allocation of water, but in terms of water quality, the easiest way to reduce loads of total phosphorus to Oswego Lake is to reduce the amount of water transferred to the lake through the Oswego Canal.

**Response:** One of the required elements of a TMDL is defining the geographic area to which the TMDL applies. The area is not necessarily limited to the natural drainage basin, the Department has the discretion to include Lake Oswego as part of the TMDL.

As Lake Oswego withdraws a portion of its water under its existing water right from the Tualatin River and the TMDL for Lake Oswego needs to account for the phosphorus loads coming from the Tualatin River, the Department had developed the original phosphorus TMDL for both the Tualatin and Lake Oswego at the same time. Similarly, the Department feels that the modifications should be done for both at the same time.

It should be noted that the Tualatin River phosphorus TMDL was established at levels to protect for the beneficial uses in the Tualatin. These levels are near background phosphorus levels given the flow management, treatment at WWTP and other phosphorus controls in the basin. This background level was used as input to the Lake Oswego phosphorus TMDLs. Similarly, the Lake Oswego phosphorus loadings within the basin are set to background in order to reduce the phosphorus loads and related algal blooms in the lake. Lake Oswego has limited its withdrawal of water from the Tualatin to the seasonal period when phosphorus controls are required (May –

October), has reduced the volume withdrawn and is undertaking aggressive in-lake controls to reduce phosphorus recycling in the lake.

**Comment P43. If DEQ nonetheless decides to promulgate a revised total phosphorus TMDL, it should not impose enforceable numeric limitations on stormwater discharges governed by MS4 stormwater permits.**

**Response:** The Department believes that wasteload allocations (WLAs) need to be incorporated into permits and, as MS4 permits are NPDES permits, WLA need to be incorporated into these permits. The WLAs will serve as targets for development of storm water management plans and will not be an end of pipe number. The specifics of how the TMDL will be incorporated into the MS4 permits will be determined during the NPDES permit process.

**Comment P44. Certain facts suggest that the TP TMDL may no longer be necessary:**

**a) USGS has previously made the case that current phosphorus control, in conjunction with improved flow management, has been sufficient to eliminate violation of max pH standard**

**b) DO compliance has improved due to current levels of phosphorus control, improved flow management, and ammonia control at the WWTPs. Increased controls on phosphorus may reduce peak algal population further and may reduce SOD downstream, but effects would be small. The controls on SOD in the DO TMDL are proposed to be sufficient to control DO in the mainstem.**

**c) The draft total phosphorus criteria is being met.**

**Response:** See response to comment P1, above.

**Comment P45. Summary of the Issue: The proposed criteria for chlorophyll a appears to remove the link between the standard and the beneficial use it is supposed to protect. Instead, they propose that the chlorophyll a level which ensures compliance with the pH standard be adopted.**

**Response:** The Department is not proposing to modify target chlorophyll a values in rule at this time as other control measures that will be implemented under new or revised TMDLs should further reduce chlorophyll a concentrations (e.g. increased shading due to temperature control, further reduction of nutrients such as through bacteria, phosphorus and volatile solids controls, etc.). However, we are suggesting that a narrative action level may be appropriate. Developing a narrative action level that links more directly to the standards is a good suggestion that will be considered when developing subbasin specific values.

**Comment P46. Decreasing the flow in the Oswego Canal would benefit water quality in both Oswego Lake and the Tualatin River.**

**Response:** See response to comment P42, above.

**Comment P47. Allocations are below background**

**Response:** See response to comment P2, above.

**Comment P48. P.118 pH violations usually occur in June, July and Aug.**

**Response:** This has been addressed in the final document.

**Comment P49. P. 123 Statements attributed to USGS are true, but need to state the 15 ug/L would not be met.**

**Response:** This has been addressed in the final document.

**Comment P50. Factors other than p affect chl-a (page 124 of draft).**
**Response:** This has been addressed in the final document.

**Comment P51. The SOD reductions called for in the DO TMDL should address DO.**
**Response:** This is true. However, as explained in the DO TMDL, one of the potential pollutants leading to increased SOD on the mainstem of the mainstem Tualatin River is detrital algal matter. In order to ensure the necessary reduction of SOD, this impact must also be addressed.

**Comment P52. DEQ did not use currently available data/reports that show the Tualatin Basin is no longer water quality limited due to total phosphorus.**

**Response:** See response to comment P1, above.

Comment P53. DEQ and DMAs need to declare victory on the total phosphorus TMDL

**Response:** See response to comment P1, above.

**Comment P54. DEQ bases its total phosphorus draft TMDL recommendations on the guidance provided by the TB_TAC and TB_PAC. This is acceptable to a limited degree. Since the TB_TAC disbanded before it could evaluate the impacts of setting the nonpoint source total phosphorus to background plus an allowance for anthropogenic, it is not correct to suggest that they would have supported the current draft TMDLs. Setting the current draft TMDLs will not result in any change in the chlorophyll *a* levels, therefore, they are not water quality based. Improving water quality is the basis for water quality driven TMDLS.**

**Response:** See response to comments P1 and P40, above.

**Comment P55. Tributary background concentrations due to groundwater are very similar to the TB_TAC values, except for Dairy Creek, which is lower than recommended by the TB_TAC.**
**Response:** TBTAC made recommendations to TBPAC. TBPAC, in turn, made recommendations to DEQ (these recommendations are listed in the draft TMDL). Some of the values are different from what TBTAC came up with. As explained in the draft TMDL, these differences are most likely due to the better flow data that was available to DEQ, which allowed for a more accurate separation of groundwater and runoff samples.

**Comment P56. TB_TAC/PAC recommended 'background plus anthropogenic' and not 'background equals anthropogenic'.**
**Response:** See response to comment P39, above.

**Comment P57. TB_TAC/PAC did not evaluate river response to background TP.**
**Response:** True. See response to comment P40, above.

**Comment P58. Target concentrations for runoff are background minus a MOS. This means runoff would have to be cleaned to levels less than background.**
**Response:** See response to comment P39, above.

**Comment P59. Although the text states that the allocations allow for some anthropogenic effects, there is no documentation to show this.**
**Response:** See response to comment P2, above.

**Comment P60. Background phosphorus will prevent attainment of 15 g/L chlorophyll a action level bacteria. Thus, the chlorophyll a action level needs to be changed.**

**Response:** It has been. See page 128 of the draft TMDL.

**Comment P61. Aesthetics is no longer a problem according to the DEQ's own assessment.**
**Response:** Aesthetics have not been a problem on the mainstem Tualatin River in recent years.

**Comment P62. DEQ proposed change to chlorophyll a guidance level couples chlorophyll a and TP legally when there is no scientific relationship.**
**Response:** See response to comment P1, above.

**Comment P63. DEQ should couple chlorophyll a compliance with pH compliance since they are scientifically linked.**
**Response:** See response to comment P1, above.

**Comment P64. Dissolved Oxygen is not directly linked to TP as is assumed.**
**Response:** This potential linkage has been identified by the USGS. See draft TMDL.

**Comment P65. Need to know how wasteload allocations and load allocations were calculated.**
**Response:** This is described in the TMDL and the appendices to the TMDL. The commentor is welcome to contact DEQ for more specific details.

**Comment P66. No tributaries are listed for chlorophyll a on 303(d) list.**
**Response:** There are six tributaries listed for chlorophyll a on the most recent (1998) 303(d) list. See Table 39 in the draft TMDL.

**Comment P67. No environmental benefit from TP control in stormwater.**
**Response:** See response to comment P38, above.

**Comment P68. Mean chlorophyll a levels are not affected at background levels of TP.**
**Response:** See response to comment P40, above.

**Comment P69. DEQ should incorporate information from the EQC required February and June 1999 reports.**
**Response:** See response to comment P40, above.

**Comment P70. Should maintain current level of WWTP permits and current levels of BMPS.**
**Response:** See response to comment P1, above.

**Comment P71. Numeric controls on stormwater are virtually impossible to implement due to the extreme variability.**
**Response:** See response to comment P43, above.

**Comment P72. Tributaries should no longer have TMDLs as they do not have pH or DO problems linked to phosphorus.**
**Response:** The primary purpose for including the tributary streams in the phosphorus TMDL is to protect water quality on the mainstem Tualatin River. The tributaries contribute phosphorus loads to the mainstem. This is discussed in more detail within the TMDL.

**Comment P73. Page 131 & 132:**
**Target tributary concentrations for Fanno Creek needs to be equal to or greater than background concentrations—not vice versa.**
**Response:** See response to comment P2, above.

# RESPONSE TO COMMENTS ON THE DRAFT TEMPERATURE TMDL

## Clarification of the TMDL Application of the Temperature Standard

*Several questions are related to the TMDL application of the temperature standard. Below are a clarification of the temperature standard and an explanation of the temperature TMDL methodology.*

Water quality standards are developed to protect the most sensitive beneficial use. The temperature standard is designed to protect cold water fish (salmonids) as the most sensitive beneficial use.

Several numeric and qualitative trigger conditions invoke the temperature standard. Numeric triggers are based on temperatures that protect various salmonid life stages. Qualitative triggers specify conditions that deserve special attention, such as the presence of threatened and endangered cold water species. The exceedence of one or more of the stream temperature triggers will invoke the standard.

Once invoked, the temperature standard specifically states that "*no measurable surface water temperature increase resulting from anthropogenic activities is allowed"* (OAR 340-41-245(2)(b)(A)). A TMDL is to be developed for 303(d) listed waterbodies. For all temperature 303(d) listed waterbodies in the Tualatin River sub-basin the standard specifies a condition of no measurable anthropogenic related temperature increases.

The temperature TMDL is scaled to the Tualatin River sub-basin and includes all surface waters. Since stream temperature results from cumulative interactions between upstream and local sources, the TMDL considers all surface waters that affect the temperatures of 303(d) listed waterbodies. For example, the Tualatin River is 303(d) listed for temperature. To address this listing in the TMDL, the Tualatin River and all major tributaries are included in the TMDL analysis and TMDL targets.

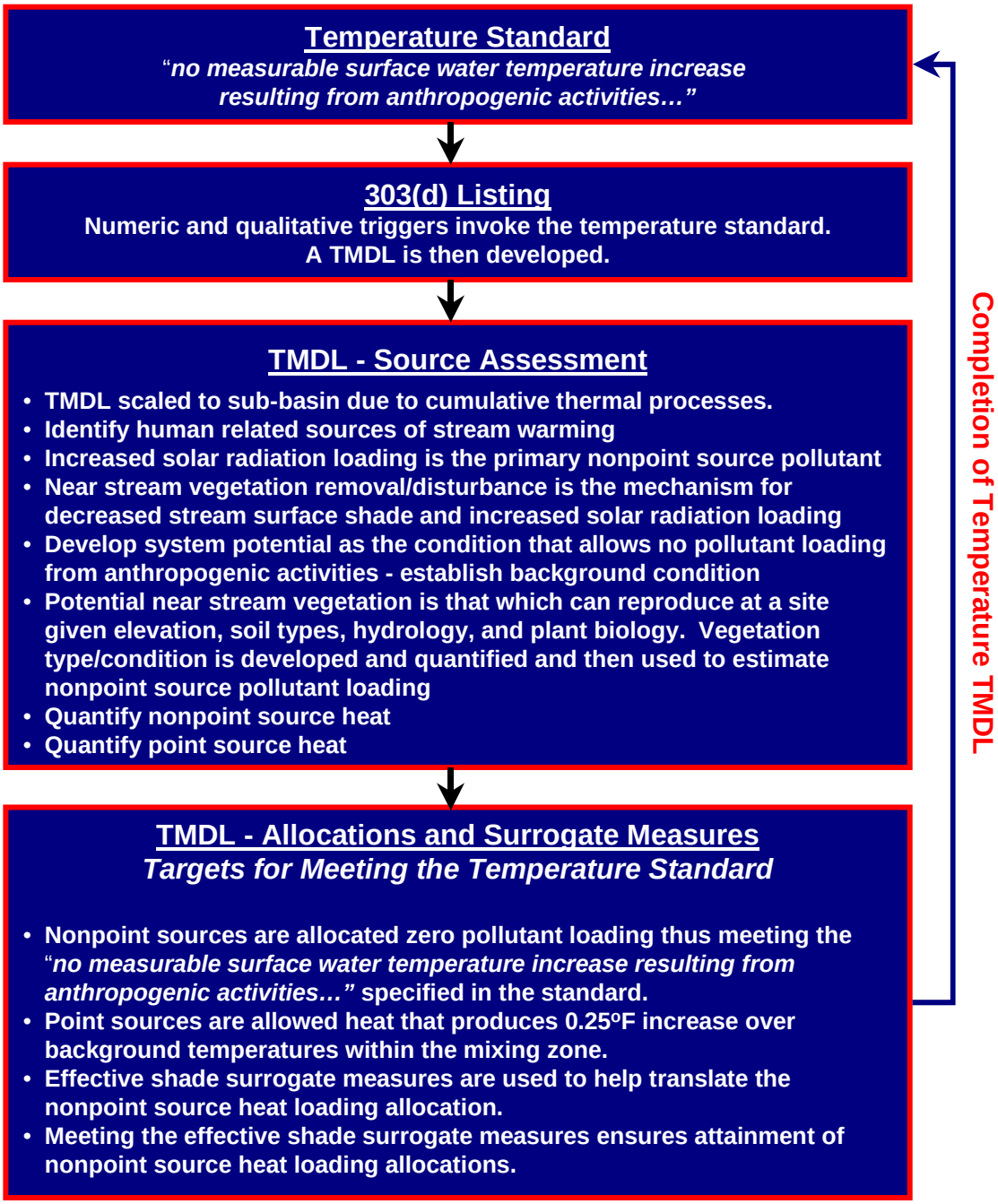
The temperature standard specifies that "*no measurable surface water temperature increase resulting from anthropogenic activities is allowed*". An important step in the TMDL is to examine the anthropogenic contributions to stream heating. The pollutant is heat. The TMDL establishes that the anthropogenic contributions of nonpoint source solar radiation heat loading results from varying levels of decreased stream surface shade throughout the sub-basin. Decreased levels of stream shade are caused by near stream vegetation disturbance/removal. Point source contributions of heat result from warm water discharges into cooler waters.

System potential near stream vegetation conditions were used to calculate effective shade surrogate measures. For clarity, system potential as defined in the TMDL is the near stream vegetation condition that can grow and reproduce on a site given elevation, soil properties, plant biology and hydrologic processes. System potential does not consider management or land use as limiting factors. In essence, system potential is the design condition used for TMDL analysis that meets the temperature standard:

- System potential <u>is</u> an estimate of a condition without anthropogenic activities that disturb/remove near stream vegetation.
- System potential <u>is not</u> an estimate of pre-settlement conditions. Although it is helpful to consider historic vegetation patterns, many areas have been altered to the point that the historic condition is no longer attainable given drastic changes in stream location and hydrology (channel armoring and wetland draining).

The Tualatin River temperature TMDL allocates heat loading. Point and Nonpoint sources are expected to manage for no measurable surface water temperature increase. Allocated conditions are expressed as heat per unit time (kcal per day). The nonpoint source heat allocation is translated to effective shade surrogate measures that linearly translates the nonpoint

source solar radiation allocation. Effective shade surrogate measures provide site-specific targets for land managers. And, attainment of the surrogate measures ensures compliance with the nonpoint source allocations.



General Temperature Comments/Questions

**Comment T1. Why are USA's augmentation flows from Hagg Lake included in the temperature modeling scenario?**

The TMDL temperature model was developed to simulate the summer critical condition (identified in the TMDL as the last week of July). As it happened, USA flow augmentation was occurring during the period for which the model was calibrated. Consequently, the calibrated model is based on the critical temperature period which included USA flow augmentation. System potential for the Tualatin River was determined without USA's flow augmentation.

However, ODEQ has simulated many scenarios for the Tualatin River and tributaries. Some of these scenarios include USA flow augmentation, and others do not. The thermal effects of USA flow augmentation have been quantified and one option for giving credit for this flow is presented in the TMDL in section 4.1.4.3 (Existing Sources - Flow Augmentation).

**Comment T2. The goals of the temperature TMDL, to revert the riparian shading back to pre-anglo settlement, are unrealistic. The temperature TMDL is based on achieving riparian conditions that never existed.**

The riparian shading allocations presented in the TMDL are not pre-anglo settlement conditions. Rather, the allocations are based on riparian species compositions and heights that can be attained given the current information available regarding near stream vegetation. The solar heat loading allocations (and the effective shade surrogate measures) are based on removing anthropogenic disturbances from the near stream area (i.e., logging, development, grazing). As indicated in OAR 340-41-025(3)(a)(D)(i) and (ii), anthropogenic sources are required to develop and implement a surface water temperature management plan which describes the practices which will be used to reverse the warming trend. Sources shall continue to maintain and improve the plans to maintain the cooling trend until the numeric criterion is achieved or until the Department, in consultation with DMAs, has determined that all feasible steps have been taken to meet the criterion and that the beneficial uses are not being adversely impacted. In the latter case, the temperature achieved after all feasible steps have been taken will be the temperature criterion. The determination that all feasible steps have been taken will be based on, but not limited to, a site-specific balance of: protection of beneficial uses; appropriateness to local conditions; use of best treatment technologies or management practices; and cost of compliance.

