State of Oregon
Department of
Environmental
Quality

Willamette Basin TMDL

Response to Comments

September 2006

WILLAMETTE BASIN TMDL

RESPONSE TO PUBLIC COMMENTS

Introduction:

Oregon's Administrative Rules and the Code of Federal Regulations (CFRs) require ODEQ to provide public notice for draft TMDLs and to allow the public adequate time to review and comment on the draft TMDL prior to submission to the U.S. Environmental Protection Agency (USEPA). The legal citations pertaining to this public comment process are presented below.

The public comment period for the draft Willamette Basin TMDL and Water Quality Management Plan (WQMP) began on October 25th, 2004. News releases were sent to the media (and to the list of interested parties maintained by ODEQ) announcing the release of the draft TMDL document and requesting comments on the draft TMDL package. The public comment period was originally scheduled to close on January 14th, 2005 but was later extended until January 31st in response to a specific request for extension received by ODEQ. Hard copies of the TMDL/WQMP were made available to the public and copies were distributed to local libraries throughout the Willamette Basin. The entire document was also available 'on-line' at ODEQ's webpage: http://www.deq.state.or.us/wq/willamette/WRBHome.htm

During the public comment period informational open house meetings were held in Albany, Eugene, Salem and Portland. These meetings took place between November 30th and December 14th, 2004. Numerous other meetings took place throughout the Willamette Basin with individual stakeholder groups that expressed interest in the TMDL. Toward the close of the public comment period (January 10-12, 2005) four public hearings were held in the cities of Albany, Eugene, Salem and Portland. During these public hearings members of the public were given the opportunity to provide formal comment to ODEQ on the draft Willamette Basin TMDL. The public was also given the opportunity to provide comment via mail, fax or e-mail by the close of business on January 31st, 2005.

A total of 69 individuals, organizations and entities submitted comments to the ODEQ on the draft Willamette Basin TMDL package. These comments were reviewed by ODEQ staff and posted on ODEQ's web page. The following document represents a compilation of the comments that were submitted to ODEQ during the public comment phase of the Willamette Basin TMDL process. The document also contains ODEQ's responses to the comments. The comments and the ODEQ responses are grouped in a manner similar to the organization of the original TMDL document. Comments and responses are organized by parameter (temperature, bacteria and mercury) where appropriate and grouped by Subbasin. Comments on the Water Quality Management Plan (WQMP) are also included in this Response to Comment document.

Significant changes were made to the draft TMDL documents in response to the comments received by ODEQ. Changes were made as appropriate in finalizing most of the chapters of the document. Changes to the chapter describing temperature effects and limits to the Willamette River were so substantial, that this part of the TMDL (Chapter 4) was released for a second public comment period. This comment period began on April 3rd 2006 and closed on June 1st, 2006, including a 2-week extension. Combination informational meetings and public hearings were held in Eugene, Albany, and Portland from May 4th through 9th, 2006. Three individuals gave verbal testimony at hearings, and 24 individuals or organizations submitted comments in writing prior to the close of comments. Three individuals gave testimony at the public hearings. Two of these represented municipalities, and the third spoke for himself. Comments were submitted by three organizations (Oregon Department of Forestry, City of Portland, and Northwest Environmental Advocates) after the close of the comment period, and are not included in this response. Many of the comments received in this second release were similar to those submitted on the

first TMDL. There were also some novel comments and some new commentors, bringing the total number of commentors to 73 for the official public comment record.
The following document outlines ODEQ's rationale for either making the changes that were identified or for deciding not to modify the document in response to a specific comment. The comments received during the second comment period for the Willamette River Temperature TMDLs (Chapter 4) are compiled and presented separately from those received in the first comment period.

How to read this document

Comments and responses are organized by TMDL chapter in the following sections. Comments are generally paraphrased from the original, and may reflect several comments that were essentially the same. Each comment received is numbered (example, "Comment 1"), and is followed by a numeric identifier in parentheses to identify the source of the comment. These commentors are listed by identification number in Table 1. ODEQ's response follows each comment in italics. Chapter 4 (Willamette River Temperature) has two sets of comments and responses; the original from the 2004-05 comment period and the second from the 2006 comment period.

Table 1. Individuals or organizations providing comments on the Willamette Basin TMDLs.

Commentor #	Organization/Sector	Commentor #	Organization/Sector
1	USEPA, M. Cairns	**38**	City of Lebanon
2	Marys River Watershed Council	**39**	Portland General Electric Company
3	City of Sweet Home Public Works	**40**	Multnomah County
4	Giustina Resources	**41**	Concerned Citizen
5	Eugene Water & Electric Board	**42**	Multnomah Dental Society
6	Oregon Dept. of Agriculture	**43**	City of Veneta
7	City of Westfir	**44**	Port of Portland
8	Linn County Board of Commissioners	**45**	Lane County
9	Linn County Soil & Water Conservation District	**46**	City of Portland
10	Citizens for Safe Water	**47**	Oregon Dept of Forestry
11	USDA, Willamette National Forest Service	**48**	City of Eugene
12	City of Troutdale	**49**	Wah Chang
13	Clear Creek Rainbow Ranch	**50**	City of Corvallis, Public Works
14	City of Dallas	**51**	Johnson Creek Watershed Council
15	Calapooia Watershed Council	**52**	Northwest Environmental Advocates
16	Oregon Dental Association	**53**	Oregon Forest Industries Council
17	US Geological Survey	**54**	Metro
18	Lane County Dental Society	**55**	Association of Clean Water Agencies
19	Southern Willamette Dental Society	**56**	League of Oregon Cities
20	Clackamas County Dental Society	**57**	City of Gresham
21	Washington County Dental Society	**58**	Confederated Tribes of the Grande Ronde
22	Siltronic Corporation	**59**	Weyerhaeuser
23	Association of Oregon Counties	**60**	Columbia River Inter-Tribal Fish Commission
24	Applied Ecosystem Services, Inc.	**61**	Northwest Food Processors Association
25	Federal Lakes Recreation Committee for Detroit Lake	**62**	Bureau of Land Management, Salem District
26	City of Springfield	**63**	City of Salem Public Works
27	Marion County Farm Bureau	**64**	Oregon Department of Transportation, Region 1
28	Audubon Society of Portland	**65**	USEPA, Region 10
29	Willamette River Keeper and others	**66**	Northwest Pulp and Paper Association
30	Oregon Natural Resources Council	**67**	Concerned Citizen
31	SP Newsprint	**68**	City of Albany
32	Marion Soil & Water Conservation District	**69**	Oregon Dept of Geology & Mineral Industries
33	US Army Corps of Engineers, Portland District	**70**	Concerned Citizen
34	Tualatin Riverkeepers	**71**	NCASI
35	Oak Lodge Sanitary District	**72**	Fort James
36	Concerned Citizen	**73**	Bonneville Power Administration
37	Clackamas County,Water Environment Services		

Legal Citations:

Federal Requirements for public participation:

USEPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, USEPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments.

Provision of inadequate public participation may be a basis for disapproving a TMDL. If USEPA determines that a State/Tribe has not provided adequate public participation, USEPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by USEPA.

Public Participation: Oregon Administrative Rules 340-042-0050

(1) The Department will establish a local advisory group or identify an existing group or forum to assist in developing a TMDL.