**Comment T3. Language should be included in the temperature TMDL acknowledging the long time frame necessary to see results due to increased riparian vegetation.**

The time frame for meeting the nonpoint source allocations will be variable. Many areas in the Tualatin River sub-basin are already meeting the solar radiation loading allocations. There are, however, some areas that will require a significant period of time to establish vegetation sufficient to meet shade surrogates and solar radiation loading allocations. Therefore, time estimates are best left to the management plans. OAR 340-41-120(11)(B) recognizes that the development and implementation of control technologies and best management practices or measures to reduce anthropogenic warming is evolving and the achievement of the numeric criteria will be an iterative process.

**Comment T4. Counties do not have authority to require shading (i.e., cannot implement temperature LAs). It is unclear whether DMAs can get legal authority to implement required tree planting on private property.**

Department recognizes that cities and counties would need to enact new regulatory authority to require shading and that this would likely be controversial, time-consuming and potentially expensive. Cities and counties however do have authorities for regulating land use and for protection of riparian areas. Specifically, under Title 3 of the Urban Growth Management Functional Plan, Metro had made recommendations for cities and counties to amend their

comprehensive plans and implementing ordinances to adopt or substantially comply with a Title 3 Model Ordinance. The Model Ordinance includes performance standards to protect and improve water quality to support designated beneficial uses, which include, but are not limited to:

1) Providing a vegetated corridor to separate Protected Water Features from development;
2) Maintaining or reducing stream corridors;
3) Maintaining natural stream corridors;
4) Minimizing erosion, nutrient and pollutant loading into waters;
5) Filtering, infiltration and natural water purification;
6) Stabilizing slopes to prevent landslides contributing to sedimentation of water features;

Efforts such as these will protect existing vegetation and can encourage revegetation and is a good place to start. In addition, cities and counties can be instrumental in working with volunteer organizations and efforts such as Friends or Neighborhood groups, SOLV and other organizations. Efforts such as these can be quite effective in clearing invasive vegetation, planting native vegetation and cleaning up streams. Management plans can be build on these efforts and, if they prove to be ineffective, effort can go into exploring new regulatory authority.

The Department would not expect counties or cites to take on responsibilities that are specified for the Department's of Agriculture or Forestry for regulating forest and agricultural activities.

**Comment T5. The great number of temperature listings are due to the inappropriateness of how the standard is written.**

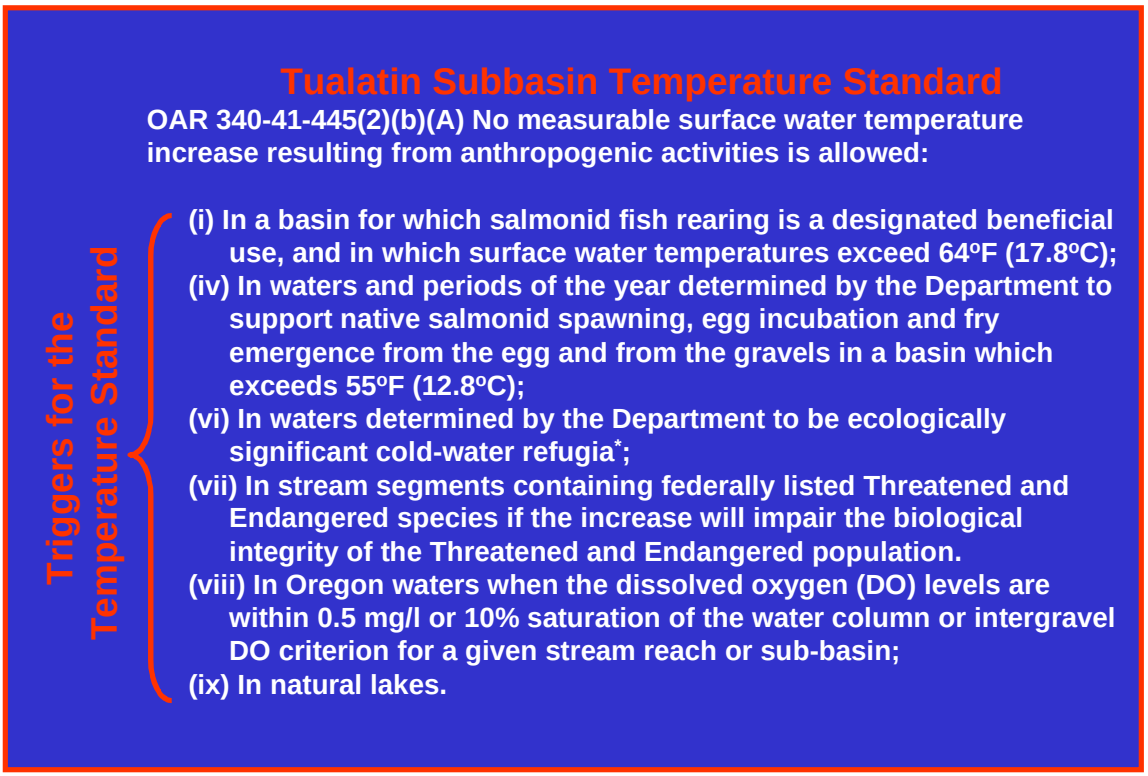
The Department disagrees and believes that the temperature standard and listings are appropriate. The Department went through an extensive public review and comment period before establishing the standard and the latest 303(d) list of water quality limited waterbodies which the Tualatin TMDL is addressing. The listing criteria were set when the temperature standard was developed (OAR 340-41-026(3)(a)(E)) and both the criteria and the list itself were extensively reviewed. EPA approved the list further supporting our position that the temperature listings in the Tualatin are indeed appropriate. The National Marine Fisheries Service (NMFS) has noted in their biological opinions for listing salmonid species in Oregon that measurable increases in stream temperature have impaired the biological integrity of threatened and endangered anadromous fish species in Oregon. Most of these species are not only living near the southern end of their ranges, but are facing widespread anthropogenic warming of their habitats.

**Comment T6. Why are the waste load allocations based on the highest stream temps and lowest flows when they don't necessarily happen at the same time?**

The purpose of establishing a TMDL is to achieve water quality standards and thus protect beneficial uses. The worst-case scenario for the beneficial uses is when we have high stream temperatures and low flows. The allocations are designed to help achieve the temperature standard and protect beneficial uses at all times, including a worst-case scenario of low flows and high temperatures. The formula for the calculation of WLA has been included in the TMDL so that the allowable effluent temperature can be determined under different river and effluent flow and temperature conditions.

**Comment T7. Does DEQ expect point sources to reduce temperatures at times when the temp standard is not violated?**

When one or more of the triggers listed in the temperature standard occur, "no measurable surface water temperature increase resulting from anthropogenic activities is allowed." The Tualatin Subbasin Temperature Standard and triggers are listed below:




The following triggers occur/apply in the Tualatin Subbasin: "i", "iv", "vii" "viii" and "ix". In areas and times when one or more triggers occur, the temperature standard applies to all sources of heat.

The critical period for applying the salmonid rearing trigger "i" is determined to be June through October. The salmonid spawning trigger "iv" is applied at several locations and time periods that are discussed in the TMDL in section 4.1.3.1 Sensitive Beneficial Use Identification. The Threatened and Endangered species trigger "vii" applies in areas where listed species occur (see section 4.1.3.1). The dissolved oxygen trigger "viii" applies to many stream segments within the Tualatin River subbasin (see Dissolved Oxygen section 4.3.2.1 303(d) Listed Stream Segments).

The temperature TMDL, as developed, is intended to apply between June and October when system potential temperatures are exceeded.

**Comment T49. Concerns regarding data used to develop allocations specific to Maxim and Fujitsu: The flow and temperature conditions used do not reflect current conditions.**

The wasteloads given in the draft TMDL were based on reported effluent temperatures and flows, and were given in the form of a percent reduction in effluent temperatures. The Final TMDL allocates wasteloads to Maxim and Fujitsu (and other sources) in the form of allowable heat loads (kcal/day). This modification will allow specific discharges to be based on actual discharge flows and temperatures, and therefore reflect current conditions.

**Comment T9. The Barney Reservoir releases should be examined for impacts.**

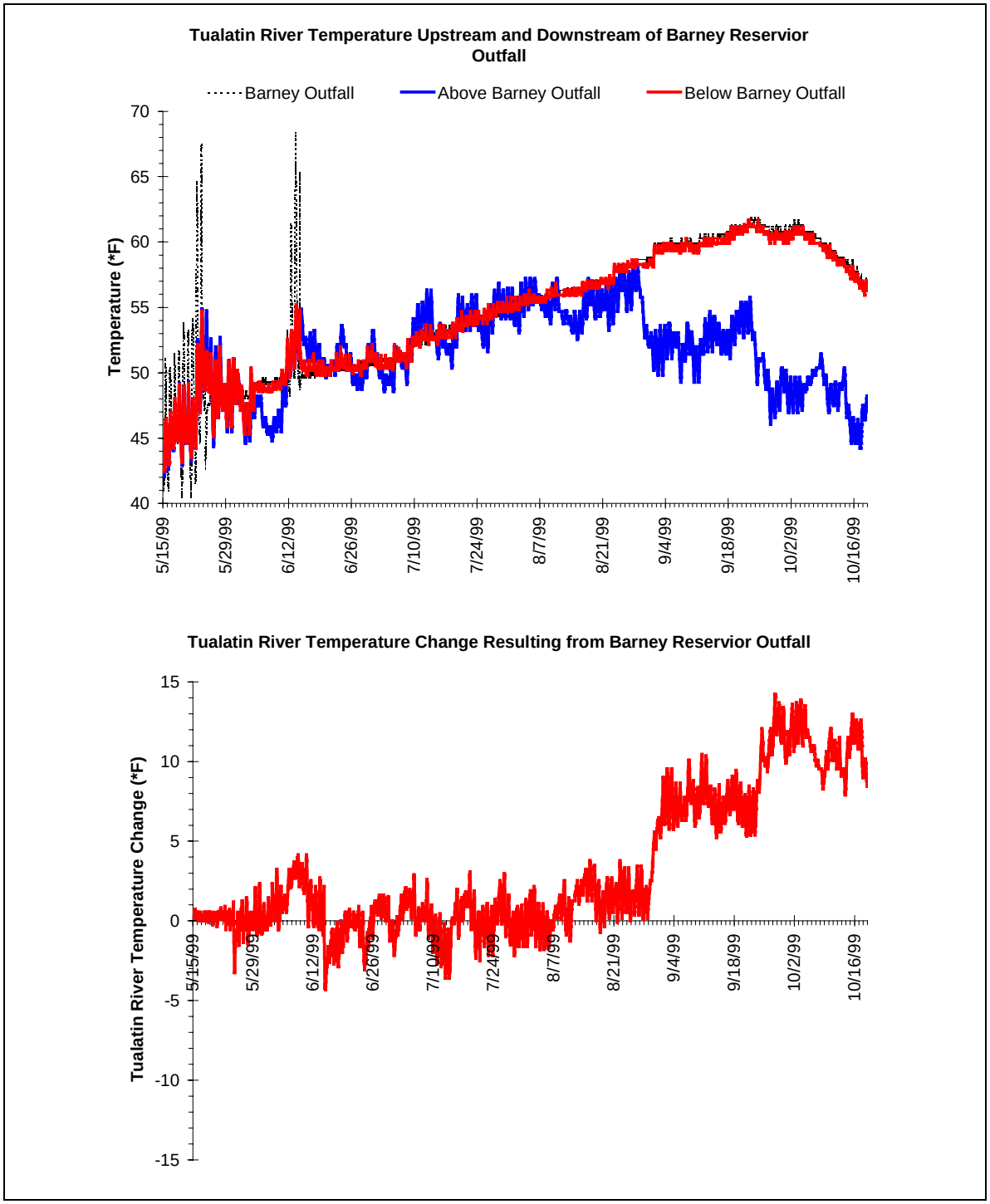
The Barney Reservoir releases flows to the Tualatin River near the headwaters (at river mile 82). Data collected in 1999 demonstrate that the influence of Barney Reservoir releases on the Tualatin River vary throughout the year. Reservoir release thermal impacts are listed below.

| Period | Thermal Impact to the Tualatin River at River Mile 82 |
|---|---|
| May to July | Variable - $\pm 5^{o}$F |

| | |
|---|---|
| August | Warming - $0^{o}$F to $5^{o}$F |
| September to mid-October (end of sampling period) | Warming - $5^{o}$F to $15^{o}$F |

**Data from Washington County Water Master*

Barney Reservoir outfall is the upstream boundary condition of the Tualatin River mainstem temperature model. The temperature and flow effects of the reservoir are accounted for in the period of modeling (last week of July). As can be seen from the graphs below, the modeling period corresponds to a time when thermal effects of Barney Reservoir are at a minimum. The modeling conducted by ODEQ does not capture the seasonal, and often dramatic, thermal effects of Barney Reservoir on the Tualatin River. It is also important to remember that the water diverted from Barney Reservoir is actually impounded in the Trask River drainage. Therefore, thermal effects resulting from Barney reservoir may also be occurring in the Trask River drainage. It is recommended that future monitoring and analysis should focus on Barney Reservoir releases to assess the effect on water quality. The adaptive management aspect of the TMDL and WQMP process are an avenue for updating the TMDL in the future provided such changes are warranted.




**Comment T9A. Regarding Table 8, p. 39 – it appears that the column labeled "loading capacity" should be "wasteload allocation"; system potential should be loading capacity; a flow-based loading should also be presented; allocations should be examined more closely; what is the basis for the ¼ river mix?; mixing zones should be authorized through the NPDES permit, not the TMDL; what is the cumulative impact of allowing 0.25 degree increase for each point source?**

The temperature TMDL was changed as follows:

- **Loading capacity** - heat loading that represents no measurable surface water temperature increase resulting from nonpoint source anthropogenic activities and from point sources.
- **Loading Allocations** - portion of loading capacity heat allocated to nonpoint sources
- **Wasteload Allocations** - portion of loading capacity heat allocated to point sources**.**

Flow based loading was developed under Section 4.1.4 - Existing Sources - CWA *§303(d)(1)* as an inserted subsection 4.1.4.3 Flow Augmentation.

The temperature standard specifies that point sources cannot produce a temperature increase of greater than 0.25$^{o}$F within the mixing zone. The Department used a 25% mix of receiving water as a default for modeling purposes in calculating a potential Waste Load Allocation unless another appropriate portion related to the mixing zone was provided by the permit writer or source. The basis for this comes from Allocated Impact Zones for Areas of Non-Compliance (EPA 823-R-95-003, March 1995). This was developed from a U.S. Department of the Interior[2] recommendation of a zone of passage of 75% percent of the cross-sectional area and/or volume of flow of a stream or estuary to ensure no adverse effects of mixing zones on migration or passive drifting of aquatic species. The design condition for point source is the heat from effluent that produces a 0.25$^{o}$F increase (or less) in the zone of dilution. The equations for calculating the heat load from point sources are provided in the TMDL. A note was added that the allowable effluent temperature were calculated from the equations associated with Table 9 but a maximum allowable discharge temperature will be included in the permit to ensure that incipient lethal temperatures are not exceeded.

**Comment T10. Forestex should have an allocation in Table 9, p. 40.**

Forestex does not discharge during the period of concern for the temperature TMDL and therefore a WLA has not been given.

**Comment T11. The attainment of system potential is not necessary to support beneficial uses and does not correlate with the standard. (see comment #46).**

Please refer to OAR 340-41-445(2)(b)(A) for more details on the Tualatin River Subbasin temperature standard. System potential represents the basis for the “no anthropogenic increase” clause of the Oregon temperature standard.

**Comment T12. The TMDL should point out what type of shade will be required.**

The TMDL has presented potential near stream vegetation species compositions appropriate for the conditions found in the Tualatin River sub-basin. These species compositions are representative of a mature overstory that is likely to produce the potential effective shade surrogate measures.

**Comment T13. The temperature TMDL does not appear to account for all anthropogenic activities.**

The Department feels that the primary sources of anthropogenic heat are accounted for in the temperature TMDL. The temperature modeling effort accounts for current condition hydrology, riparian and atmospheric parameters. In addition, existing point source flow and temperatures were incorporated into the current conditions model calibration. Under the system potential modeling scenarios, all point sources were reduced to their calculated wasteload allocation and

[2] U.S. Department of the Interior. Federal Water Pollution Control Administration. 1968. Water Quality Criteria: Report of the National Technical Advisory Committee to the Secretary of the Interior. Washington, D.C. 234 pg.

nonpoint source solar loading was reduced to an estimated background condition. Predicted system potential temperatures reflect these considerations.

Current reservoir operations were used in the temperature modeling effort. Since it is likely that Barney and Henry Hagg reservoirs will continue to operate in the future, flows from these reservoirs are used in hydrology portion of simulations.

The adaptive management aspect of the Oregon TMDL and WQMP process will allow the TMDL to be updated in the event that Henry Hagg Lake or Barney Reservoir operations (or other flow conditions) change in the future.

**Comment T14. Mixing zones are not appropriate for water quality limited streams.**

For the temperature TMDL the Department believes that the temperature standard allows a point source an increase of 0.25$^{o}$F within a defined zone of dilution. Discussion of point sources (methodology and calculations) can be found in section 4.1.4.2 Point Sources of Pollution.

**Comment T15. The cumulative impact of several ¼ degree increases appears contrary to "no measurable surface water temperature increase…"**

The Oregon temperature standard defines "no measurable" as being equal or less than 0.25 $^{o}$F. The cumulative impact of allocated point source loads is very small, less than 0.4% of the total loading capacity calculated in the TMDL (i.e. less than the model accuracy).

**Comment T16. "It appear that 10 to 12 years of thousands of data points stored in the EPA STORET system, and the United States Geological Service (USGS) models, were only glanced at in the analysis. Instead, a theory is used that the Tualatin Basin should and could return to pre-settlement conditions [it is not clear how they determined what streamside conditions existed at that time] for temperature by 'restoration' of the riparian corridor."**

The Department strongly disagrees with the premise that available data and analytical methods were not used to develop the temperature TMDL. ODEQ used data from municipalities, counties, Oregon Water Resource Department and the United States Geological Service. ODEQ partnered with USA in funding FLIR remote sensing sampling for the entire subbasin. Further, ODEQ and USGS frequently worked together in analytical modeling. Specifically, ODEQ produced shade calculations for USGS modeling scenarios. ODEQ used USGS hydrology data to develop the lower Tualatin River modeling.
ODEQ also disagrees with the statement that "a theory is used that the Tualatin Basin should and could return to pre-settlement conditions." Such a theory is not advanced in the temperature TMDL. Instead, the TMDL develops a rational for decreasing solar loading of streams via streamside vegetation protection and restoration. The TMDL does not target "pre-settlement" conditions, but rather the TMDL targets the characteristics of a mature woody overstory vegetation community that would result when anthropogenic disturbance is removed from near stream areas. See response to #T2 above for further detail.

**Comment T17. "In terms of current assumptions, we disagree that it [is] reasonable to assume pre-human disturbance shade levels of 90 plus percent, and then to combine that with temperature reduction from post-human disturbance addition of cooler water from Barney Reservoir and Hagg Lake."**

The temperature TMDL does not target "pre-human disturbance shade levels of 90 plus percent." System potential near stream vegetation conditions were used to calculate effective shade surrogate measures. For clarity, system potential as defined in the TMDL is the near stream

vegetation condition that can grow and reproduce on a site given elevation, soil properties, plant biology and hydrologic processes. System potential does not consider management or land use as limiting factors. In essence, system potential is the design condition used for TMDL analysis that meets the temperature standard. Effective shade surrogate measures developed in the temperature TMDL range from 50% to 100%.

Current reservoir operations were used in the temperature modeling effort. Since it is likely that the reservoirs will continue to operate in the future, flows from Henry Hagg Lake and Barney Reservoir are used in system potential simulations.

It should also be recognized that a large volume of Hagg Lake Reservoir augmentation is withdrawn from the Tualatin River 4.9 river miles downstream at Springhill Pump Station. Water withdrawals persist in the downstream direction. Further, late season reservoir releases are often warmer than receiving waters and can have significant warming influence. These releases may pose a thermal risk to spawning salmonids.

**Comment T18.** **"A goal of the TMDL is the development of "system potential" and a "riparian vegetation condition without human disturbance" across the riparian landscape. The definition of system potential, however, is inconsistent with what is known about historical conditions in the Tualatin Basin and Pacific Northwest forest in general. Specifically, it does not consider the influential role of natural disturbance and forest succession, and in fact, specifically state disturbance could "interfere or delay the attainment of the TMDL". Given that the TMDL is intended to achieve temperature standards based primarily on what is most beneficial for fish, it is unclear how a TMDL inconsistent with historical conditions can be inconsistent with the recovery of fish that evolved and thrived within those conditions. "**

The temperature TMDL approach used by ODEQ for the Tualatin River Subbasin is a correct application of the temperature standard and will protect beneficial uses, as required by the Clean Water Act. Concerns raised by ODF involve several issues, including questions about the (a) temperature standard, (b) surrogate measures used for nonpoint pollution sources in the temperature TMDL, (c) system potential conditions used to develop surrogate measures, and (d) the consequence of ***natural*** disturbance.

**(a) The Temperature Standard -** Water quality standards are developed to protect the most sensitive beneficial use (salmonid populations). The temperature standard is designed to protect cold water fish (salmonids) as the most sensitive beneficial use.

Several numeric and narrative trigger conditions invoke the temperature standard. Numeric triggers are based on temperatures that protect various salmonid life stages. Narrative triggers specify conditions that deserve special attention, such as the presence of threatened and endangered cold water species. The occurrence of one or more of the stream temperature standard triggers will invoke the standard.

Once invoked, a stream segment is placed on the 303(d) list. A TMDL is to be developed for 303(d) listed waterbodies. The temperature standard specifically states that "***no measurable surface water temperature increase resulting from anthropogenic activities is allowed"*** (OAR 340-41-245(2)(b)(A)). For all temperature 303(d) listed waterbodies in the Tualatin River subbasin the TMDL targets a condition of no allowable anthropogenic related temperature increases.

The temperature TMDL is scaled to the Tualatin River subbasin and includes all surface waters. Since stream temperature results from cumulative interactions between upstream and local sources, the TMDL includes all surface waters that affect the temperatures of 303(d) listed waterbodies. For example, the Tualatin River is 303(d) listed for temperature. To address this

listing in the TMDL, the Tualatin River and all major tributaries are included in the TMDL analysis and TMDL targets.

**(b) Surrogate Measures Used for Nonpoint Sources in the Temperature TMDL -** The temperature standard specifies that "*no measurable surface water temperature increase resulting from anthropogenic activities is allowed*". An important step in the TMDL is to examine the anthropogenic contributions to stream heating. The pollutant is heat. The TMDL establishes that the anthropogenic contributions of nonpoint source solar radiation heat loading results from varying levels of decreased stream surface shade throughout the subbasin. Decreased levels of stream shade are caused by near stream vegetation disturbance/removal.

System potential near stream vegetation conditions were used to calculate effective shade surrogate measures. For clarity, system potential as defined in the TMDL as the near stream vegetation condition that can grow and reproduce on a site given elevation, soil properties, plant biology and hydrologic processes. System potential does not consider management or land use. In essence, system potential is the condition that meets the temperature standard:

- System potential is an estimate of a condition without anthropogenic activities that disturb/remove near stream vegetation.
- System potential is not an estimate of pre-settlement conditions. Although it is helpful to consider historic vegetation patterns, many areas have been altered to the point that the historic condition is no longer attainable given drastic changes in stream location and hydrology (channel armoring and wetland draining).

The Tualatin River subbasin temperature TMDL allocates the solar radiation heat loading that would be expected with the elimination of anthropogenic disturbance. The heat energy allocation is also expressed as an effective shade surrogate measure that linearly translates the nonpoint source solar radiation allocation. Effective shade surrogate measures provide site-specific targets for land managers. Attainment of the surrogate measure ensures compliance with the nonpoint source allocations.

**(c) System Potential conditions used to develop surrogate measures. -** Framing the relevance of system potential is important since it directly links the temperature standard to the surrogate measures and nonpoint source allocations. The questions raised in the ODF comments largely concern system potential conditions described in the Tualatin TMDL. System potential conditions were developed in order to evaluate the resulting energy loads and river temperatures under an estimated condition "***no measurable surface water temperature increase resulting from anthropogenic activities is allowed"***.

It is important to point out that the best available information is used in TMDL development. System potential conditions were based upon published information about vegetation characteristics and current vegetation descriptions developed in several Tualatin River subbasin watershed analysis documents. Utilizing this information, system potential conditions were developed for level IV ecoregions (USEPA) delineation areas within the Tualatin River Subbasin. The term "ecoregion" is generally understood to describe regions of relative homogeneity in ecological systems or in relationships between organisms and their environments (Omernik and Gallant 1986). Ecoregions are delineated on the premise that ecological regions can be identified through the analysis of the patterns and composition of biotic and abiotic components, such as soil composition, vegetation, climate and topography. Areas within a specific ecoregion are likely to share a common set of ecological characteristics with respect to vegetation, climate, topography, etc. The purpose of utilizing ecoregions is to provide a spatial map for research assessment, management, and monitoring of ecosystems and their components.

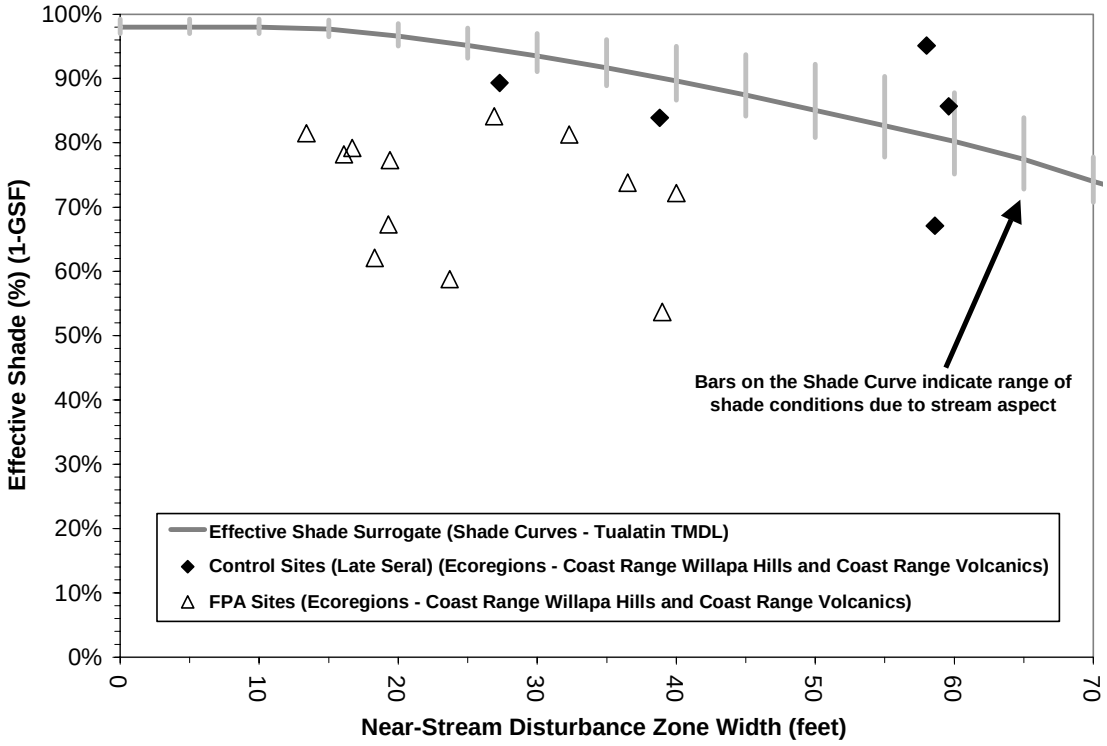
Effective shade targets (e.g., surrogate measures) developed from system potential vegetation and channel morphology can be compared to field measurements collected by the Oregon Department of Forestry (ODF). ODF performed ground level effective shade data collection during the summer of 1999 using hemispherical canopy photography (Fish Eyed Lens) at 17 sites within:

1) the Coast Range Willapa Hills Ecoregion, and
2) the Coast Range Volcanics Ecoregions.

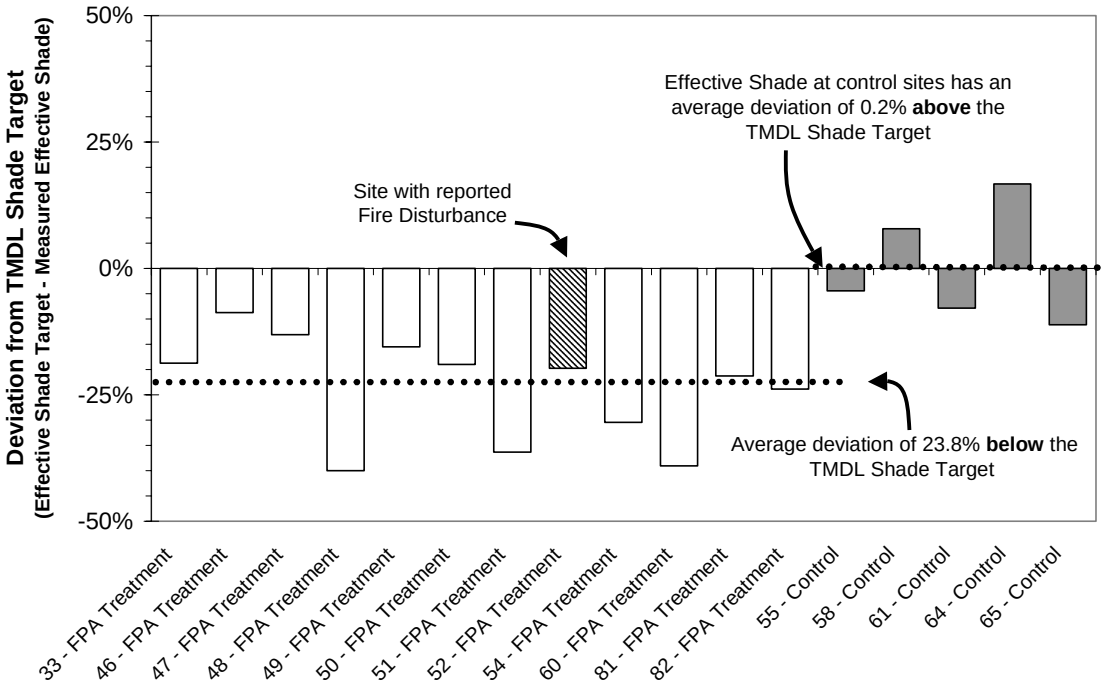
Forested regions of the Tualatin River subbasin are primarily located within these two Ecoregions. Effective shade was measured at stream areas managed under the Forest Practices Act (FPA) rules management, as well as at late seral populations (control sites). These control sites provide a method to evaluate calculated effective shade targets developed from system potential conditions within the Tualatin River subbasin.

Measured effective shade at control sites (i.e., late seral) correspond with effective shade surrogate measures developed for the Tualatin River Subbasin TMDL. **ODF measured effective shade data at control sites have an average deviation of 0.2% from the TMDL effective shade surrogate measures**. The Department interprets the close match between TMDL shade targets and ground level measurements at control sites as an indication that TMDL targets are accurate (see figures below).

Tualatin River Subbasin TMDL Effective Shade Surrogate Measures (DEQ Data) and Measured Effective Shade Data (ODF Data, 1999)

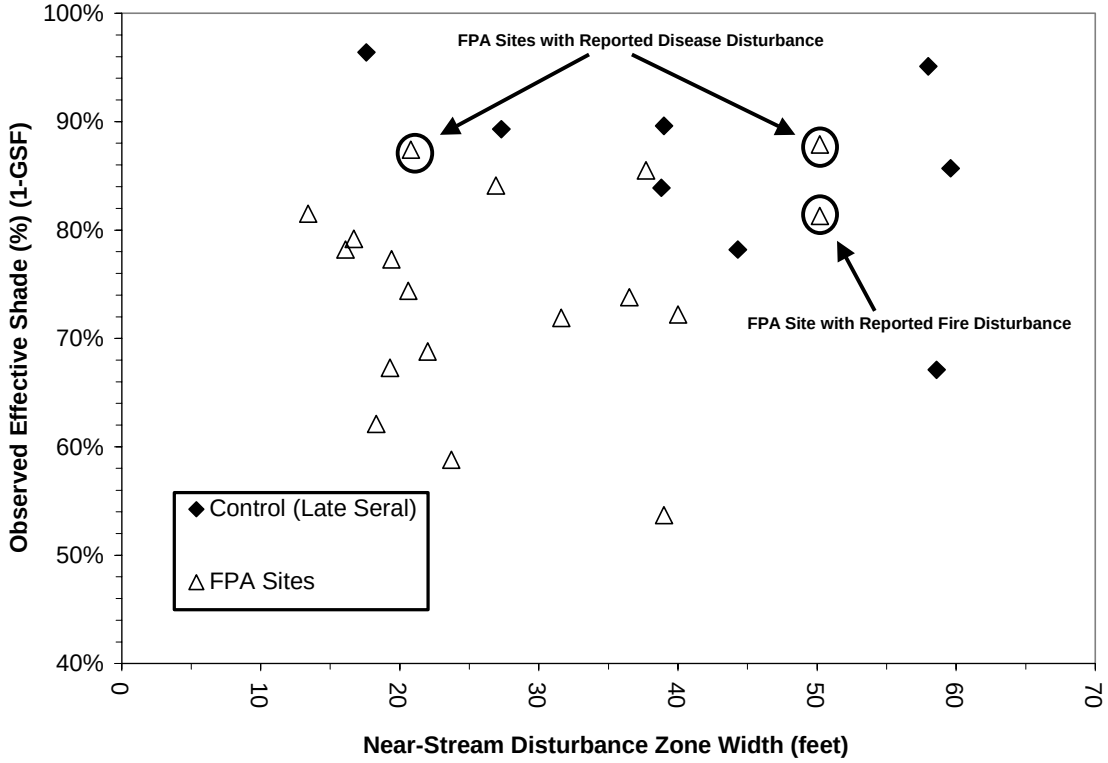


Deviation of Measured Effective Shade Data (ODF Data, 1999) from Tualatin River Subbasin TMDL Effective Shade Surrogate Measures (DEQ Data)




**(d) Consequences of *natural* disturbance on the application of the temperature standard** - It can be expected that natural disturbance (i.e. floods, fires, windstorms, insect outbreaks, and diseases) will periodically occur in the Tualatin River subbasin and it is possible that effective shade could be impacted by these natural disturbances. However, such conditions are considered as natural processes and therefore would not be considered as an anthropogenic pollutant. Similarly, natural forest succession within the riparian zone is not an anthropogenic pollutant.

It is important to point out that despite natural disturbance, high shade levels measured by ODF in the Coast Georegion were observed at sites with a reported (ODF Shade Study 1999). It is reasonable to assume that natural disturbances may have a variable effect on effective shade. ODF data demonstrate that at sites with natural disturbance, conditions (two sites with diseased stands and one with fire damage) may not necessarily result in dramatically lower shade conditions (figure below).