(2) The Department will provide an opportunity for persons to review and comment on a draft TMDL and on proposals to revise loading capacity or allocations in a TMDL as follows:

(a) The Department will maintain a mailing list for each TMDL.

(b) The Department will provide notice and an opportunity for public comment on a proposed TMDL or revision to loading capacity or allocations in a TMDL. The public comment period will generally be 60 days.

(c) The Department will respond to public comments received during the public comment period and will prepare a written summary of responses.

Stat. Auth.: ORS 468.020, ORS 468B.020, ORS 468B.030, ORS 468B.035 & ORS 468B.110
Stats. Implemented: ORS 468B.020, ORS 468B.110
Hist.: DEQ 18-2002, f. & cert. ef. 12-20-02

Response to Comments on Chapter 1: Overview	
Comment 1.	On page 1-11 in the second bullet near the bottom of the page, please substitute the word "partners" in place of the word "contractors." USGS was not a contractor to ODEQ. (17B)
Response	*The suggested text change was made.*
Comment 2.	On pages 1-18, 4-30, and 4-82, the text mentions that water from the USACE projects is released from "near the bottom" of each reservoir. Actually, releases from some of the projects (such as Detroit Lake) are not taken from near the bottom, but closer to the middle. That release is still cold enough to cause the seasonal patterns referenced in the text. Still, it would be more accurate to say that the releases are sufficiently deep that they access cold water in mid-summer. (17B)
Response	*Language changes were made to Chapter 1 and Chapter 4.*
Comment 3.	On page 1-18 in the second to last paragraph, it would clarify the text if the word "minimum" were inserted so that the text would read "... a series of minimum flow regimes downstream of each Willamette Project Reservoir." (17B)
Response	*The suggested text was added.*
Comment 4.	In the draft Willamette Basin TMDL: Overview, on page 1-18. Under the first paragraph titled Dam and Reservoir Operations, third sentence. "Flood control is the highest priority of the Willamette Project, but other purposes include flow augmentation for navigation, irrigation, hydroelectric power production, fisheries and water quality." We request that the word "recreation" be included and listed in that last line as one of the other proposes. (25)
Response	*The suggested text was added.*
Comment 5.	Page 1-13, first paragraph says, "ODEQ will work with DMAs in developing Implementation Plans that are consistent in meeting … For the Willamette Basin TMDLs, these plans will be developed *within 18 months of ODEQ approval of the TMDL and WQMP.* (40)
Response	*The correct date for when TMDL Implementation Plans are due is 18 months from the date of the Notification Letters that ODEQ sends to DMAs, permitees, and other affected parties. The Notification Letters are to be sent out within 20 days of the TMDL being issued as an Order by ODEQ. The Implementation Plan due date is not dependent on USEPA's approval of the TMDL.* *The text was corrected to reflect that TMDL Implementation Plans are due 18 months after Notification Letters are sent to DMAs.*
Comment 6.	Page 1-9: "Pollutants being addressed by a TMDL:" DDT in the Lower Willamette Subbasin (Johnson Creek) is missing. Some of the subbasins referred to include minor tributaries that are, in many cases, not listed for the pollutant under consideration. (46B)
Response	*Text changes were made as appropriate.*
Comment 7.	Page 1-9: "Pollutants not being addressed by a TMDL:" Many pollutants listed in the 2002 303(d) list, e.g. PAH, PCBs, Aldrin, etc in Johnson Creek or the Lower Willamette River are missing. (46B)
Response	*Text changes were made as appropriate.*
Comment 8.	Page 1-9: "The Willamette Basin TMDL has two pollutants that have surrogate measures. They are bacteria and temperature." Dieldrin and DDT in Johnson Creek have TSS as surrogate and total mercury is used a surrogate for fish tissue concentrations. Please include a section discussing these pollutants and their surrogates. (46B)

Response	*Text changes were made as appropriate.*
Comment 9.	Page 1-10: "While human disturbances are not considered in determining system potential vegetation, …" It is not reasonable to determine shade targets especially in the Lower Willamette Basin without considering structures, such as levees and other flood control fixtures, which prevent planting of shade-producing vegetation. (46B)
Response	*ODEQ defines system potential vegetation as a condition free of human disturbances in order to determine the natural thermal potential of the waterbody as required in OAR 340-41-0002(35). Allocations to the nonpoint source sector are available for features such as flood control structures that are not vegetated, but no allocations have been assigned to specific structures at this time.*
Comment 10.	Page 1-10: "Reserve Capacity" The definition of reserve capacity presented here must be applied to the discussion of the temperature reserve capacity on P. 4-121 (Option 2- USEPA Version). (46B)
Response	*The definition was included in Chapter 4.*
Comment 11.	Page 1-10; pp1 In the last sentence, do not include mention of "forestry" as a sector involved with bacteria. You have stated in the "Bacteria" section that forestry contributes very little of this pollutant and this could be confusing to the public reader. (62)
Response	*The suggested text change has been made.*
Comment 12.	Page 1-21; map1.4 Due to coloration, the BLM lands are really not distinguishable from the US Forest Service. The color that BLM uses for lands we manage is a yellow/orange combination (RGB values 254-230-121). (62)
Response	*Comment noted.*
Comment 13.	Page 1-22; map 1.5 BLM has provided update data to the Fish use designation maps that does not appear to be illustrated on these maps. Is there a method and schedule in place for update of these designations? (62)
Response	*There are several possible reasons why updates did not occur. ODFW was the source of data for determining fish use distribution maps. Most likely, the scale or level of detail that BLM provided was greater than the level of detail displayed on the Fish Use map. These maps will be reviewed and updated during the next review of the temperature standard or as resources allow. ODEQ will notify interested parties that changes can be submitted at that time.*
Comment 14.	Acronym List, p. 1 - NPT should be NTP. (65)
Response	*The correction was made.*
Comment 15.	Page 1-30, Appendix 1.A: 303(d) Listings - It would be helpful if the waterbodies which are not addressed by these TMDLs were listed separate from those which are addressed. By doing so, this appendix would also provide a list of all listed waterbodies specifically addressed by these TMDLs, something which is currently lacking in the document. (65)
Response	*Appendix 1.A has been changed from all 303(d) listed waterbodies to only 303(d) listed waterbodies that have TMDLs.*
Comment 16.	Page 1-30, Appendix 1.A, Lower Willamette Subbasin - It appears the pH listing for Blue Lake/Arata Creek was left out of the table. (65)
Response	*Appendix 1.A has been changed to include only 303(d) listed waterbodies that have TMDLs.*