**Comment T19. "Is the "potential mature vegetation" density of 90% inferred from field data or selected arbitrarily, also what is the sensitivity of the temperature modeling to changes in this value. "**

Estimated potential riparian vegetation density for the TMDL is defined as the percent area of ground surface visible on aerial photographs or the percent open sky measured by a densiometer within stream-side vegetated areas. The TMDL targets a 90% canopy density potential value based on professional judgement and extrapolated from:

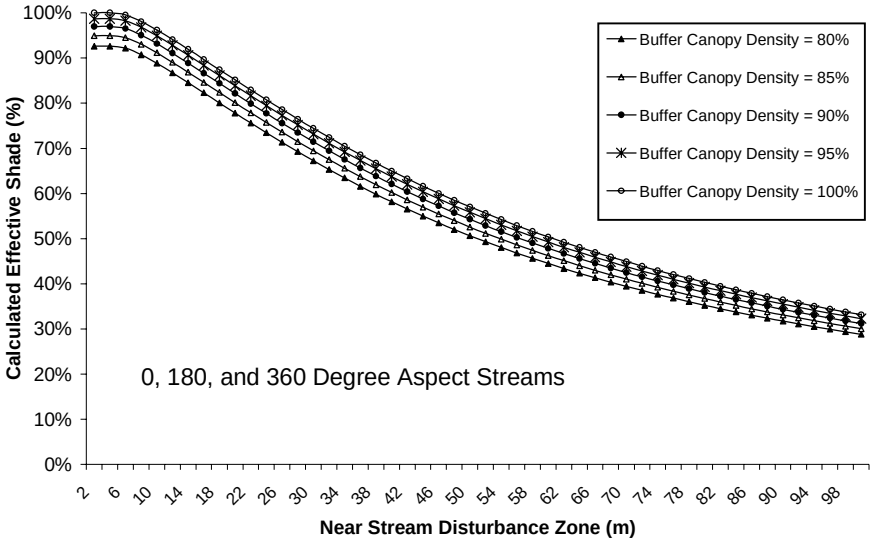
1) field measurements,
2) Tualatin River subbasin aerial photography interpretation of mature stands;
3) Satellite-based interpretation (canopy density for existing stands) reported by BLM (WODIP) for the upper subbasin, and
4) Knowledge of typical measured values, (e.g., cottonwood galleries are normally 100 percent, pine forests 70-90 percent, etc.).

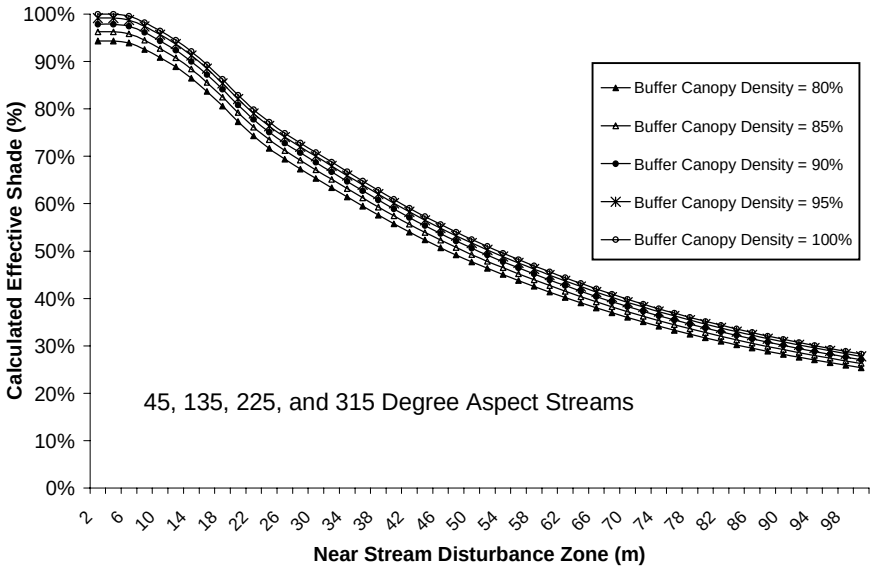
An overall average value was assumed due to the characteristic variability and complexity of riparian density and the inherent difficulty in extrapolation into the future. Effective shade estimates are not highly sensitive to shade density.

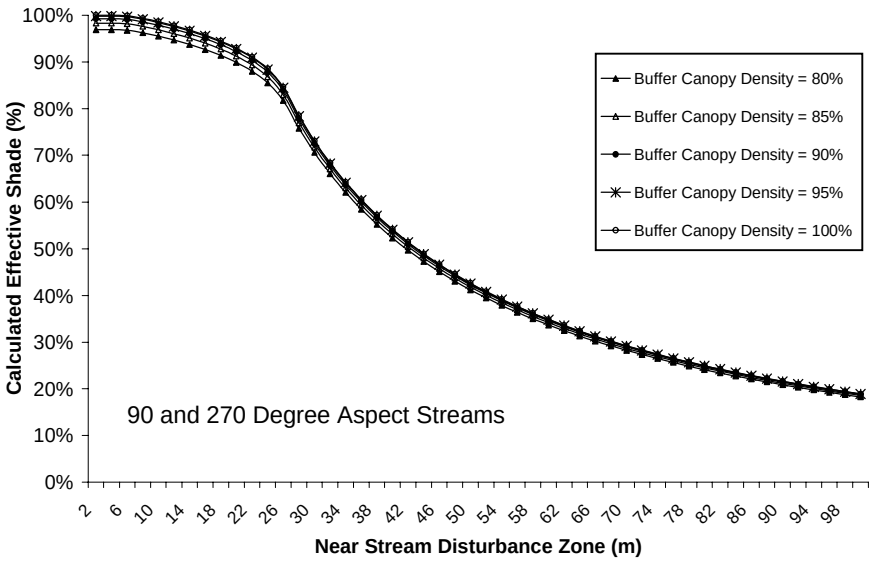
The charts below illustrate the sensitivity of effective shade calculations to buffer canopy density conditions (termed vegetation density within the TMDL) within the Tualatin River subbasin. As can be seen, effective shade levels have little sensitivity to vegetation density when values are between 80% to 100%.

Data used in the sensitivity analysis were: tree height = 110', overhang = 5', elevation = 328', date of simulation is 7/27/99.

Effective Shade Sensitivity to Vegetation Density (ODEQ Simulations)

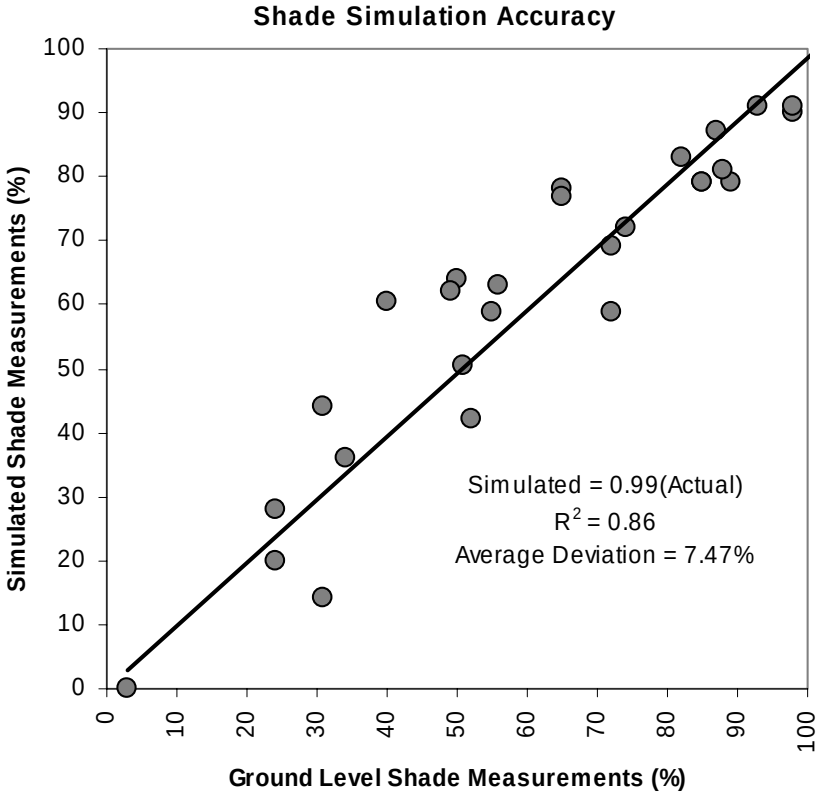


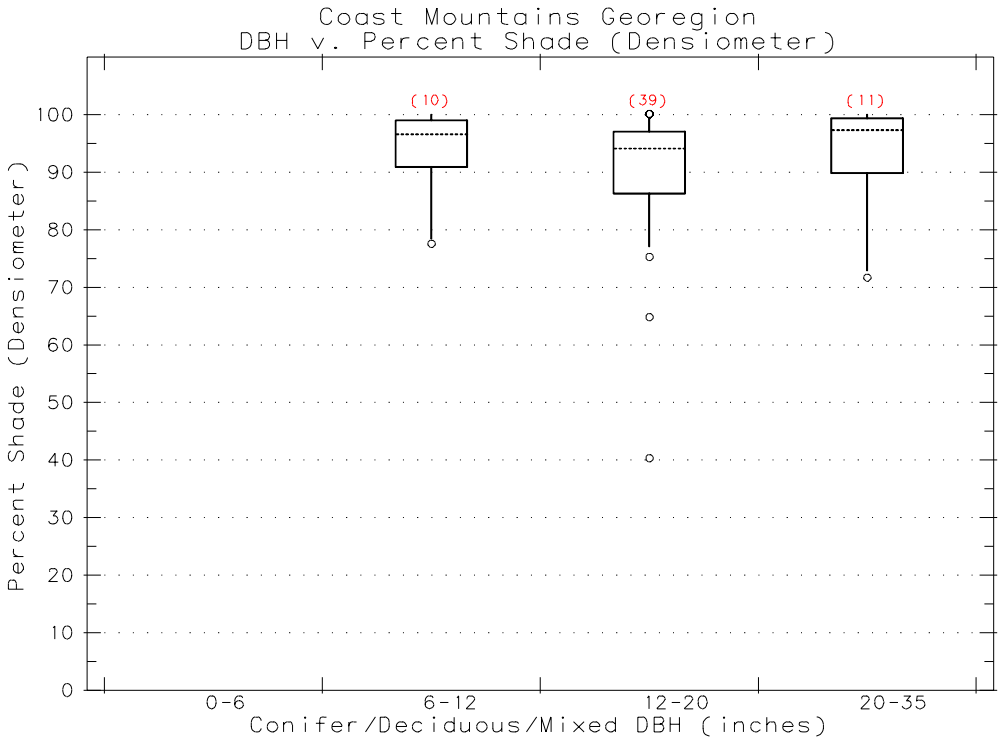
**Comment T20. "It would add significantly more credibility to the process if ground-based data were presented to evaluate the validity of the "shade calculator", especially in light of the fact that the predicted relationship between shade and stand age is inconsistent with the relationship observed in the ODFW stream surveys (see ODF comments to DEQ on the UGR TMDL, 3/13/00)."**

As part of this TMDL data collection effort, effective shade was measured at numerous locations throughout the subbasin. A close correlation between observed shade conditions and simulated shade conditions exists ($R^2 = 0.86$). Ground level effective shade measurements are an average of several "point" measurements with a sampling rate of approximately 100 feet. The department considers the methodology and results credible, given the accuracy of the of effective shade simulations.




ODF asserts that the stand age and effective shade can be inversely related. ODF uses tree diameter breast height (dbh) as a surrogate for stand age. An Oregon State University document prepared for ODF (Cumulative Effects of Forest Practices in Oregon: Literature and Synthesis 1995) states that the angular canopy density (%) is proportional to stand age (Figure 7.22, page 61).

To evaluate this relationship ODEQ summarized ODF data collected with the intent of quantifying the relationship between stand characteristics and stream surface shade (1999 ODF Shade Study). Data from this effort does not support the assumption that increased stand age (assuming dbh is a surrogate to stand age) correlates to lower shade levels. Tree diameter and effective shade data presented in the figure below indicate that shade levels remain statistically unchanged as a function of tree size (ranging 6 to 36 inches).




**Comment T21. "Given that the achievement of "system potential" as defined in the this TMDL will result in neither maximum shade nor a condition that emulates pre-European settlement, how does the achievement of the TMDL protect and restore the fish populations that water quality standards are designed to address?"**

The Tualatin River Subbasin TMDL is not designed to emulate pre-European settlement conditions. The TMDL does not target the "maximum shade." The TMDL simply estimates near stream vegetation types and characteristics that are expected to be present in the absence of anthropogenic disturbance. Instead of selecting vegetation types based on the ability to shade a stream, the TMDL selects vegetation types that are appropriate to the ecoregions in the Tualatin Subbasin.

The Tualatin River Subbasin temperature TMDL is designed to eliminate heating due to anthropogenic activities and is consistent with the temperature standard. By targeting the temperature standard, beneficial uses are protected (i.e. standards are designed to protect sensitive beneficial uses). The Department believes that the application of the temperature standard within the Tualatin River subbasin will protect and restore the fish populations (i.e., sensitive beneficial uses).

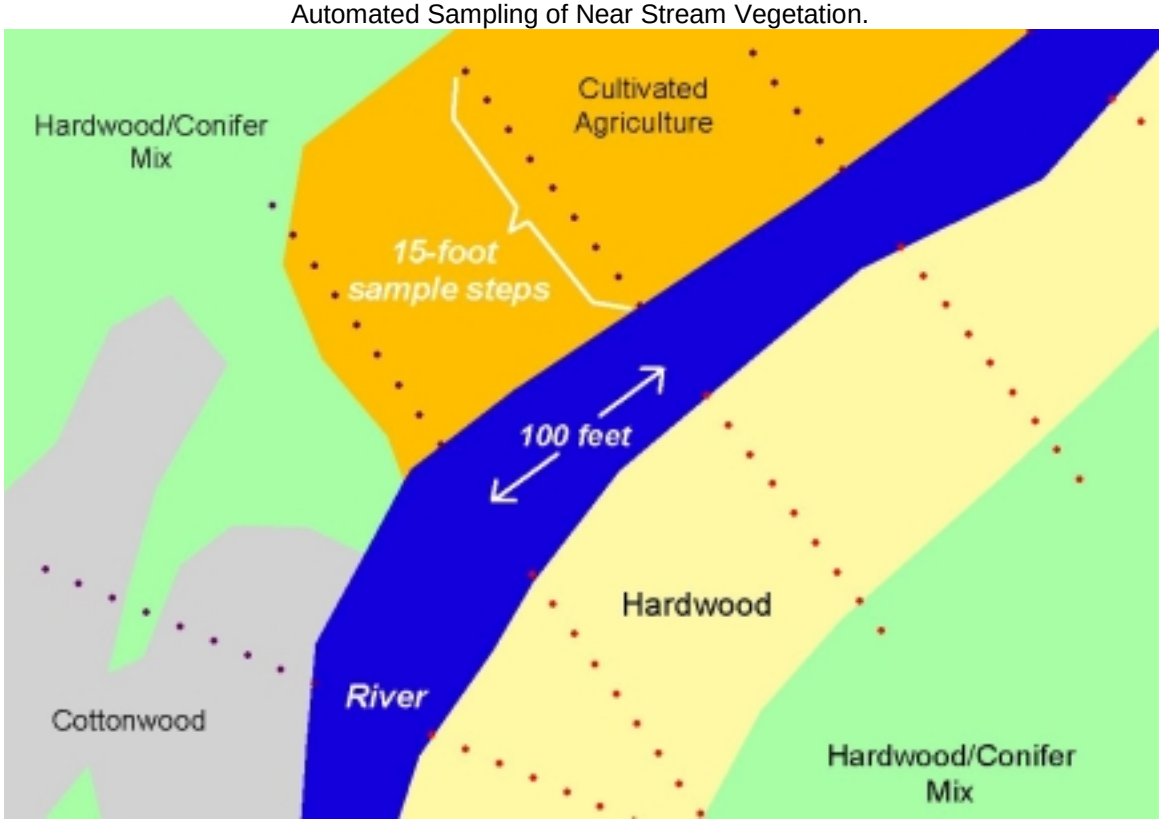
It should be noted that the TMDL does not prohibit the management for "maximum shade." Individuals and land managers can choose to exceed effective shade surrogate measures.

**Comment T22. "The model essentially looks at the riparian forest as a 100x110x1000-foot 'black box' with a an assumed density of 90% that remains unchanged over time and calculates the resulting shade over the stream"**

Riparian data developed for estimating near stream vegetation develops riparian segments 100 feet long and 135 feet wide for each stream bank. Vegetation was sampled at a hundred-foot interval for over 186.2 stream miles within the Tualatin River subbasin. At each sampling node riparian conditions were sampled at nine 15-foot intervals perpendicular to the stream's aspect (figure below). This corresponds to over 2,654,467 discrete riparian samples, each with

corresponding attributes: vegetation identification code, height and vegetation density. Near stream vegetation sampling covered 6,098 acres within the Tualatin River subbasin, and resulted in 42.5 MB of data. This level of riparian analysis is unprecedented at a 4th field watershed scale.

Automated Sampling of Near Stream Vegetation.