Comments on Chapter 2: Bacteria	
Comment 1.	A TMDL is not necessary for the mainstem necessary given that trend for E. coli bacteria is downward? (37, 68)
Response	*Although there may be a decreasing trend in bacterial concentrations in the Middle Willamette River (as suggested by Figure 2.6), there are still violations of water quality standards in the lower Willamette River that are not entirely explained by local sources. A TMDL is necessary to reduce loads to rivers and streams tributary to the mainstem that currently violate water quality standards and that contribute to violations in the mainstem of the Willamette River. While a decreasing trend in the mainstem is an encouraging sign, concentrations of fecal bacteria must be controlled further to protect beneficial uses as defined in water quality standards.*
Comment 2.	Although we concurred in the analytical tools and data that were used to set the bacteria TMDLs for Johnson Creek, we were unaware of the outcome of two recent studies that tracked the source of bacteria in other watersheds that include urban and rural land uses. These studies indicate that anthropogenic sources of bacteria may be a small portion of the total fecal bacteria load. This raises at least two issues. First, it may be impossible to meet the percent reductions required by the TMDL. Second, the current use of E. coli as an indicator of human pathogens may need further examination. (40,57,63)
Response	*Bacteria Source Tracking (BST) is an emergent field that can, under best conditions, distinguish among various warm-blooded vertebrate animals as sources of contamination. There is a variety of methods used to make these distinctions, but all have limitations that may result in making incorrect classifications, or not being able to classify samples at all. Recent surveys and reviews of these methods indicate that in some cases a very small proportion of samples are successfully analyzed and/or correctly classified (Ritter, et al 2003; Stewart, et al 2003; Stoeckel, et al 2004). Moreover, correct classification rates were generally significantly lower, often times no better than random chance, than reported in published studies (Stoeckel, et al 2004). The overall poor classification rates, along with the potential for bias in assessing relative contribution from multiple sources, brings into question the ability to partition contaminant loading from those sources. Although this does not necessarily mean the cited studies of bacterial sources are incorrect, the likelihood of incorrect classification remains a concern.* *ODEQ has so far been sufficiently concerned with the limitations of new Bacteria Source Tracking methods that ODEQ has not widely pursued them for TMDL determinations. ODEQ has applied antibiotic resistance analysis and genetic marker analysis of fecal bacteria to attempt discrimination of sources in other basins. While these methods have been able to determine sources to some extent, in general, samples have included fecal bacteria from a variety of sources; all of which need to be controlled to achieve the overall objective of supporting beneficial uses.* *There is flexibility on addressing the sources of bacteria as specified under OAR 340-041-0009(11) which states: In water bodies 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 may 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, best management practices 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 best management practices or measures and approaches.* *See Comment 4 (below) regarding review of the E. coli standard.*
Comment 3.	Municipalities will be responsible for human related bacteria generated within their jurisdictions. Municipalities will continue to work with DEQ in a logical manner to address bacteria issues by

	exploring areas of cross-connection, failing septic systems, and through public education. However, once reasonable measures have been instituted to control urban bacteria, we believe we have fulfilled our commitments. (55, 63)
Response	*Reasonable measures for the control of bacteria clearly go beyond "exploring" cross-connections and failing septic systems. The TMDL and WQMP assume that best management practices will be applied to the full variety of sources to control bacteria loading to urban streams. Municipalities are responsible for their contributions to excess bacterial loading. There is no intention that a municipality or any other land-use category will have to reduce excess bacterial loading beyond its own contribution.*
Comment 4.	DEQ should consider reviewing the bacteria standard in the future to determine whether a better proxy exists for human pathogens than E. coli strains that might come from any warm-blooded animal, or whether the allowable number of E. coli colonies should be tied to the source of the bacteria. (40, 57, 63)
Response	*ODEQ does not have sufficient resources to develop new guidance for bacteria standards given the complex relationship between pathogens, sources and risk of disease and is dependent on USEPA guidance. USEPA has not seen fit to develop any new indicators or more direct means of assessing pathogen exposure, disease risk assessments, or indices. Indeed, USEPA recently promulgated rules for marine bathing beaches (USEPA 2004) that rely directly, with only minor changes, on Ambient Water Quality Criteria adopted in 1986 (USEPA 1986). Although there were new interpretations and clarifications of these criteria, there was no indication that USEPA was dissatisfied with current indicators for protecting beneficial uses. Moreover, there is some information suggesting that bacterial indicators have been effective in estimating risk of disease, and that there is a measurably higher risk associated with E. coli concentrations higher than the numeric criterion in recreational fresh waters (Wade et al 2003). As better tools for assessing risk are developed, they can be applied through future reviews of the TMDL and its allocations.* Timothy J. Wade, Nitika Pai, Joseph N.S. Eisenberg, John M. Colford Jr. 2003. Do U.S. Environmental Protection Agency Water Quality Guidelines for Recreational Waters Prevent Gastrointestinal Illness? A Systematic Review and Meta-Analysis. Environmental Health Perspectives, Vol. 111.
Comment 5.	The bacteria TMDL should be deferred until a determination has been made whether a better indicator of human health risk than E.coli exists and a review of the water quality standard has been completed. (37).
Response	*The E. coli criterion was adopted in 1996 and is based on USEPA current guidance for freshwaters. ODEQ does not have plans to review this standard at this time.*
Comment 6.	Are bacteria criteria developed with information gathered at bathing beaches where human sources dominate applicable to urban settings and what options do urban DMAs have to control non-human (especially wildlife) sources of E.coli bacteria? (46)
Response	*ODEQ acknowledges that the current bacteria criteria were developed from studies of bathers at beaches directly impacted by human wastewater sources. However, there is no reason to assume that bacteria from sources other than humans do not indicate the presence of disease causing organisms. Although there may be different pathogens associated with wildlife, livestock and pets, for example, many of these pathogens still cause diseases in humans (M. Samadpour, Univ. of Washington, personal communication). Moreover, USEPA recently reviewed the ambient water quality Criteria for Bacteria and chose to rely on these same risk analyses for promulgation of new water quality criteria for marine waters, regardless of the proximity to wastewater discharges. See also response to Comment 4, above.*
Comment 7.	We suggest that the TMDL include a statement that DEQ will review the feasibility of meeting the allocations at a future date, and conduct a Use Attainability Analysis or set a site-specific standard if appropriate (40, 57, 63).
Response	*ODEQ will review the TMDL in 2013, revising loading capacities and allocations if necessary. This is presented in the Overview section of the TMDL. Presently, there is not sufficient reason to anticipate the need for a Use Attainability Analysis for bacterial contamination. Once anthropogenic sources have been controlled to the appropriate degree, ODEQ believes most, if*

	not all, water bodies will meet water quality standards.
Comment 8.	The existing State of Oregon design storm event for allowable wastewater overflows should be referenced in the TMDL documents. The TMDL document should specifically reference the Oregon Administrative Rules "design storm event" of a winter allowable wastewater overflow during a 1 in 5, 24-hour storm and a summer allowable overflow during a 1 in 10, 24-hour storm. Municipal wastewater treatment facilities are designed to meet the flows generated in the sanitary systems by these storm events, and the basis for the TMDL should be consistent with these standards. (48, 56, 63) Note this is also identified in the WLA comments.
Response	*These provisions of the rule were included on page 2-5 in the Target Identification Section of the Draft TMDL. This language is retained in the final document.* *Wasteload allocations for bacteria have not included an allocation for sanitary sewer overflows (SSOs). These events are rare, and are only allowed under conditions beyond the control of wastewater treatment facilities. As such, they are dealt with through the NPDES permitting process. If these events occur more frequently than allowed by rule, ODEQ will work with the facility's operators to ensure appropriate corrective actions are taken. Wasteload allocations are intended to reflect ongoing controls and loads or concentrations that will ensure compliance with standards under the vast majority of operating conditions.* *Although the analysis of SSOs in the TMDL indicated these events may have occasionally resulted in a violation of a water quality criterion, the regular and ongoing violations of water quality standards are the result of poor control of other sources. ODEQ has no intention of changing the means of controlling or correcting SSOs as a result of the TMDL.*
Comment 9.	Most of the mainstem river was listed as out of compliance with the bacterial water quality standard in 2002, but above the falls violations are rare both spatially and temporally. Do rare violations at a few sites justify listing on the biannual list of quality impaired waters? This inconsistency needs to be resolved. It may be related to the adequacy of data upon which decisions are made. The situation is not clarified by the statement on page 2-5 that, "[v]iolations near the mouth of the river occurred in approximately 30 to 40% of samples, while violations decreased to 12% of samples at rivermile (RM) 131 near Corvallis." The frequency of upriver violations is not what is usually considered as "rare". (24) There is also inadequate justification for having listed RM 0 to149 on the mainstem Willamette as not complying with the bacterial water quality standard if the violations are common in the tributaries but the bacterial concentrations are diluted by the confluence of the tributary with the mainstem river. (24)
Response	*The Willamette River and many of the tributaries treated in this TMDL were originally listed under the fecal coliform criteria of the water quality standard in effect prior to 1996. The listings for all reaches were based on violations of the 90th-percentile criterion (no more than 10% of samples exceeding 400 fecal coliform/100ml), with violation rates ranging from 12% at Corvallis to 39% at RM 7 in the Portland Metro area. The river was ultimately listed from the mouth to RM 149. Once a waterbody is listed as water quality limited, Oregon is required to develop a TMDL, or demonstrate compliance with water quality standards with data of the same quality or better than was used for listing.* *The rarity of violations in the upper watershed was in part in the context of an allowed 10% exceedance rate in the old standard. The record for the Corvallis area includes samples collected during overflows that have since been controlled. In the case of the lower river, violations are common to this day due to ongoing combined sewer overflows. However, water quality violations have been observed in sufficient numbers at several points along the mainstem of the Willamette River to justify listing. Moreover, the relatively high concentrations that flow to the mainstem in several of the major tributaries certainly cause localized, short-term violations throughout the river.*

	Listing of water quality limited waterbodies under Section 303(d) of the federal Clean Water Act is reviewed and revised generally on a two-year periodic basis. When determining whether sufficient information indicates violation of water quality standards, ODEQ reviews data to determine if a minimum proportion violate these standards (See "Consolidated Assessment and Listing Methodology for Oregon's 2004 303(d) List of Water Quality Limited Waterbodies" at www.deq.state.or.us/wq/303dlist/303dpage.htm). With respect to bacteria standards, reaches of the river are currently listed if greater than 10% of samples exceeded the instantaneous maximum criterion of 406 E. coli organisms/ 100 ml based on data collected since 1996. This is a coarse screening level (the standard allows no samples to exceed the 406 criterion), and the removal of a waterbody from the list would require demonstrating standards were met in all or nearly all cases.
Comment 10.	Page 2-6, Table 2.2: Only Lower Willamette from Mouth to Willamette Falls and Johnson Creek are listed as water quality limited. Why did the Department decide to establish TMDL reduction targets for other streams? (46)
Response	*As described previously, the Willamette River is listed from the mouth to river mile 149. Johnson Creek was listed in fall-winter-spring from the mouth to the headwaters. It has been the policy of ODEQ to develop TMDLs for entire subbasins rather than in a piecemeal fashion based on individual reaches of water bodies. The TMDLs in the Lower Willamette and Johnson Creek are based on landuses in the area and analysis of both the mainstem and this tributary. There is no reason to expect differences from adjacent drainages with similar uses or types of development.*
Comment 11.	A bacteria TMDL is not necessary in the upper mainstem Willamette River. In-stream monitoring indicates that the bacteria water quality standards are not exceeded in the upper reaches of the mainstem of the Willamette River, therefore a TMDL is not necessary for this parameter in this section of the river. Furthermore, the draft TMDL states (page 2-21): "Modeling also indicates that, although loads from upstream are important to the lower reach below river mile 34, local loading from urban runoff, combined sewer overflows and spills are responsible for most bacteria violations." In light of this finding, we request that the Department drop the proposed TMDL for bacteria in the upper reaches of the Willamette River (Table 2-7). (48, 56). The City questions the need for a bacteria TMDL for the entire Willamette River mainstem when the river is currently meeting water quality standards for bacteria above River Mile 18 (Chapter 2, page 2-13). The City requests that the Willamette River above RM 18 be removed from the 303(d) list. (50).
Response	*The mainstem of the Willamette River has historically violated water quality standards for protection of recreational contact. Although the violation rate appears to be lower in recent times, there have been some violations at sporadic points along the mainstem since the adoption of new water quality criteria that use E. coli as an indicator. Since the Willamette River is the receiving water for several large, and many small tributaries throughout its length, there almost certainly are local violations of standards in the Willamette at the confluences with these tributaries. As the documents states, ODEQ still believes "loads from upstream are important to the lower reach" as well as being important throughout the mainstem.*
Comment 12.	In several places within Chapter 2 we read that a lot of the nonpoint source bacterial load is transported to the mainstem river by tributaries, but you do not explain how you reached this decision. The sampling locations are neither on tributaries nor surrounding the confluences of tributaries with the mainstem river. The basis for these statements should be included in the next version of the document. (24)

Response

Concentrations and flow rates for significant tributaries to the Willamette River are included in Table 7 of Appendix A: Bacteria. A form of this table (below) will be moved to the discussion of modeling in Chapter 2. Loads from the tributaries were not backed out of the model. Rather, they were derived from sampling through time on each of the tributaries, and a statistic (90th percentile) from these data was used as input to the mainstem (QUAL2E) model. This is important, because listings on the tributaries were based on violations directly observed within those tributaries. Moreover, these tributaries carry substantial loads of bacteria into the mainstem. It is apparent from review of these data that bacterial concentrations in several of the tributaries violate water quality standards more than 10% of the time. Given the relatively large volumes of water they carry, the Long Tom, Calapooia, Luckiamute, and Yamhill Rivers contribute large loads that likely cause local violations of standards in the Willamette River mainstem The following table includes the concentrations used as model inputs for each of the tributary rivers/streams (far right-hand column), and will be added to the Bacteria TMDL to more fully describe the method:

Tributary	River Mile of Confluence	USGS Gage #	ODEQ Site #	Flow (cfs)	FWS *E. coli* samples (count)	FWS *E. coli* 90th percentile (org / 100 ml)	
Coast Fork Mid Fork	187	14157500 14152000	11275 10386	10649	27 27	55[A]	
McKenzie R	174.8	14163900 14165000	10376	6317	43	40	
Long Tom R	145.9	14170000	11140	2100	31	540	
Mary's R	132.1	14171000	10373	1192	79	215	
Calapooia R	119.5	14173500	11180	2276	34	522	
North Santiam R South Santiam R	108	14189000	17092 10366	14270	45 28	60[B]	
Luckiamute R	107.5	14190500	10658	2236	7	427	
Rickreall Cr	88.1	14907000	10364	392	8	357	
Mill Cr*	83.6	14192000	28961	272	12	862	
Yamhill R	54.9	14194150 14197000	10363	5510	40	908	
Molalla R Pudding R.	35.7	14200000 14202000	10637 10363	5156	28 28	272A	
Tualatin R	28.4	14207500	10456	3883	41	228	
Clackamas R	24.8	14211000	11233	7019	43	96	
Johnson Cr	18.5	14211550	11321	65	32	976	

Comment 13.