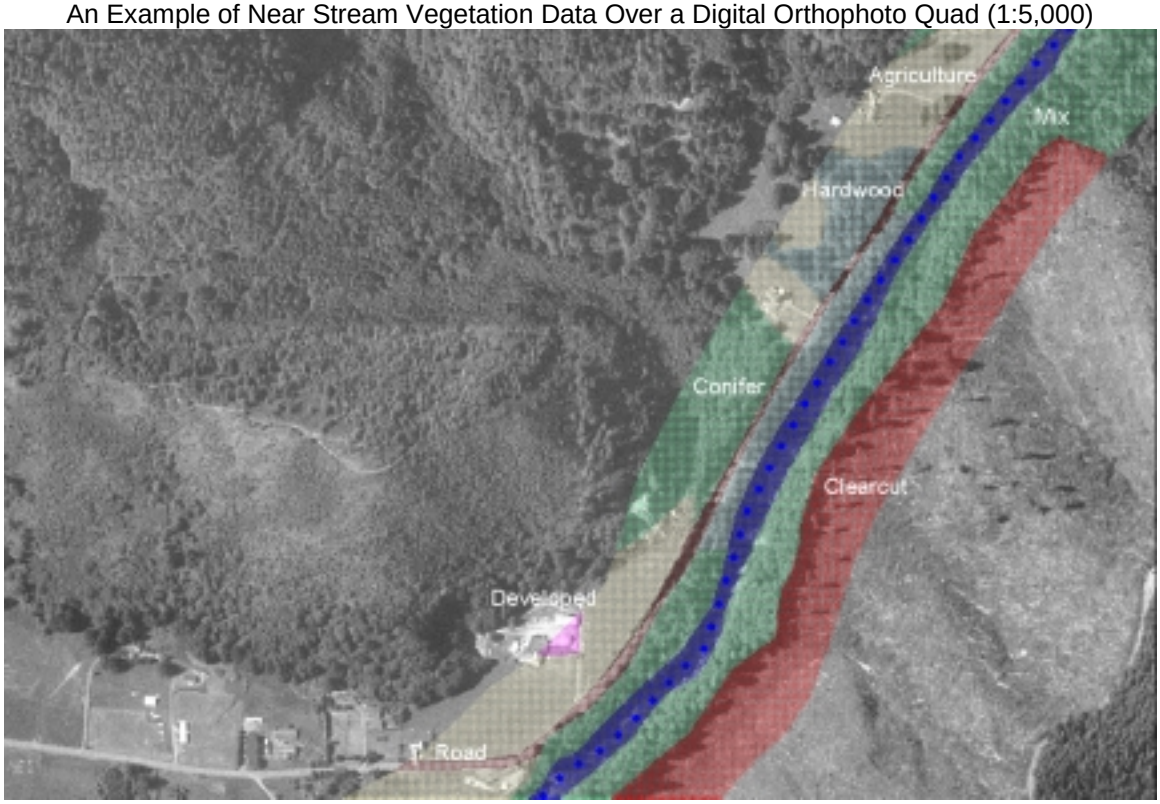



**Comment T23. "What kind of 'check' on the satellite data was done in classifying riparian vegetation? Were a few random images selected and assessed qualitatively? Was there a systematic assessment with a quantitative comparison of satellite data to digital orthoquads? Given the limitations of WODIP satellite vegetation coverage in classifying riparian vegetation, the Tualatin TMDL would be significantly strengthened if this methodology was clearly described. "**

Small-scale heterogeneity within the spatial data sets for the Tualatin River subbasin were addressed through GIS line work and field data verification described below:

- Stream (thalwags) and the banks were digitized at a 1:5000 scale using DOQs in ArcView.
- A WODIP vegetation polygon layer was developed for 300 feet perpendicular from each bank. These data were corrected at a scale of less than 1:5000 using DOQs in ArcView to increase the resolution and to add features not captured by the WODIP data source (i.e., roads, harvest, buildings, etc).
- WODIP attributes were utilized in areas where line work described above was not developed, which was less than 10 percent of sampled river miles in the Tualatin River subbasin.
- Ground-level riparian data (i.e., species composition, stand density, and stand height) was collected at over 70 sites throughout the subbasin and was used to assign attributes to the digitized riparian vegetation layer.
- Simulated effective shade measurements using the resulting vegetation data layer match closely with measured shade conditions within the subbasin (see figure above).

An Example of Near Stream Vegetation Data Over a Digital Orthophoto Quad (1:5,000)




**Comment T24. The document would be strengthened significantly if, at a minimum, it were clearly articulated as to how possible effects from the modification of channel widths and stream flows were considered." "How, specifically, are these two factors being considered in the Tualatin TMDL in terms of surrogate measure's designed to meet the heat load capacity targets?**

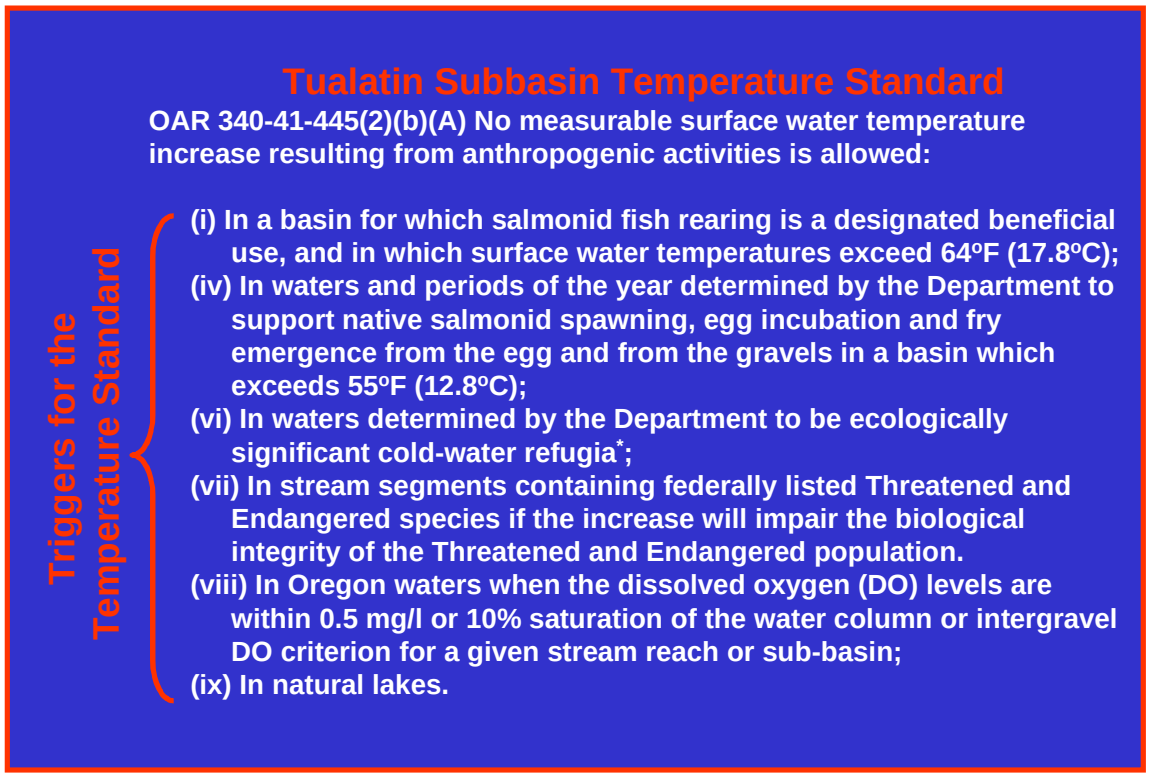
The temperature TMDL does not provide targets for channel width or instream flow volumes. Channel width and stream flows are not primary sources of stream heating. Direct beam solar radiation heating is a primary source of stream heating in the Tualatin River Subbasin. Current channel widths and instream flows were utilized in the modeling. The effects of stream flow augmentation were considered in the TMDL (see section 4.1.4.3 Flow Augmentation).

**Comment T25. "The department recommends an alternative approach to the methodology presented in the temperature TMDL. The definition of "system potential" should be modified to be consistent with what is know about historical conditions in the Tualatin basin in terms of forest succession and disturbance cycles. The shade targets should be representative of a distribution of shade conditions across the basin that emulates those conditions that persisted prior to European settlement. Given the role of disturbance, this would result in highly variable shade conditions, both spatially and temporally, where a certain percentage of the riparian landscape will experience low, moderate, and high shade levels at any given time. "**

This comment is a summary of ODF comments listed above. Issues raised in this comment are addressed in the responses to previous comments.

**Comment T26. "Among the scientific community as well as the management agencies and the public, much confusion exists regarding ODEQ's interpretation**

**of Oregon's water temperature standard. In the case of the Tualatin River Basin, ODEQ states that because water temperatures exceed 64°F at any one location within the basin, the standard allows no measurable surface water increases resulting from anthropogenic activities."**




Water quality standards are developed to protect the most sensitive beneficial use (salmonid populations). The temperature standard is designed to protect cold water fish (salmonids) as the most sensitive beneficial use. Several numeric and narrative trigger conditions invoke the temperature standard. Numeric triggers "i" through "iv" are based temperatures that protect various salmonid life stages. Narrative triggers specify conditions that deserve special attention, such as the presence of threatened and endangered cold water species. **For clarity, the occurrence of one or more of the stream temperature triggers will invoke the standard. The 64°F numeric criterion is just one of many triggers for the temperature standard.**

Once invoked, the temperature standard specifically states that "*no measurable surface water temperature increase resulting from anthropogenic activities is allowed*" (OAR 340-41-445(2)(b)(A)). A TMDL is to be developed for 303(d) listed waterbodies. For all temperature 303(d) listed waterbodies in the Tualatin River sub-basin the standard specifies a condition of no allowable anthropogenic related temperature increases.

The following triggers occur/apply in the Tualatin Subbasin: "i", "iv", "vii" and "viii". In areas and times when one or more triggers occur, the temperature standard applies to all sources of heat.

The critical period for applying the salmonid rearing trigger "i" is determined to be June through October (139.7 miles of perennial streams within the Tualatin River subbasin have daily maximum temperatures over the 64°F numeric trigger). The salmonid spawning trigger "iv" is applied at several locations and time periods that are discussed in the TMDL in section 4.1.3.1 Sensitive Beneficial Use Identification. The Threatened and Endangered species trigger "vii" applies in areas where listed species occur (see section 4.1.3.1). The dissolved oxygen trigger "viii" applies to many stream segments within the Tualatin River subbasin (see Dissolved Oxygen section 4.3.2.1 303(d) Listed Stream Segments).

A subbasin scale temperature analysis is justified because:

- Large portions of the surface waters do not meet the numeric and/or narrative temperature standard triggers, and
- Temperature is the result of cumulative and local thermal and hydrologic processes.

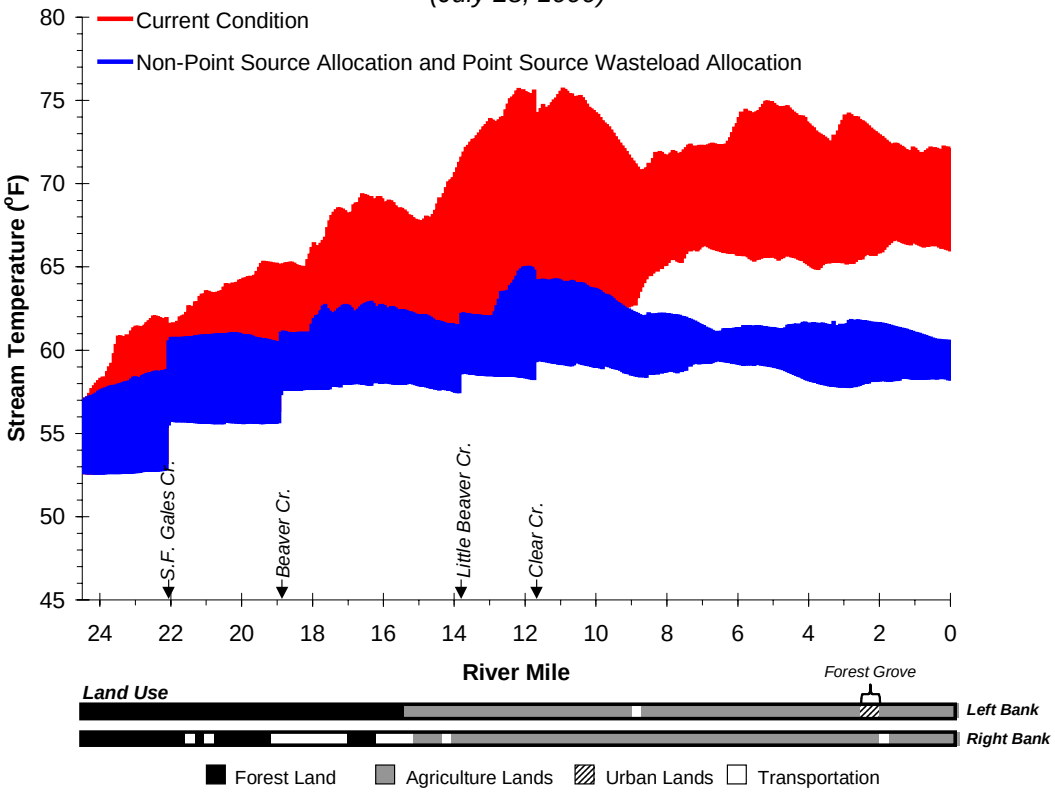
The TMDL analysis demonstrates that when anthropogenic sources of heat are removed that the Tualatin River still does not meet the numeric criteria listed in the temperature standard. Other numeric triggers may also apply. Hence, no measurable surface water increases are allowed because triggers for the standard apply.

**Comment T27.** **"In the case of the Tualatin River [Sub]Basin, a small anthropogenic increase in water temperature on Gales Creek may influence water temperature downstream for no more than a few miles, and certainly will have no effect on the water temperature in the reservoir reach of the Tualatin River, at least 25 to 50 or more miles downstream. This is true because the stream will reach a thermal equilibrium with its local environment before joining with and influencing the temperature of the mainstem river."**

Gales Creek current condition temperatures experience maximum daily summertime temperatures greater than 64°F for nearly 19 miles of its 26-mile length (roughly 73% of the perennial length). In fact, summertime daily temperature can exceed 75°F. In the current condition, anthropogenic sources of heat increase daily maximum stream temperature by roughly 12°F above the background condition.

In the allocated system potential condition, Gales Creek daily maximum stream temperatures are reduced, yet the 64°F criterion is exceeded in one localized area. Further, Gales Creek is listed for dissolve oxygen violations from the mouth to Clear Cr. Thus, the temperature standard does not allow anthropogenic heating since one or more of the triggers for the standard apply.

Gales Creek Diurnal Temperatures - Current Conditions and Allocated Condition
*(July 28, 1999)*



It is important, when asking whether an anthropogenic increase in the temperature of Gales Creek will induce an increase in the mainstem of the Tualatin River, to consider the biological value of the cold water biota that inhabit Gales Creek. Aquatic species reside in Gales Creek. The habitat value of Gales Creek is not solely to provide water of a specific temperature to the mainstem. It is to support the thermal needs of beneficial uses that inhabit Gales Creek and to prevent heating of the mainstem in excess of potential background temperatures.

The temperature standard is not solely concerned with mainstem river reaches. Instead, the temperature standard takes a "basin" approach. The meaning of the term "basin" is a reference that considers stream networks as they exist: interconnected both thermally and hydrologically. The Tualatin River 4$^{th}$ field hydrologic unit is the scale at which the TMDL is designed. The surface waters contained in the Tualatin River Subbasin experience local thermal loading, upstream transport of heat and heat from mixed tributaries and subsurface sources. The waters contained in the Tualatin River Subbasin are interconnected. Recent advances in temperature modeling that draw from spatial data sources and simulate at a network scale have started to reveal that the level of interconnectedness and complexity of local and downstream thermal responses is significant. Many generalizations about expected responses are proving to be either false or overly simple.

The equilibrium temperature hypothesis postulates that stream temperatures will converge toward and stabilize at a specific temperature given the thermal environment and stream hydrology. This hypothesis is an example of oversimplification of stream thermodynamics. While the logic employed in creating the stream equilibrium temperature hypothesis is scientifically valid, it is important to note that data collected in the Tualatin River Subbasin do not confirm the hypothesis.

Stream temperatures rarely converge to a common temperature and remain constant. Of the streams sampled with FLIR in the summer of 1999, data indicate that equilibrium temperatures do not develop and persist. Instead stream temperatures are dynamic and variable. Thermal and hydrologic processes are variable, often dramatically, in both time and space. Stream temperatures indicate this variability. Spatial variability is primarily caused by longitudinal changes in riparian conditions, topography, channel morphology, microclimates (air temperature, relative humidity and wind speeds) and mixing (tributaries, reservoir releases and subsurface waters). Equilibrium temperatures seldom are allowed to develop because the thermal conditions and stream hydrology do not exist as an equilibrium condition over time or space. The level of variability may be dampened as stream flow increases, however. Provided that equilibrium temperatures are not observed in data or analysis, generalizations based on equilibrium theory are not advised.

It is always difficult to speak in nebulous terms such as a "small" anthropogenic increase. Depending on the amount of heat delivered to Gales Creek and the location of the increase along Gales Creek the temperature response will vary. Whether temperatures will return to background will depend on the level of heating, heat from upstream sources and the local and downstream thermal environment. For example, removing vegetation in the upper 1/4 mile of Gales Creek will cause a temperature increase that persists for over 12 miles in Gales Creek (temperature simulation, ODEQ). Such an increase is not allowed under Oregon's stream temperature standard.