On page 29 we read in the section on fall,winter,spring data that "the 10 stations with sufficient data were ... analyzed". This statement needs explanation. There are only 10 stations and all data are presented in Figure 23, so which stations or data were not analyzed?

There appears to be more data points incorporated into Figure 2.3 than are incorporated into the summer plot, Figure 22. (24)

Response

Over the years, ODEQ has maintained a network of stations at which samples for a variety of conventional pollutants are collected on a regular basis. These stations are used for a statewide assessment of water quality in relatively large waterbodies. Samples have been collected either monthly or bimonthly since the early 1990's at each of these stations, providing a long term record of water quality conditions. Bacteria sampling has a mixed record due to changes in standards that were based on fecal coliform, enterococcus, or E. coli bacteria depending on the water quality standard in effect at the time. During this period, stations have been established for shorter periods or focused studies that would not provide useful data for the purposes of Loading Analysis. These stations have been excluded from analyses. There were 10 stations on the mainstem of the Willamette River, and another 17 stations on significant tributaries.

There are more samples in the fall-winter-spring than the summer plots because samples are collected at regular intervals and fall-winter-spring is longer than summer.

Comment 14.	The first paragraph in the same section (page 2-9) reports that data suggest the entire river is in compliance with the numeric criteria during the non-summer months. Page 2-12 repeats this conclusion that water quality criteria are met most months at most stations during the period of record. These are inconsistent with the statement earlier in the chapter that the river is out of compliance during these same months. It is also puzzling that the collected data "were not able to capture certain patterns in bacterial concentrations". If the patterns could not be captured, how does DEQ know that those patterns exist? Further, if monthly or bimonthly sampling intervals are too coarse then TMDLs based on those data cannot be supported as reasonable and prudent. The two issues of where/when data were collected and the adequacy of those data to support regulatory decisions need to be better addressed in the revision of this draft document. There just does not seem to be sufficient data and the written interpretations of what those data indicate are inconsistent between and within sections of Chapter 2. (24)
Response	*Although the data indicate "attainment … in much of the Willamette River during fall, winter, and spring," there have still been occasional violations of standards. This combined with several large tributaries being clearly out of compliance with standards, and a history of violations in the river, make it prudent to assume that the river does not meet water quality standards all of the time. ODEQ sampling design for the mainstem would not be sensitive to local violations at confluences with tributaries or short-term violations during storm events, but if we consider the proportional influence of the tributaries, it is clear that violations likely occur where high concentrations flow into the river. This is illustrated in Figure 2.7, which indicates concentrations in the Willamette River are elevated above the log-mean criterion at the confluences with some large tributaries. The concentrations presented in the figure are based on the assumption that the tributary and mainstem are fully mixed, which would happen some distance downstream of the tributary mouth. It is likely that concentrations are higher still in areas nearer the mouths of the tributaries.*
Comment 15.	As an aside, we would like to see a discussion, perhaps in an appendix, of the sampling scheme used at each site. (24)
Response	*Details of the Ambient Monitoring Network and sampling guidance are available at:* http://www.deq.state.or.us/lab/wqm/watershed.htm and; http://www.deq.state.or.us/lab/qa/techdocs.htm
Comment 16.	The QUAL2E model is one -dimensional; it assumes the channel is well-mixed both vertically and laterally. Such simplification may be appropriate for a very coarse initial screening, but not for the purpose of setting regulatory thresholds. The mainstem Willamette River is sinuous and has a well-defined thalweg. In these reaches the flow velocity is much higher in the thalweg but much lower along the opposite bank. This flow difference results in the creation of lateral and point gravel bars along the river bank. Such vertical and lateral differences in flow sort sediments by weight which is an indication that the waters are not well-mixed for dissolved chemicals or bacteria, either. Then there are major morphometric changes such as the 30-mile long Newberg Pool which is much deeper than the river further south and the Willamette Falls which certainly does provide a mixing action to waterborne constituents as they flow from higher to lower elevation at this location. The mainstem also has backwater sloughs, eddy currents on the downriver side of large woody debris and other large obstructions in the channel, and the confluences of tributaries. The non-uniform, non-well-mixed nature of the river is acknowledged by the designation of a "mixing zone" for point source discharges. In summary, the assumption of vertical and lateral uniformity is an over-simplification not suitably rigorous for setting load allocations, particularly for nonpoint source reaches. (24)
Response	*Load capacity for the river was determined from the load duration curve at RM 18 based on an analysis of data collected over time and under a variety of conditions. This method is appropriate for setting gross allocations (i.e. percent reduction). The QUAL2E model was used to demonstrate the impacts of tributary loads and those of future reductions in those loads compared to current conditions. Additional modeling downstream in the Portland area was informed in part by the load duration curve and assumptions about the ability to achieve the standard at RM 18. Allocations were not developed directly from the QUAL2E model, rather, the impact of those allocations was assessed by the model.*

Comment 17.	QUAL2E also segments the river system into equally sized reaches. This results in reach calculations that do not account for changes in slope, sinuosity, width, tributary inflow or other variables. This works well with the steady state hydraulic assumption that the flow is steady but not uniform longitudinally. Again, these coarse assumptions are adequate for initial screening decisions but they are not sufficiently robust to support load allocation decisions. (24)
Response	*The "equal-sized" refers to the length of the reach. Reaches had different slopes and widths and accommodated tributary inflows. Refer to the response to Comment 16, above.*
Comment 18.	Please clarify the statement on page 214: "Given the model is steadystate a reasonable worst case scenario was developed." First, what has nonuniform, steady flow to do with worst case scenarios? Second, how does a "reasonable worstcase" differ from an "unreasonable worstcase"? Our concern is that such imprecision will result in uncertainty and unpredictability by the agriculture industries in demonstrating compliance with all water quality criteria under the TMDL water quality management plan. We will continue to work cooperatively with ODA on the 1010 basin water quality plans if the blanket TMDL document permits more flexibility in determining where there may be threshold violations and corrective actions. (24)
Response	*Given that the model is steady-state, it cannot be used to evaluate bacteria concentrations during rapidly changing conditions (i.e. a storm-event). Therefore, ODEQ developed a "reasonable worst case scenario" to evaluate bacteria concentrations during a critical period (i.e. high flows). This scenario assumed average January flows and 90th percentile bacterial concentrations in tributaries for estimating loading to the Willamette River. These conditions would be rare, but could occur in any given year. An "unreasonable" worst case would be a scenario that assumed physical conditions that were vanishingly rare or too common to represent the worst observed water quality limitations.*
Comment 19.	In the next paragraph about the model we read that the Department's "ambient monitoring network provided E. coli data for tributaries and the main stem calibration sites", but Figure 22 shows a total of 10 sites all on the mainstem of the river and none on tributaries or at the confluences. The same map does not show the stations that are "near the mouths of rivers". We request that you provide more comprehensive maps and tables that indicate the full extent of the ambient monitoring network and data collection frequencies and specific locations within the channel. The paragraph continues by stating that the monitoring network is distributed across the entire state but does not explain how these data in other basins are relevant to TMDL determinations within the Willamette River drainage. (24)
Response	*The Ambient monitoring network includes 151 stations distributed around the state and is generally designed to track statewide trends (see the DEQ website at http://www.deq.state.or.us/lab/wqm/ambientmonitoring.htm for further information). These stations are generally at the mouths of significant tributaries and provide information on the quality of water upstream in these tributaries. Only stations on tributaries to the Willamette River were included in the analysis as indicated in the Table in the response to Comment 12. Data from other basins were not included in the analysis. Text and a map including station locations have been added to the "Current Conditions" Section of the final TMDL.* *See response to Comment 13, also.*
Comment 20.	Page 2-9 / 2-10: The statement "these data demonstrate common exceedance of the geometric mean criterion in the lower river both upstream and downstream of the CSO region, … and are typically associated with storm events that result in overflows from the Portland CSOs" does not support the conclusion. Please remove the conclusion that CSOs are to blame for the common exceedance of the geometric mean criterion upstream and downstream of the CSO region. (46)
Response	*The conclusion has been re-worded to read: "These data demonstrate common exceedance of the geometric mean criterion in the lower river within the CSO region, and that violations were more common with distance downstream. These data also indicate that violations generally occur between October and March of any given year, and are associated with storm events of at least 0.15 inches per 24 hours, which typically result in overflows from the Portland CSOs."*

Comment 21.	Page 2-18: "Although the loading from urban runoff could not be quantified in this reach, Generalized reductions will apply to these sources." 'Generalized reductions' appears a vague term for a TMDL document. At best these reductions can be called targets but at no time should be call load or waste load allocations. (46)
Response	*Percent reductions have been developed on a regional basis within the Willamette Basin. These reductions in load are surrogates for direct loading estimates, but they have been developed directly from "load duration" analysis of distributions of bacteria loads at a number of sites around the basin. The "generalization" of these reductions is appropriate as they are applied to areas adjacent to the watersheds where they were developed. They are in effect the same as other surrogates (e.g., shade as a surrogate for heat load) used to express a change in pollutant loading that will be evident on the ground.*
Comment 22.	Page 2-19: "The QUAL2E model indicates that, in the absence of additional loading beyond that in upstream flow, the lower reach would meet water quality criteria." This statement, in essence, says that the City of Portland is responsible for violation of the bacteria standard because it is at the downstream end of the Willamette River. If that is the case, then we request not to place the burden on the City. DEQ needs to explain why a 47% reduction in the bacteria load for stormwater from the City is necessary to achieve the criteria. Shouldn't the upstream sources be required to reduce the load coming into the City? (46)
Response	*The statement neither says nor implies that the City of Portland is solely responsible for violation of the standard. It does say that there are sources upstream of river mile 18 that must be reduced to meet water quality criteria. The TMDLs are comprehensive throughout the Willamette Basin. Sources are addressed at all points along the river, and reductions are expected throughout the basin as a result of the allocations developed in the TMDL. Although the QUAL2E model suggests that loading in the upper watershed is reduced below water quality standards before the lower reach, significant reductions are being required of all sources upstream of the City. Whether as reductions in nonpoint source loads or wasteload allocations for point sources, all sources are required to apply significant controls to loading.*
Comment 23.	P. 2-20: "As of 2003, the City of Portland estimates that CSO volume has been reduced by 53% (City of Portland, 2003)." State what is the baseline for this reduction to provide a context. (46)
Response	*As of 2003, the City of Portland estimates that CSO volume has been reduced by 53% since 1990 (City of Portland, 2003).*
Comment 24.	The Willamette Basin bacteria TMDL as discussed in Chapter 2 and Chapter 10 lists specific numeric percent reductions for instream bacteria load. The reductions are based on land use (i.e., agriculture, range, forest, or urban) which the appropriate Designated Management Agency will use as the goal in developing the required Bacteria Management Plan. The City requests that ODEQ state explicitly that the instream bacteria load percent reductions are target levels and not regulatory or permit limits. (50)
Response	*Load reductions were allocated to land uses to ensure that instream concentrations of bacteria will meet water quality criteria. These are not permit limits, although the reductions should direct the type of management practices applied by DMAs to control runoff loads. ODEQ expects the management of these loads to improve as DMAs learn what is effective and adapt through time to ultimately meet these allocations.*
Comment 25.	On page 2-24, we recommend that "reasonable" wet weather conditions be used rather than "extreme" wet weather conditions. (63)
Response	*The point being made by use of the word "extreme" is that a violation of water quality standards was likely only under extremely high flows and rainfall events that that are very rare and so, not considered reasonably common. This result was based in part on PULSEQUAL modeling of bacterial concentrations done for the lower reach of the river, and indicated violations of water quality standards only under what could be described as extreme rainfall events. Modeling of the river upstream of river mile 18 was based on average January flows, which are commonly observed (approximately half of the time in a normal January) and were considered a reasonable worst-case condition.*

Comment 26.	Page 2-19 - Figure 2.8 seems to indicate modeling results do not match actual monitoring site data, particularly in the lower reach. Please provide more information describing the purpose of Figure 2.8, and how the model was parameterized with monitoring data. (65)
Response	*In the lower reach, the model was not intended to reproduce monitoring data. Rather, the model is used to evaluate the impact of upstream and tributary E. coli loading on the lower reach. The difference between the model results and monitoring data is the portion of E. coli loading attributed to sources that discharge directly into the lower reach of Willamette River.*
Comment 27.	On page 23 the nonpoint sources load allocation are "expressed as a percent reduction necessary to meet the numeric criteria". However, on page 2-13 we read, "There were no reported violations in ODEQ data during summer in the entire river through the period beginning in 1996 to present. ODEQ data indicate rare violations of the single sample maximum criterion (406 MPN/100 milliliter) and no violations of the geometric mean criterion (126 MPN/100 milliliters) in recent years in the fall-winter-spring period above Willamette Falls." (Emphasis added.) This raises the question of what percentage reduction is required to meet the geometric mean criterion and how can one predict and, therefore, prevent the rare single sample criterion? It would be very helpful for you to address this point in the next revision of the TMDL document. (24)
Response	*Violations of water quality criteria for bacteria were rare in data collected by ODEQ. A larger dataset collected by the City of Portland was used to determine the loading capacity and allocations for the river upstream of RM 18. These data demonstrated that upstream loading would need to be reduced by 46% to meet the geometric mean criterion (126 E. coli organisms/100ml) at all flow regimes. The TMDL allocations were focused on meeting this geometric mean criterion, because it was developed from epidemiological studies directed at protecting human health during contact recreation. The more restrictive single sample maximum (406 E. coli organisms/100ml) was intended as a screening tool for determining whether swimming beaches should be closed on a short-term basis. This screening criterion is commonly used for listing purposes under Section 303(d) of the federal Clean Water Act. The TMDL does not envision that there will never be a violation of the single sample maximum, but that the geometric mean criterion will be met under all foreseeable conditions. A discussion of the utility of these two criteria is in the recent document: Water Quality Standards for Coastal and Great Lakes Recreation Waters; Final Rule Federal Register / Vol. 69, No. 220 / Tuesday, November 16, 2004 / Rules and Regulation. In this document, USEPA stated:* *"using the single sample maximums as values not to be surpassed for all Clean Water Act applications, even when the data set is large, could impart a level of protection much more stringent than intended by the 1986 bacteria criteria document"* *Therefore, the geometric mean criterion is identified in the "Target Identification" section as the ultimate goal of the TMDL. Future, post-TMDL compliance assessments of the basin will compare instream concentrations to the geometric mean criterion.*
Comment 28.	Based on the data, the 46 percent reduction in stormwater bacteria contribution is questioned. The river is close to meeting the water quality criteria and estimates indicate that stormwater contributes only two percent of the E.coli load. (46). Page 2-25: "A 46% reduction from current estimated bacteria loading will be required to meet the estimate of the Loading capacity of the Willamette River at all places and all times. "If the river upstream of RM 18 does not violate the bacteria criteria even in FWS then why is a 46% reduction above the CSO control required? (46)
Response	*The reduction of 46% relative to current conditions is based on empirical analysis of the existing data from RM 18. The data are directly associated with flows to derive loading estimates and determine whether these exceeded loads that would be associated with the numeric criteria in the bacteria standard. Loads that exceeded the criteria were common in the "wet" to "high" flow regions of the load duration curves. Modeling done for reaches upstream and downstream of this point provide estimates under defined conditions, verified by appropriate data in those reaches. This modeling suggests what loads will be when all upstream sources have been*