**Comment T28.** **"The insistence that no measurable anthropogenic increase in water temperature be allowed is also inconsistent with the definition of a TMDL loading capacity. A TMDL loading capacity is defined as the maximum quantity of a pollutant that the stream can carry without causing violations of water quality-standards. According to ODEQ's interpretation of the water temperature standard, no anthropogenic increases in water temperature are allowed, anywhere in the basin and the loading capacity that is attributed to anthropogenic sources is zero. According to the TMDL definition of a loading capacity, anthropogenic influences to water temperature would be allowed, as long as they caused no violations of the water temperature standard."**

The Department disagrees that "the insistence that no measurable anthropogenic increase in water temperature be allowed is also inconsistent with the definition of a TMDL loading capacity." The water quality standard specifies a **loading capacity** based on the condition that meets the **no measurable surface water temperature increase resulting from anthropogenic activities.** This loading condition is developed as the sum of nonpoint source background solar radiation heat loading and the allowable point source heat load.

The loading capacity provides a reference for calculating the amount of pollutant reduction needed to bring water into compliance with standards. EPA's current regulation 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 water quality standard states that **no measurable surface water temperature increase resulting from anthropogenic activities** is allowed in the Tualatin River and tributaries (OAR 340-41-445(2)(b)(A)).
- The pollutants are solar radiation heat loading (nonpoint sources) and heat loading from warm water discharge (point sources).
- Loading capacities in the Tualatin River Subbasin are the sum of (1) background solar radiation heat loading profiles for the mainstem Tualatin River and all major tributaries (expressed as kcal per day) based on potential near stream vegetation characteristics without anthropogenic disturbance and (2) allowable heat loads for NPDES permitted point sources based on the $0.25^{o}$F allowable temperature increase in the zone of mixing.
- The calculations used to determine the loading capacity are presented in section **4.1.4 Existing Sources - CWA §303(d)(1)**
- **Appendix A** describes the modeling results that lead to the development of system potential river temperatures.

The Department agrees that "according to the TMDL definition of a loading capacity, anthropogenic influences to water temperature would be allowed, as long as they caused no violations of the water temperature standard." However, the Tualatin River Subbasin experiences widespread violations of numeric temperature standard triggers. Threatened and endangered cold water species listings also trigger the temperature standard. Dissolved oxygen violations also trigger the temperature standard.

The temperature standard has been invoked for these reasons and will continue to be applied to the Tualatin River Subbasin as long as one or more of the triggers are violated and/or apply.

For clarity, the **loading capacity** is based on meeting the temperature standard and represents a heat loading condition of **no measurable surface water temperature increase resulting from anthropogenic activities.**

**Comment T29. A-78 states that the lower river was not modeled by DEQ.**

This was a typographic mistake that has been corrected.

**Comment T30. Widths graphed in figure A-41 do not always correlate with USGS cross-sectional data.**

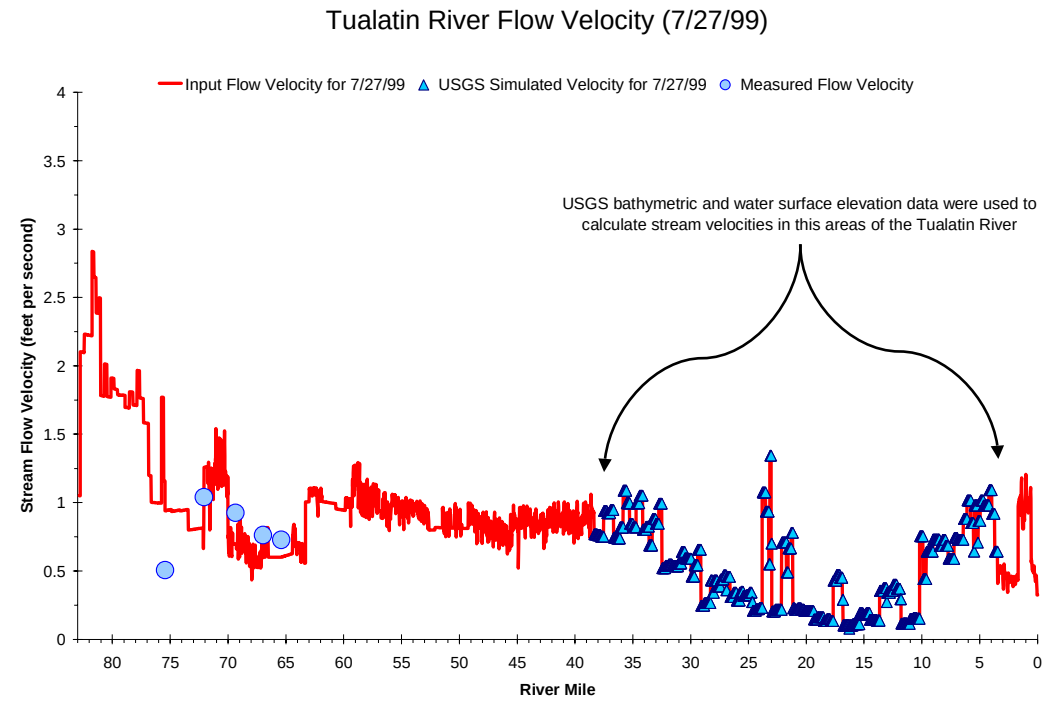
Channel widths were digitized from digital othrophoto quads with a 1-meter pixel resolution at a 1:5,000 resolution. There may be a level of error introduced in the digitizing process. These channel widths were then sampled using a ODEQ GIS tool. No inaccuracy is introduced during the sampling process. ODEQ cannot explain some of the differences observed between ODEQ and USGS channel width data.

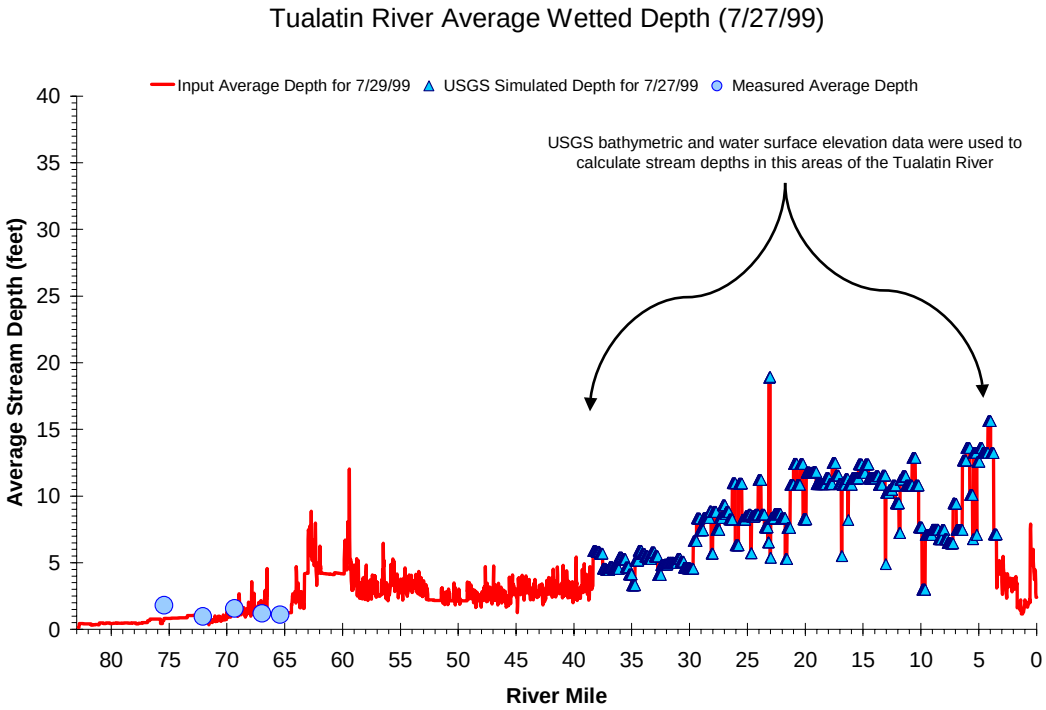
**Comment T31. The velocities and mean depths used in the temperature model for the reservoir reach are not accurate.**

The Department has made the following changes to the temperature model.

- USGS stream bathymetry and water surface elevation data developed for the period of simulation were used to calculate hydraulic parameters.
- Parameters affected are maximum stream depth, average stream depth, and hydraulic radius. USGS derived mannings n values were used to solve mannings equation for stream velocity.

Below are the resulting average stream depth and stream velocity values used in the temperature model.




**Comment T32. Concerns regarding the accuracy of the simulated velocities and depths on the tribs.**

Simulated and measured average cross-sectional velocities and depths are presented in the TMDL Appendix A. Calibrations were made by adjusting mannings n. The Department feels that the input flow velocity and depth values are accurate.

**Comment T33. USGS model for the lower mainstem is available.**

Hydraulic data derived from the USGS model were used in the temperature model.

**Comment T34. Other (better?) calibration data is available for the lower mainstem.**

The temperature TMDL analysis used five continuous temperature data sets collected in the lower Tualatin River at the following sites:

- Tualatin River - Rood Road Bridge - River Mile 39.0
- Tualatin River - Farmington Road Bridge - River Mile 33.4
- Tualatin River - Elsner Bridge - River Mile 16.2
- Tualatin River - Oswego Canal - River Mile 6.7
- Tualatin River - West Linn - River Mile 1.7

The Department believes that data from these sites, along with the FLIR data, were representative of the river and appropriate to use in the calibration of the model.

**Comment T35. Question regarding the use of 7Q10 flows which do not correlate with system potential temperatures. Also, 7Q10 for Durham WWTP was based on West Linn Gage, which does not include Lake Oswego flows.**

7Q10 flows were used to estimate low flow conditions for point source calculations. 7Q10 flows were calculated using gage data collected since 1990 (water calendar year).

**Comment T36. Figure A-36 includes incorrect data (was this data used as model input)**

The graph contained a label mistake that was corrected.

**Comment T37. Question regarding 55 degree criterion (a misunderstanding of our criterion)**

Refer to standard discussion - Question #27

**Comment T38. DEQ should follow the OAR and require the development of a temperature management plan for the Tualatin River rather than establishing a TMDL.**

DEQ disagrees that a temperature TMDL is not required. It is clear under federal definitions that heat is considered a pollutant and would require a TMDL. There is nothing inconsistent with how Oregon rules read in that a management plan would be required to implement control measures in order to meet allocations in the temperature TMDL.

OAR 340-41-0026(3)(D) reads as follows:

> "Effective July 1, 1996, in any waterbody identified by the Department as exceeding the relevant numeric temperature criteria specified for each individual water quality management basin… and designated as water quality limited under Section 303(d) of the Clean Water Act, the following requirements shall apply to appropriate watersheds or stream segments in accordance with priorities established by the Department…
> (i) Anthropogenic sources are required to develop and implement a surface water temperature management plan which describes best management practices, measures, and/or control technologies which will be used to reverse the warming trend of the basin, watershed, or stream segment identified as water quality limited for temperature;"

While OAR 340-41-0026(3)(D) does not specifically call for the development of a TMDL for temperature, it is clear that EPA considers heat a pollutant for which TMDLs should be developed. This can be found in EPA's definition of pollutant[3], in EPA's early TMDL guidance (e.g. "Guidance for Water Quality-based Decisions: The TMDL Process" EPA440/4-91-001) and in EPA's recent clarification (Federal Register Volume 65, Number 135, page 43592) on the relationship between pollutants and pollution for purposes of section 303(d). EPA states that:

> "Of the top 15 categories of impairment identified on the 1998 section 303(d) lists, 11 categories are directly or indirectly associated with pollutants: sediments, pathogens, nutrients, metals, low dissolved oxygen, temperature, pH, pesticides, mercury, organics and ammonia."

The TMDL would therefore serve as the target upon which temperature management plans should be based in order to achieve the standard. OAR 340-41-0026(3)(D) is consistent with Implementation Plan requirements as identified in the February 2000 Memorandum of Agreement between EPA and DEQ regarding implementation of Section 303(d) of the CWA.

**Comment T39. The TMDL, as proposed, is overly prescriptive and significantly reduces the flexibility in developing implementation plans.**

The Department disagrees and, in fact, has built tremendous flexibility in to the TMDL and WQMP to allow for adaptive management. Please refer to section 2.3.2, Implementation and Adaptive Management Issues, that clearly outlines how the Department has built flexibility in to the development of implementation plans.

**Comment T40. The TMDL, as proposed, does not adequately account for the DMAs legal and statutory authority to implement the requirements.**

See Response to #4

**Comment T41. The proposed wasteload allocations would result in significant negative environmental and financial impacts (e.g., refrigerating wastewater treatment plant discharges with the resultant need for additional electric power generation, relocating the discharges to the Columbia River thereby reducing the flow in the Tualatin). The WLAs would redirect resources away from otherwise improving the overall health of the Tualatin River watershed.**

The Department does not anticipate these outcomes as a result of the temperature TMDL. The Tualatin TMDL is designed to benefit the overall health of the Tualatin River subbasin and the Department will guide implementation measures to avoid such environmental and financial impacts as described above.

The following text has been inserted into section 4.1.7 Allocations – 40 CFR 130.2(g) and 40 CFR 130.2(h):

> ***Wasteload Allocations (Point Sources)*** *- Surface water discharges into Tualatin River Subbasin receiving waters have been given a heat load based on the 0.25$^{o}$F allowable increase in the mixing zone as specified in the temperature standard. Heat loads have been converted to allowable effluent temperatures as well. It should be noted that the wasteload allocation is the point source heat load (21,326,120 kcal/day) and not the calculated maximum effluent temperatures. There are several options for meeting the allocated heat loads (i.e. passive effluent temperature reductions, changes in facility discharge operation, purchasing instream flows, pollutant trading, etc.).*

[3] The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water

Point sources should anticipate that resources will be required to meet the temperature wasteload allocations. However, resources such as "refrigerating wastewater treatment plant discharges with the resultant need for additional electric power generation, relocating the discharges to the Columbia River thereby reducing the flow in the Tualatin" are not recommended by the Department or necessary to meet TMDL targets.

**Comment T42. The final TMDL should evaluate all anthropogenic activities, allowing credit to be given for cooling influences (e.g., discharges from Hagg Lake and Barney Reservoir).**

Under Section 4.1.4 - Existing Sources - CWA *§303(d)(1)* a subsection was inserted in to the TMDL that considers the effects of flow augmentation (4.1.4.3 Flow Augmentation). Heat loading from flow augmentation can be calculated as follows,

$$H_{Aug} = M_R \cdot c \cdot \Delta T_R \cdot \left( \frac{5^o F}{9^o C} \right)$$

If we correct for units we can calculate heat from flow augmentation as,

$$H_{Aug} = Q_R \cdot c \cdot \Delta T_R \cdot \left( \frac{5^o F}{9^o C} \right) \cdot \left( 2{,}447{,}592 \frac{ft^3 \cdot day}{kg \cdot sec} \right)$$

where,

$T_R$: Change in river temperature ($^o$F)
$Q_R$: Upstream river flow (cfs)
$M_R$: Daily mass of river flow (kg/day)
$H_{Aug}$: Heat from point source effluent received by river (kcal/day)
c: Specific heat of water (1 kcal/kg $^o$C)

Flow augmentation is a possible source of heat transfer. Increasing stream flow can result in heat loads via two ways:

- Directly changing the heat of a waterbody by mixing river water with water with a different temperature thus affecting the T term, and/or
- Increasing the assimilative capacity of a waterbody by changing the mass ($M_R$) of the waterbody.

As an example, USA flow augmentation was analyzed. USA purchases 30 cfs of flow at Springhill Pump Station. When this water is left in stream (i.e. the result is a 30 cfs flow augmentation in the Tualatin River from river mile 58.0 to the mouth), the temperature change is -2.1$^o$F at USA Rock Creek WWTP and -1.8 $^o$F USA-Durham WWTP. Heat reductions associated with USA flow augmentation was then related to the heat increases caused by USA effluent discharge to the Tualatin River. The results are as follows:

| | $Q_R$ | $T_R$ | $H_{PS}$ | $H_{Aug}$ | $_R = H_{PS} - H_{Aug}$ |
|---|---|---|---|---|---|
| USA Facility | River Flow at the USA Facility (July 29, 1999) (cfs) | Stream Temperature Reduction at USA Facility ($^o$F) | Current Point Source Heat Loading on River (kcal/day) | Heat Reduction Associated with USA Flow Augmentation (kcal/day) | Change in River Heat Due to USA Flow Augmentation and Effluent Discharge (kcal/day) |
| Durham WWTP | 142 | -1.8 | $2.5 \cdot 10^8$ | $-3.5 \cdot 10^8$ | $-1.0 \cdot 10^8$ |
| Rock Creek WWTP | 200 | -2.1 | $6.5 \cdot 10^8$ | $-5.7 \cdot 10^8$ | $0.8 \cdot 10^8$ |

In a similar fashion the thermal effect of future flow augmentation can be calculated for other anthropogenic sources of heat and related to the overall heat budget.

**Comment T43. Modeling omitted consideration of water withdrawal rights, groundwater inflows and stratification in the lower stretches.**

Temperature modeling performed a mass balance on flow. Interpolation between measured flows accounted for instream withdrawals and flow reductions. The effect of USA's water right to flow was evaluated and is included in under Section 4.1.4 - Existing Sources - CWA *§303(d)(1)* as an inserted subsection 4.1.4.3 Flow Augmentation.