	reduced, but the data at RM 18 is a real measure of what loads have been recently, and by what percentage they need to be reduced.
Comment 29.	The estimated existing bacteria loading contribution from wastewater treatments should specify the estimated current loadings from SSOs and CSOs for each treatment plant. The draft TMDL attributes the bacteria loads from wastewater plants to be only those loads permitted under their NPDES permit (Tables 2-6 and 2-8), and asserts that wastewater treatments have permit limits that minimize their contribution of bacteria (executive summary page, page 2-20). In reality, the contribution from some of the wastewater treatment plants in the Willamette Basin is significant due to extensive SSOs and CSOs. Although the draft TMDL acknowledges that loadings from SSOs are significant, all loads from SSOs are lumped into the nonpoint source category (Table 2-8). Existing estimated SSOs and CSOs should clearly be under the current point source loads for the wastewater treatment plants. As presented in the Water Quality Standards Attainment Analysis (page 2-30 to 2-31), successful elimination of excessive CSOs and SSOs in the Willamette basin is essential to meet the bacteria water quality standards criteria. Under the model scenario run to ensure that the geometric mean bacteria standard would be met, the model input assumed no bacteria loads from "sewer overflows and spills" in the upper reach (page 2-30) and it assumed that "CSO and sewage spills will be mostly eliminated" in the lower reach (page 2-31). (65)
Response	*ODEQ has demonstrated in the analysis that the rare sewer overflows that occur in the Willamette River may cause occasional localized violations, not that they are an ongoing "significant source." It is ODEQ's belief that an allocation for sanitary sewer overflows is inappropriate, as these discharges are not allowed under existing NPDES permits. Although there are provisions for not bringing enforcement action against a facility when an uncontrolled discharge occurs under certain unusually high rainfall conditions, these are still not allowed under rule, and they are quite rare overall. An SSO is a violation of a permit and will result in some form or response, whether that is an enforcement action, an order to repair and schedule for eliminating the problem. It is not appropriate to Include an allocation for a discharge that is not permitted to occur.* *These events, along with spills, should be dealt with as they occur and measures taken to prevent all of them. In general, these events violate the instantaneous maximum criterion (406) but would generally not lead to longer term violations of the geometric mean criterion due to their short duration. The TMDL is designed to ensure this latter criterion is not violated, in accordance with USEPA guidance for developing pathogen TMDLs. Moreover, recent guidance from USEPA included in the promulgation of marine beach bacteria criteria discussed the intended use of the instantaneous criterion for immediate events rather than as never to exceed criteria (see response to Comment 27, above).* *The difference between this and the CSO allocation is that we do expect a discharge from the CSO every time certain precipitation conditions occur. ODEQ does not expect SSOs to occur from each plant under any flow conditions, but if they do happen during wet-weather events of a certain scale ODEQ does not enforce against the facility.*
Comment 30.	A 46% reduction from currently estimated sources does not align with the fact that the Willamette River is close to meeting water quality standards for bacteria. Additionally, the source of bacteria in the Willamette is not understood and background bacteria levels need to be considered when setting wasteload allocations. (55, 63)
Response	*Although the QUAL2E model suggests that concentrations in lower reaches are or should be low, direct sampling demonstrates that sources of bacteria upstream of RM 18 are significant. The model suggests the effects of tributary loads in the middle and upper reaches of the river should have been reduced by dilution and decay before reaching the lower reach. The 46% reduction in bacteria is based on a direct measure of instream loads at RM 18 (Figure 2.11 pg 2-23). The River does not meet standards at this point and the need for reductions is clear. The precise composition of sources that result in this excess bacterial loading is uncertain, but the indications are that significant loads are entering the river between river miles 18 and 34. Stormwater was*

	clearly an important source of bacteria in any of the urban areas that were studied as part of this TMDL (e.g., City of Salem, Johnson Creek watershed). Urban development accounted for only 6% of area in the reach from river mile 34-48 compared to 26% of area in the reach from river mile 18-34 (see Figure 2.9 pg 2-19). This degree of urbanization and the common observation of elevated loads derived from urban sources strongly implicate urban runoff as a significant factor. Other nonpoint sources will also be required to reduce bacterial loads in runoff according to the percent reductions.
Comment 31.	Chapter 2 of the draft TMDL addresses bacteria. On page 2-30, the Department shows an allocation to municipal separate storm sewers (MS4) dischargers of 53%. It is unclear if the Department will assign waste load allocations to MS4 owners or operators. However, any attempt to do so would be arbitrary and not in accordance with applicable law. *a. Permitted MS4 Dischargers are Subject to a Maximum Extent Practicable Standard.* In 1987, Congress amended the federal Clean Water Act, adding Section 402(p) to address discharges of pollutants contained in storm water associated with both industrial and municipal separate storm sewer systems. 33 U.S.C. 1342 (p). In establishing the regulatory program requirements for municipal storm water discharges, Congress recognized that the standards and permit requirements for municipal separate storm sewer systems must be flexible and reflect the wide range of impacts associated with the nature of this type of discharge. *See National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges*, 55 Fed. Reg. 47990, 48037-38 (Nov. 16, 1990). In the final rule implementing section 402(p) of the Clean Water Act, the Environmental Protection Agency (EPA) explained: "When enacting this provision, Congress was aware of the difficulties in regulating discharges from municipal separate storm sewers solely through traditional end-of-pipe treatment and intended for EPA and NPDES States to develop permit requirements that were much broader in nature than requirements which are traditionally found in NPDES permits for industrial process discharges or POTWs." *Id.* Congress was also cognizant of the practical limitations of storm water regulations for municipalities because "discharges from municipal storm sewers are highly intermittent, and are usually characterized by very high flows occurring over relatively short time intervals." *Id.* Accordingly, Congress provided in the federal Clean Water Act that municipalities must implement "controls to reduce the discharge of pollutants to the maximum extent practicable." 33 U.S.C. 1342 (p)(3)(B)(iii). To achieve Oregon's water quality goals described in ORS 468B.015 and ORS 468B.020, Oregon statutes provide the EQC and the Department with authority to implement federal regulations and guidelines established by the EPA in accordance with the Clean Water Act. Oregon follows the federal approach to control the discharge of pollutants that may be contained in municipal storm water and applying the maximum extent practicable standard. Accordingly, DEQ requires that MS4 permittees implement reasonable and available measures to the maximum extent practicable to control the discharge of pollutants that may be contained in municipal storm water, as required by Section 402(p)(3)(B) of the federal Clean Water Act, 33 USC 1342 (p)(3)(B)(iii) and ORS Chapter 468B. Requiring permitted MS4 dischargers to comply with numeric waste load allocations not only is impractical, but goes well beyond the requirements provided under the Oregon and federal water pollution control laws. *b. There is Not Sufficient Information to Establish Appropriate Allocations.*
Response	*There have been multiple comments suggesting that allocations for stormwater, applicable to both MS4 and non-MS4 systems are inappropriate or even unlawful. These commentors argue that the basis of pollution control for these systems is the application of control technologies that reduce pollutant loads to the "maximum extent practicable," or "MEP." ODEQ acknowledges that MEP technologies are appropriate for pollution control and for meeting the allocations presented for these sources in the TMDLs. However, the allocations provide the degree to which these*