FLIR temperature remote sensing found little evidence of concentrated groundwater inflow into the Tualatin River and tributaries during the sampling period (late July 1999). The thermal effect of ground water was omitted because there is little evidence that ground water is a considerable source of cooling when compared to nonpoint source anthropogenic solar radiation heat, point sources and flow augmentation.

All simulated temperatures represent an average water column temperature. The temperature modeling does not account for surface stratification.

**Comment T44. To the extent that the draft TMDL requires control for "pollution" rather than "pollutants" it is not legally authorized.**

Comments: Most of the temperature increases (other than the wastewater treatment plant discharges) are attributable to pollution – increases in solar radiation resulting for human land clearing activities – rather than being caused by the discharge of pollutants.

Response: Section 303(d)(1)(C) of the CWA states that "each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 304(a)(2) as suitable for such calculation. The term pollutant is defined in section 502(6) of the CWA and in the proposed 40 CFR 130.2(d) as follows: "The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water."

Further, under §130.7(c)(2), "Each State shall estimate for the water quality limited segments still requiring TMDLs identified in paragraph (b)(2) of this section, the total daily thermal load which cannot be exceeded in order to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife."

The CWA and subsequent guidance make it very clear that "heat" has been determined to be a pollutant for which TMDLs are to be established, regardless of the source of heating.

**Comment T45. "According to OAR 340-41, compliance with the temperature standard was meant to be achieved through implementation of an adaptive temperature management rather than a numeric limit. The second is a more effective path."**

The Tualatin River subbasin temperature standard contains both narrative and numeric targets (OAR 340-41-445(2)(b)(A)). Due to the presence of federally listed threatened and endangered species and due to the fact that the Tualatin River mainstem system potential temperature is predicted to exceed 64°F, no anthropogenic increase in stream temperature is allowable. The surrogate measure, effective shade, is a numeric target based on no anthropogenic disturbance. In addition to establishing the numeric point source waste load allocations and nonpoint source load allocations, the TMDL incorporates adaptive management via the Water Quality Management Plan.

**Comment T46. "Establishing a system potential below the standard is essentially setting a new standard."**

A new standard was not set for the Tualatin River subbasin. According to OAR 340-41-445(2)(b)(A), the Tualatin River subbasin stream temperatures can have no anthropogenic increases because a) the mainstem Tualatin River does not meet 64°F even under system potential conditions, b) widespread dissolved oxygen violations and c) the presence of threatened and endangered species,. Thus it is necessary to apply the "no anthropogenic" narrative of OAR 340-41-445(2)(b)(A), to the entire 4$^{th}$ field subbasin.

**Comment T47. "System potential calculations do not take into account site constraints such as existing development.'**

System potential conditions do not account for site constraints such as existing development. It is important to recall that the temperature standard specifically states that "***no measurable surface water temperature increase resulting from anthropogenic activities is allowed***" when trigger conditions apply (OAR 340-41-245(2)(b)(A)). These trigger conditions occur within streams of the Tualatin River subbasin and subsequently these stream segments are listed on the 303(d) list. A TMDL is to be developed for 303(d) listed waterbodies. However, it is important to note that the TMDL incorporates a Water Quality Management Plan and such concerns should be addressed within this process. See answer to #2 regarding all feasible steps.

**Comment T48. "Due to limited data on travel times in the tributaries, the tributary model runs may be flawed."**

Tributary model runs are not flawed. There is not a limitation of data about stream hydrologic conditions (i.e., stream velocity) in tributaries of the Tualatin River. All stream models within the TMDL were calibrated to field measured flow volumes, velocities, widths and average depths. In addition, stream gradients for these modeled reaches were measured using GIS for every 100-foot model reach segment and was directly used, along with field data, to calculate stream velocities and depth conditions for these tributary reaches. Collected FLIR temperature data, which is spatially continuous, was used to validate the effects of stream velocities and depths (developed using mannings equation with the high-resolution GIS data) on stream temperature.

**Comment T49. "Temperature was modeled for the hottest part of the summer. This is not when the fish are spawning. Therefore, it cannot be used to determine spawning requirements. The model should be calibrated for the hottest 7-day period during the spawning season."**

The Tualatin River is listed for temperature violations based on violating the salmonid rearing criterion. Accordingly, the temperature standard dictates no measurable surface water temperature increases from anthropogenic causes during the summer period (OAR 340-41-445(2)(b)(A)). It is important to note that pollution abatement measures implemented for the rearing period (i.e., surrogate measure - system potential shade condition) would continue during spawning periods. Also, temperature methodology calculations have been provided to allow flexibility for point source effluent heat limits that can be adjusted based on differing conditions.

**Comment T50. "What is the historic basis for applying the ecoregion concept when calculating shade percentages?"**

Ecoregions are an accepted methodology for describing areas of similar elevation, geology, geography, and soil types, all of which help determine the vegetative communities. System potential conditions were developed for Level IV Ecoregions (USEPA) delineation areas within the Tualatin River subbasin. The term "Ecoregion" is generally understood to describe regions of relative homogeneity in ecological systems or in relationships between organisms and their environments (Omernik and Gallant 1986). Ecoregions are delineated on the premise that ecological regions can be identified through the analysis of the patterns and composition of biotic and abiotic components, such as soil composition, vegetation, climate and topography. Simply, areas within a specific Ecoregion are likely to share a common set of ecological characteristics with respect to vegetation, climate, topography, etc. The purpose of Ecoregions is to provide a spatial map for research assessment, management, and monitoring of ecosystems and their components.

**Comment T51. "Channel morphology description does not accurately portray streams in headwater areas (Page A-31)."**

This particular section presents general principles associated with channel morphology and its affect on stream temperature. This section is not intended to be a site specific description of any one location in the Tualatin River subbasin.

**Comment T52. "Williams Control, Inc. is not in Portland (Figure A-9)."**

The address listed in the DEQ permit database is 14100 72nd Ave., Portland, OR. Comment is noted.

**Comment T53. "Fanno Creek Temperature Data collected by the City of Portland are not shown in Figure A-27."**

This is correct. This figure was developed as part of the initial assessment and was intended to help ODEQ develop a sample plan for the 1999 summer sampling season. As a result of this effort, ten monitoring locations were established on Fanno Creek during the 1999 sampling effort, and FLIR temperature data was collected for the entire length of Fanno Creek. (see Table A-12 and A-28).

**Comment T54. "Page A-54: Table A-12 – Sites are not consistent with figure A-28 on page A-53."**

Table A-12 lists the streams for which FLIR data was collected. Figure A-28 shows locations where continuously monitoring temperature probes were deployed instream.

**Comment T55. "Page A-204: Most graphs starting with Figure A-178 started at RM 9.0. Where is the information for RM 14 to RM 9? This is information critical to the City of Portland to prepare management strategies."**

Flow and temperature were collected throughout Fanno Creek (also above RM 9). Data is presented in Appendix A. Modeling began at RM 9 because extremely low flows were measured upstream of this location making it impossible to have reliable temperature simulations at such low flow conditions. The Department agrees that these areas are extremely important for the City of Portland in preparation of management strategies. The temperature TMDL surrogate measures for this section of Fanno Creek are presented in the main TMDL document (Surrogate measures - shade curves plots). These target values are the allocated condition for this section of the river.

**Comment T56. "Page A-217: Achieving system potential for the conditions presented is unrealistic in a developed watershed. It is not possible to return riparian vegetation to pre-human disturbance conditions. According to OAR 340-41, point source only needs to achieve no measurable increase in**

**surface water temperature, if the temperature is above 64°F. As soon as temperature is below 64°F, the load capacity, thermal point source discharges can be allocated."**

The Tualatin TMDL **is not designed** to emulate "pre-human disturbance" condition. The Tualatin temperature TMDL **is designed** to eliminate heating due to anthropogenic activities. System potential near stream vegetation conditions were used to calculate effective shade surrogate measures. For clarity, system potential as defined in the TMDL is the near stream vegetation condition that can reproduce on a site given elevation, soil properties, plant biology and hydrologic processes. System potential does not consider management or land use as limiting factors. In essence, system potential is the design condition used for TMDL analysis that meets the temperature standard.

Water quality standards are developed to protect the most sensitive beneficial use (salmonid populations). The temperature standard is designed to protect cold water fish (salmonids) as the most sensitive beneficial use. Several numeric and narrative trigger conditions invoke the temperature standard. Numeric triggers "i" through "iv" are based on temperatures that protect various salmonid life stages. Narrative triggers specify conditions that deserve special attention, **such as the presence of threatened and endangered cold water species**. For clarity, the occurrence of one or more of the stream temperature trigger will invoke the standard. It is important to note that threatened and endangered cold water species reside within the Tualatin River subbasin. Once invoked, the temperature standard specifically states that "*no measurable surface water temperature increase resulting from anthropogenic activities is allowed"* (OAR 340-41-445(2)(b)(A)). A TMDL is to be developed for 303(d) listed waterbodies.

The Tualatin River 4$^{th}$ field hydrologic unit is the scale at which the TMDL is designed. The surface waters contained in the Tualatin River subbasin experience local thermal loading, upstream transport of heat and heat from mixed waters from tributaries and subsurface sources. The waters contained in the Tualatin River subbasin are interconnected. Recent advances in temperature modeling that draw from spatial data sources and simulate at a network scale have started to reveal the level of interconnectedness and complexity of local and downstream thermal responses is significant. Accordingly, anthropogenic pollution within Fanno Creek can be a significant part of the thermal budget for downstream locations. Therefore, allocated conditions would be applicable in Fanno Creek if any downstream areas violate any portion of the temperature standard.

**Comment T57. "Page 17: Figure 5 – Cannot assume that all land in an 'urban' setting is developed."**

That assumption is not made. The riparian area was digitized at a 1:5000 scale from digital orthophoto quads that were taken in 1997. At every 100 feet in the downstream direction, the left and right bank riparian areas were automatically sampled using ArcView. This high-resolution riparian mapping methodology identifies roads, railroads, bridges, houses, parking lots, single mature trees, and any other significant feature visible on the 1-meter resolution digital orthophoto quads. Accordingly, the level of analysis did not assume that all "urban" lands were "developed" (see Figure A-183).

**Comment T58. "Page 27: "Elevated summertime stream temperature attributed to sources in the Tualatin River subbasin result from riparian vegetation disturbance." This statement is too simplistic and does not consider withdrawal of water, channel modification, reduced groundwater recharge, etc."**

Other factors that affect stream temperature were discussed in paragraphs directly below where this sentence was taken from the TMDL document. Specifically, the TMDL goes on to state that elevated summertime stream temperatures in the Tualatin River subbasin result, in part, due to changes in flow, channel modification, and reduced groundwater recharge. Channels are indirectly being considered in the Tualatin TMDL because factors that affect water temperature

are interrelated. The surrogate measure (percent effective shade) relies on restoring/protecting riparian vegetation to increase stream surface shade levels, reducing stream bank erosion, stabilizing channels, reducing the near-stream disturbance zone width and reducing the surface area of the stream exposed to radiant processes. Large wood contribution resulting from protected/restored riparian zones would be another component expected to improve temperature conditions. Flow modification was directly considered during TMDL analysis, including water withdraws throughout the basin and reservoir releases from Henry Hagg Lake. In addition, ground water recharge was incorporated in the analysis. That is, FLIR thermal imagery was collected throughout the Tualatin sub-basin as part of this effort (see Table A-12). FLIR is the best available technology to evaluate and account for ground water recharge and its effect on surface water temperatures.

**Comment T59. "Page 37: "System potential temperatures during the critical condition in late July result when the nonpoint source loading capacity is achieved…" The distinction between nonpoint and point source load capacity is artificial and not supported by the definition of load capacity in 40 CFR 130.2."**

System potential temperatures are predicted assuming there are no point sources. This resultant temperature is then used to calculate the WLAs for the point sources. The final result is a stream temperature prediction that has eliminated all sources of anthropogenic heating.

**Comment T60. "Page 39: Table 8 – Wasteload allocations are not equitable since they are based on local system potential and not on the temperature standard. Wasteload allocation (expressed in max. effluent temperature) should not be above the instantaneous lethal temperature for salmonids of 92°F."**

Base on the standard, a point source cannot measurably increase the surface water temperature, no matter where it is located. Waste load allocations vary between point sources based upon system potential stream temperature, 7Q10 flow, and volume of discharge. The effluent temperatures shown in the TMDL are maximum temperatures that would not cause a measurable increase to system potential at the specified flows. The Department added a note to the text that, as permits are renewed, a maximum allowable discharge temperature will be included that will ensure incipient lethal temperatures are not exceeded.

**Comment T61. "Page 40: If 100% of the load capacity is allocated to natural sources how is it possible to have load capacity for point sources as indicated by allowable effluent temperatures above the temperature standard or system potential?"**

Load Allocation refers to nonpoint sources. Waste Load Allocation refers to point sources. Once the nonpoint source load allocations are determined, the potential stream temperature is then calculated based upon that. From there, the point source waste load allocations are calculated using the stream temperatures that result from load allocations being met. Finally, system potential stream temperatures are predicted using both the load allocations and the waste load allocations, resulting in no anthropogenic increases.

**Comment T62. "Page 41: Limiting the management of thermal loading to restoring and preserving riparian vegetation amounts to a prescriptive TMDL which will not allow for other management options such as flow augmentation, channel restoration, reduction in water use, etc."**

The TMDL does not limit restoration activities to preserving riparian vegetation. The DMAs have options to improve water quality in addition to riparian vegetation, as long as it will demonstrably meet the standard and protect beneficial uses. For example, maintaining flow volumes or re-connecting flood plains can potentially impact stream temperatures.

**Comment T63. The Margin of Safety must be quantified.**

The Margins of Safety have been specifically discussed in the TMDL with both implicit and explicit approaches stated.

## RESPONSE TO COMMENTS ON THE DRAFT WATER QUALITY MANAGEMENT PLAN AND OTHER GENERAL COMMENTS

**Comment W1. TMDL process should allow flexibility in implementation and acknowledge there is still much to learn.**

**Response:** The Department is committed to employing an adaptive management approach to development of TMDLs and implementation of WQMPs. This is stated in several places in the TMDL and WQMP summary. In employing an adaptive management approach to this TMDL and WQMP, DEQ has the following expectations and intentions:

- Subject to available resources, on a five-year basis, DEQ intends to review the progress of the TMDL and the WQMP.
- In conducting this review, DEQ will evaluate the progress towards achieving the TMDL (and water quality standards) and the success of implementing the WQMP.
- DEQ expects that each management agency will also monitor and document its progress in implementing the provisions of its component of the WQMP. This information will be provided to DEQ for its use in reviewing the TMDL.
- As implementation of the WQMP proceeds, DEQ expects that management agencies will develop benchmarks for attainment of TMDL surrogates, which can then be used to measure progress.
- Where implementation of the WQMP or effectiveness of management techniques are found to be inadequate, DEQ expects management agencies to revise the components of the WQMP to address these deficiencies.
- When DEQ, in consultation with the management agencies, concludes that all feasible steps have been taken to meet the TMDL and its associated surrogates and attainment of water quality standards, the TMDL, or the associated surrogates is not practicable, it will reopen the TMDL and revise it as appropriate. DEQ would also consider reopening the TMDL should new information become available indicating that the TMDL or its associated surrogates should be modified.

**Comment W2. DEQ should continue cooperative nature of TMDL efforts to date. Restoring watersheds cannot be done by mandate or regulation alone.**

**Response:** The Department is committed to continue to work cooperatively in the development and implementation of TMDLs. This commitment has been identified in a number of key areas including: Healthy Streams Partnership (HSP) Agreement that the State of Oregon entered with various stakeholders; the Oregon Plan for Salmon and Watersheds Executive Order (No. EO 99-01); and the February 2000 Memorandum of Agreement between EPA and DEQ regarding the implementation of Section 303(d) of the Federal Clean Water Act.

Several of the principals of HSP Agreement include:

- supporting protection and enhancement programs and modify damaging activities in a cooperative manner;
- developing collaborative ways to solve problems through identification of all causal factors, developing alternative solutions and effective implementation of locally appropriate solutions; and
- using integrated solutions that include all landowners in planning and implementation to improve water quality.

The Department believes that much has been accomplished in the Tualatin under the original TMDLs and looks forward to working with DMAs and others in the implementation of the new and revised TMDLs.

**Comment W3. DEQ should take holistic approach to subbasin.**

**Response:** The Department is committed to taking a holistic approach to addressing water quality problems. The Department's TMDL approach focuses working at a subbasin level (see February 2000 MOA with EPA, HSP Agreement or EO 99-01) and committing to review and, if necessary, to revise TMDLs on a 5-year basin cycle. This 5-year cycle will be timed to precede NPDES permit renewals in the subbasin.

**Comment W4. There is a need to balance environment and economy.**

**Response:** The Department believes that such issues are best described when developing detailed implementation plans rather than in the development of TMDLs given that there are a variety of management measure options and timelines that can be considered for achieving the allocations.

**Comment W5. Can DEQ assist with acquiring local funding for SWCD?**

**Response:** The Department has assisted in funding the Washington County SWCD with 319 grant funding and is willing to support local efforts for acquiring a local funding source for the SWCD.

**Comment W6. DEQ's approach is to use simplistic models to drive a one-size-fits-all strategy. Recommends against any new regulations and "moving goal posts"**

**Response:** The Department believes that it has utilized state of art models in developing or modifying the TMDLs in the Tualatin Subbasin. The QUAL-2E modeling framework used for modification of the phosphorus, ammonia and development of the volatile solids TMDLs is one that is supported by EPA. The HeatSource model has been extensively peer-reviewed and a tremendous amount of data described in the TMDL documents went into its calibrations. The bacteria model is based on accepted approaches for estimating runoff volumes and the Soil Conservation Service (SCS) curve number and rational method which both predict over land flow.

The Department is required to develop TMDLs, which are a form of regulations, for pollutants that cause water quality standards to be exceeded in the Tualatin. TMDLs are required to address pollutants that impair waters listed on a State's 303(d) list under the Federal Clean Water Act and EPA's implementing regulations. The Department has agreed to a schedule that would address waters on the 1998 303(d) List by 2007 (February 2000 MOA with EPA which is also a basis of Consent Decree (No 86-178-HO and No 00-679-HO)). The listing of waters in a sub-basin and the TMDLs and their implementation plans will be reviewed periodically and modified as needed. This is part of an adaptive management approach described under W1.

**Comment W7. Several commenters recommended that a variety of management measures should be addressed in the TMDL. Recommendations include: reorganizing WQ committee for agriculture; removing USA flows from river – use for irrigation; installing small dams on tributaries; removing LO diversion dam; banning or promoting phosphorus-free fertilizer products.**

**Response:** These recommendations are more appropriately considered in the development of detailed management plans by DMAs and will be forwarded to them.

**Comment W8. DEQ should consider all testimony.**

**Response:** The Department does consider all testimony and responds to the best of its abilities. In addition, EPA regulations require public review of TMDLs (40CFR §130.7(c)(1)(ii), 40CFR §25) consistent with state public participation requirements. EPA has explained in guidance that the final TMDLs submitted to EPA for review and approval must describe the public participation process, including a summary of significant comments and responses to those comments.

**Comment W9. Disagrees with statement that sufficient initiative currently exists to achieve water quality goals with minimal enforcement. Enforcement needs to be improved.**

**Response:** The implementation of TMDLs and the associated management plans is generally enforceable by DEQ, other state agencies and local governments. However, it is envisioned 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 to progress through education and technical support. Enforcement may be necessary in instances of insufficient action towards progress. This enforcement could occur first through direct intervention from responsible management agencies (e.g. ODF, ODA, counties and cities), and secondarily through DEQ. The latter may be based in departmental orders to implement management goals leading to water quality standards. DEQ would work with the DMAs on such actions.

**Comment W10. Standards should be written so they do not become a legal pitfall.**

**Response:** Standards are reviewed on a triennial basis with specific standards that have prioritized for review modified through a triennial review process. This process has a public review process to determine which standards will be reviewed each cycle and a public review process prior to adoption of the standard. In addition, the Department has worked with Policy and Technical Advisory Committees in the development of the standards. Concerns about potential pitfalls are addressed through this process.

**Comment W11. Keep allocations at zero or as close as possible**

**Response:** The levels at which TMDLs are established are specified under federal rule and guidance. Under §130.7, TMDLs are to be established at levels necessary to attain and maintain the applicable water quality standard with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Determinations of TMDLs shall take into account critical conditions for stream flow, loading and water quality parameters.

**Comment W12. The WQMP does not provide reasonable assurance of compliance with the TMDL. WQMP does not describe all of the steps that need to be taken to achieve Water Quality Standards. The WQMP should be more specific regarding implementation plans. The WQMP should delineate appropriate regulatory mechanisms. What is the definition of reasonable assurance as it relates to WQMPs and is it consistent with that by Congress? Statutory authority restricts County/City authority to regulate on agricultural and forest lands.**

**Response:** EPA has proposed to define “reasonable assurance” as a demonstration that wasteload allocations and load allocations in a TMDL would be implemented to attain and maintain water quality standards in a waterbody (§130.2). Under EPA current guidance, “reasonable assurance” pertains to implementation of nonpoint control measures in streams where there is a mix of point and nonpoint sources. The purpose summary implementation plan that is submitted with the TMDL is to provide a description, in a level of detail appropriate to the

circumstances, of actions necessary to implement the TDML so that the waterbody attains and maintains water quality standards. EPA does not expect the implementation that is submitted to be a complex, lengthy document.

The Department believes that the summary WQMP provides reasonable assurance that the TMDL will be implemented with the goal of achieving and maintaining applicable standards. The Department has submitted a summary WQMP, which describes the mechanisms available for implementing the load and wasteload allocations. This summary implementation plan delineates appropriate regulatory mechanisms. Waste Load Allocations are assigned to point sources by the Department and incorporated into NPDES permits. Load Allocations for forest operations on private and state forest lands are implemented through rules adopted by the Board of Forestry under the Forest Practices Act (ORS 468B.110; 527.765; 527.770). Load allocations for agriculture are implemented through Agricultural Water Quality Management Area Plans developed by the Oregon Department of Agriculture or other statutorily available authority (ORS 561.191; 568.900 to 568.933). Other Load Allocations are implemented by the Department or by federal or local agencies.

Upon approval of the TMDL, the Department will work as expeditiously as practicable with DMAs to update permits and revise management plans in order to meet the load and waste allocations, typically within 1-2 years. The revised management plans will provide more detail on the management measures that the DMA will implement, schedules, interim milestones and monitoring plans. In many cases, it is difficult to develop this detailed implementation plan until after the TMDLs are approved and that is why a summary implementation plan is submitted with the TMDL.

**Comment W13. The DMAs may not have adequate authority to implement the necessary management practices. Inclusion of local land use jurisdictions as co-permittees in MS4 permits.**

**Response:** The Department recognizes that it will need to explore with current DMAs their authorities, especially for implementation of the temperature TMDLs where stormwater runoff is less of an issue or to further address other concerns related to stormwater. In some cases, new DMAs may need to be specified with appropriate agreements developed. This can be done through the implementation phase. The Department also recognizes that cities and counties may need to enact new regulatory authority and this is discussed further under the response to comment T4.

**Comment W14. The relationships between DO, SOD, TP, nitrogen, etc are recognized only partially or are completely ignored. Expected effects of one TMDL are not always considered in the development of another (e.g. Temperature & Bacteria). Control strategies (or form of allocations) are not coordinated between TMDLs.**

**Response:** The Department did consider the relationships between parameters when developing TMDLs (e.g. in addressing low dissolved oxygen, impact of nitrification, CBOD, algal growth, temperature and SOD were evaluated in developing the TMDLs. Similarly, the impact of reduced temperatures (due to implementation of the temperature TMDL) on the die-off of bacteria for the bacteria TMDL were considered. The Department realizes that certain implementation practices that address one TMDL parameter could negatively affect another TMDL parameter (for example, stormwater detention ponds that would reduce bacteria loads to a stream may cause some heating). The Department believes that the best place to address these concerns is in the development of detailed implementation plans as there are a variety of ways that management measures can be implemented and will work with DMAs during this process.

**Comment W15. DEQ should consult with NMFS regarding the TMDL and ESA implications.**

**Response:** Although there is no legal requirement for formal consultation, under Section 7 of the Endangered Species Act, the Department sent the draft TMDLs to NMFS and USFWS for their review and comment. The Department is also collaborating with both Services and EPA to better coordinate the Department's activities with the implementation of the Endangered Species Act. One of the activities being discussed is TMDLs.

**Comment W16. DEQ should go to EQC for TMDL approval. Requests an "EQC approvable Compliance Order and Schedule to meet the TMDLs".**

**Response:** The Department has initiated a separate action in November 2000, which is being taken to the EQC in March 2001, to repeal the current Tualatin TMDL Rule (OAR 340-41-0470(9)). OAR 340-41-0470(9) established the following, in 1988, by rule:

- the total phosphorus and ammonia Total Maximum Daily Loads (TMDLs), expressed in terms of monthly median concentrations at the mouths of tributaries and along the mainstem of the Tualatin River (which were submitted to the Environmental Protection Agency (EPA) and subsequently approved);
- requirements for program plans to be submitted to the Department; and
- a date for achieving the concentrations.

The Department proposes to repeal this rule as it is redundant and covered under other authorities. When submitted to EPA, the TMDLs are in the form of a Department Order. As required under the Federal Clean Water Act (CWA), TMDLs are approved by EPA and Waste Load Allocations are assigned to point sources by the Department and incorporated into NPDES permits. Load Allocations for forest operations on private and state forest lands are implemented through rules adopted by the Board of Forestry under the Forest Practices Act (ORS 468B.110; 527.765; 527.770). Load allocations for agriculture are implemented through Agricultural Water Quality Management Area Plans developed by the Oregon Department of Agriculture or other statutorily available authority (ORS 561.191; 568.900 to 568.933). Other Load Allocations are implemented by the Department or by federal or local agencies.

**Comment W17. Recommend that WQMP include 3 types of monitoring – implementation (compliance), effectiveness (status and trend) and validation (cause and effect).**

**Response:** The Department will be working with DMAs to update monitoring plans within one of TMDL approval. An annual monitoring plan has been developed by DMAs in the basin under the previous TMDL and this would be expected to continue. These areas of monitoring have been and will continue to be included.

**Comment W18. Listed streams should stay on the 303(d) list until Water Quality Standards are met.**

**Response:** Under current EPA guidance, States can remove streams from the 303(d) under a number of situations, which include:

- when TMDLs are approved and being implemented; or
- when the waterbody attains the applicable water quality standards.

Under this policy, DEQ has chosen to remove waters once the TMDL has been approved. The Department still tracks the condition of the waterbody and will show its status of being water

quality limited (not meeting the standard) or meeting the standard. The Department will be reviewing this policy during the next 303(d) listing cycle and pending implementation of revisions to EPA regulations that pertain to 303(d) lists.

**Comment W19. The time frame for updating and implementing the city of LO's plan is too long. Need more than one year to develop. Timeline for preparing the implementation plan should be flexible. USA has stated that it could take from 12-24 months, depending on details of final TMDL.**

**Response:** The Department feels that it has identified a reasonable time frame for renewing permits and updating management plan. It has identified that it will be modifying permits and working with the agricultural community to update the Tualatin Subbasin Agricultural Water Quality Management Plans with 1-year of the TMDL approval (Chapter 7 of Appendix I). (EPA has suggested that permit reissuing or revising be done as expeditiously as practicable – within two years after establishment of the TMDL.) Additional needed schedules and time frames for implementation will be referenced in these documents. Permits and the Agricultural Water Quality Management Plan have their own public review process.

**Comment W20. The life stage timing patterns shown in the TMDL and Appendix F are conservative.**

**Response:** The information used to determine the life stage timing patterns are from the Oregon Department of Fish and Wildlife (ODFW) and have been reviewed by ODFW's District Biologist. As new information becomes available, such as through an ODFW update of fish distribution maps, the TMDL may be modified as described under adaptive management.

**Comment W21. Coho are not indigenous to the Tualatin Subbasin and therefore DEQ should not designate spawning criteria directed toward coho salmon spawning areas.**

**Response:** Coho spawning information, as well as other information, was used within the TMDL to assist in the determination of the appropriate dissolved oxygen (DO) criteria. The DO standard applies to the spawning of all affected salmonids (see figure 48, p.79 of the draft TMDL), not just indigenous species. Therefore, it is appropriate to utilize coho spawning information in evaluation of appropriate DO criteria.

**Comment W22. The TMDL documents do not provide data to confirm designation of Scoggins Creek and the upper Tualatin for spawning habitat.**

**Response:** As explained in Appendix F, spawning data for steelhead and coho salmon were obtained from ODFW. While fish distribution data may not be available for all reaches, the information used represents the best professional judgment of the ODFW District Biologist. In addition, the data used for cutthroat trout distribution has also been reviewed by ODFW.

**Comment W23. TMDLs should be established for other surrogates to address the Biological Criteria listing.**

Summary of Concerns:

- Fine sediment is a "pollutant" for which a TMDL should be established
- If effective shade can be used as a surrogate measure for TMDL to achieve temperature standard, then measures of woody debris, pool-riffle ratios, refugia, streamflow regimes, and the like can as well and by the same rationale be used as surrogate measures for TMDL to achieve a narrative standard for biological criteria.

**Response:** The 303(d) List is intended to identify all waters not meeting water quality standards. EPA has interpreted that Total Maximum Daily Loads (TMDLs) are to be established only where a waterbody is water quality limited by a "pollutant[4]." In the case of the listings such as for Habitat Modification and Flow Modification which are not pollutants[5], TMDLs would not need to be established and other approaches to address these concerns, such as through Management Plans, should be used to address these impairments. In the case of a Biological Criteria listing which could be due to either a pollutant (e.g. excessive temperature, low dissolved oxygen or sedimentation) or some form of pollution (flow or habitat modification), the likely cause for the Biological Criteria exceedence needs to be determined. If pollutants were the likely cause, a TMDL would need to be established. If some other form of pollution was involved, other appropriate measures could be used.

The listing for Biological Criteria was based on work by Oregon Department of Fish and Wildlife (*Distribution of Fish and Crayfish and Measurement of Available Habitat in the Tualatin River Basin – Final Report of Research,* June 1995, ODFW). The report explored the relationship of biotic integrity and habitat and found that habitat scores were positively influenced by the amount of shade and were negatively influenced by the amount of soil substrate, percent glides and eroding stream bank.

Actions under the temperature TMDL will address the amount of shade and the increased vegetation along the stream. The ODFW report found that the amount of shade was negatively correlated to the amount of soil substrate. Trees and vegetation associated with stream canopy should also serve to decrease erosion, thereby decreasing the amount of soil substrate in the streams.

The Department recognizes that factors such as habitat and flow are important to address in management plans to insure protection and recovery of fish populations and will encourage this while working with management agencies in the refinement and implementation of their management plans. Many surrogate measures can be incorporated even though they are not established as TMDLs. The Department also recognizes that some parameters such as sedimentation and toxics were not fully addressed at this time, as they were not listed for the Tualatin. The Department will be seeking and reviewing data for these parameters in the Tualatin under its watershed approach and will revise TMDLs accordingly on a five-year cycle.

**Comment W24. Urban Growth and stormwater runoff needs to be addressed under the TMDLs as they are affecting the quality of the tributaries.**

**Response:** The Department believes that new TMDLs for settleable volatile solids and bacteria along with the revised TMDL for phosphorus set Wasteload Allocations that will be incorporated into MS4 permits. Management activities under these permits will address concerns from growth and urban runoff.

**Comment W25. Currently available scientific knowledge and analytic techniques have not been consistently incorporated into the TMDLs and WQMP. A process should be adopted that requires certainty that TMDLs and WQMPs shall be reviewed and adjusted when new evidence justifies a change.**

**Response:** The Department disagrees and believes that it has used the most recent data and state of the art models. These are discussed in the documents and related responses can also

[4] Section 303(d)(1)(C) states that "each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 304(a)(2) as suitable for such calculation.

[5] The term pollutant is defined in section 502(6) of the CWA and in the proposed 40 CFR 130.2(d) as follows: "The term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water."

be found under **Comments B5, D12, P6 and T16** as well as in other responses. In the case of the phosphorus and ammonia TMDLs, the Department reviewed existing information using a Technical Advisory Committee and received recommendations from a Policy Advisory Committee. The Department has indicated that further data and information should be gathered and reviewed in the course of implementing WQMPs and this information should be used to adjust the actions and the TMDLs as needed through adaptive management.

**Comment W26. A thorough analysis of which standard applies to the water and consideration of all beneficial uses needs to be done**

**Response:** The standards are developed to protect beneficial uses, which are designated for the Tualatin in Table 6 (OAR 340-41-442). Numeric standards are often developed at a level to protect the most sensitive of these beneficial uses (e.g. salmonid spawning, water contact recreation, and water supply). The TMDL documents focus on identifying the most sensitive beneficial uses that are affected by the parameters listed on the 1998 303(d) list for the Tualatin.

**Comment W27. The TMDL does not Demonstrate how the WLA and LA will lead to attainment of the Water Quality Standards**

**Response:** The Department believes that the TMDL document does demonstrate this. This analysis is the foundation of the TMDL and can be found in numerous places but specifically in Sections 4.1.11 (temperature), 4.2.10 (bacteria), 4.3.4.6.4 (SOD), 4.3.8.3 (Ammonia) and 4.4.6.2 (phosphorus) as well as in the modeling runs which are detailed in the supporting documentation.

**Comment W28. The State of the Science is not evolved to make the connections from BMPs to Numerical Load Reductions. Appropriate loads must be allocated to both point and nonpoint sources and each must be held accountable for ensuring pollution reduction plans are implemented.**

**Response:** As described in the February 2000 MOA with EPA regarding the implementation of Section 303(d) of the Federal CWA, there are a number of elements of that are to be described in the WQMP. These include proposed management measures tied to the attainment of the TMDL, timeline for implementation (including a schedule for revising permits and a schedule for completion of measurable milestones including appropriate incremental, measurable water quality targets and milestones for implementing control actions), reasonable assurance, monitoring/evaluation and legal authorities. Ideally, much of this would be worked out and submitted with the TMDL. The EQC had requested part of this information as part of a June 1999 Report from the DMAs to the Department. DMAs indicated that it would be more appropriate to prepare final implementation plans after the revised and new TMDLs are final and approved by EPA (Appendix I). The Department will work with DMAs to renew permits and update management plans in the year following the TMDL approval. There are a variety of ways that management measures can be tied to the attainment of the TMDL. These will be developed and described during the development of permits and update of management plans. EPA regulations state water quality-based effluent limits need to be consistent with the assumptions and requirements of the wasteload allocation (CFR 122.44(d)(1)(vii)(B)). The expression of the wasteload can be somewhat modified in form as long as it is consistent with the WLA.