	technologies must reduce pollutant loads to meet the ultimate goal of eliminating violations of water quality standards. *There is nothing inconsistent between setting allocations that reduce loads significantly below current conditions and the application of best management practices. As part of stormwater management plans for MS4 designated management agencies (collectively, "DMAs"), the expected efforts of the DMAs over the lifetime of a permit will be described as a feature in the stormwater management plan developed for the permit. These plans will detail the types of technologies, their efficacy at removing pollutants (e.g., fecal bacteria) from stormwater prior to discharge, and estimates of reductions that may occur from implementation. The plans will also present monitoring and reporting elements that will allow the DMAs and ODEQ to determine whether allocations or interim targets are being met into the future. These results will be reviewed during the permit renewal process, with updates to plans reflecting success or failure in making significant progress toward meeting allocations.* *Through implementation of stormwater plans as required by permits and other authority, improvements in runoff water will be documented by the DMAs. This information, along with data collected in receiving waters to assess ongoing water quality, will be the basis of future changes to stormwater plans, permits, and for revisions of TMDLs during the normal review process. As improvements are made, technologies that have been effective under various circumstances will be identified and applied as appropriate.*
Comment 32.	The sources of non-point source bacteria have not been sufficiently identified to enable the Department to establish any waste load allocation for MS4 dischargers. Any allocation prior to such identification would be arbitrary.
Response	*It is clear that stormwater is a significant component of bacteria loading to the Willamette River and several of its tributaries. MS4 dischargers are responsible for pollution control anywhere within their management areas.*
Comment 33.	Table 2-6 page 2-26 assigns waste load allocations as concentration based and load limits as organisms per day. Does daily load allocation represent opportunities for trading? (37).
Response	*Trading is unlikely. Bacteria effluent limits for Wastewater Treatment Plants (WWTP) require the numeric criteria to be met before discharge. Since all WWTPs must meet the bacteria water quality standards before discharge, there is no opportunity for trading. Any trading opportunities would be between the treatment plants and nonpoint sources, though the loading from treatment plants is small relative to these latter sources.*
Comment 34.	Reference OAR language that allows a winter season (November 1 to May 21) overflow during a one in five year, 24 hour duration storm and a summer (May 22 to October 31) overflow during a one in ten year, 24 hour storm event. (37). The existing State of Oregon design storm event for allowable wastewater overflows should be referenced in the TMDL documents. The TMDL document should specifically reference the Oregon Administrative Rules "design storm event" of a winter allowable wastewater overflow during a 1 in 5, 24-hour storm and a summer allowable overflow during a 1 in 10, 24-hour storm. Municipal wastewater treatment facilities are designed to meet the flows generated in the sanitary systems by these storm events, and the basis for the TMDL should be consistent with these standards. (48, 56)
Response	*This language was cited in the Target Identification section of the TMDL and has been retained in the final document. Regardless of the design allowances in rule, overflows are expected to be rare events, and will be controlled as much as possible. Overflows should only occur when unforeseeable events interfere with normal operations. For this reason, there is no allocation for overflows, and their prevention will remain a function of the NPDES permitting process.*

Comment 35.	Page 2-26: "Where subbasin TMDLs present load reductions for specific waterbodies that are covered by an MS4 permit, those reductions will also be applied to the portion of the MS4 area that drains directly to the Willamette River." (46) It does not make sense to require a higher than necessary reduction for the Municipal Separate Storm Sewer System (MS4) area that drains to the Willamette River (WR) just because it is needed for the tributaries. BMPs can be applied by watershed or subbasin and need not be MS4 area wide. (46)
Response	*The reductions referred to were developed to be landuse specific. The appropriate reductions for MS4 management are the urban landuse allocations. It is proper to apply an allocation for stormwater to a stormwater management program.*
Comment 36.	Municipal wastewater NPDES permit conditions are sufficient to protect public health and the environment. The existing NPDES permit requirements for disinfection, and the associated limits on the allowable discharge of bacteria in treated municipal wastewaters, is sufficient to meet the requirement of the bacteria TMDL. We support this conclusion in the draft TMDL documents, and furthermore ask that the tables and references in this section (such as Table 2.6) of the TMDL documents be revised to remove any estimated bacteria loading and to indicate that no wasteload allocations are being specified that are over and above the existing NPDES permit limitations. (48, 56, 63) The City has a concern regarding Chapter 2, Table 2.6 (page 2-26), titled "Wasteload allocations for Wastewater Treatment Plants (WWTPs)." The right-hand column labeled "Estimate of Loading (organisms/day)" needs to be more explicit. These numbers are <u>not</u> actual wasteload allocations as indicated by the table title, rather they are estimates of loadings from point sources. The City requests that these numbers be removed or relocated to a new table titled "Estimate of Loading (organisms/day) from Point Sources at Current Permitted Limits". It should also be clearly stated that no wasteload allocation is being specified for municipal wastewater dischargers in this TMDL beyond the requirements of existing NPDES permit limits. (50) Page 2-26 - Table 2.6 is entitled as "Wasteload Allocations for Wastewater Treatment Plants", but the column in which flow-based wasteload allocations are listed is labeled as "Estimate of Loading". Specific wasteload allocations for each wastewater treatment plant should be included. A suggestion is to re-label the column "Estimate of Loading" to "Wasteload Allocations." (65) In Table 2.6, delete the column entitled 9(a) Estimate of Loading (organisms/day). POTWs will be expected to meet the current effluent limit concentrations. A separate WLA as suggested by this current column heading is incorrect. (63) We suggest that Table 2.6 be modified to remove the right-hand column A Estimate of Loading. This table is titled Wasteload Allocations for Wastewater Treatment Plants and inclusion of these numbers in the table is potentially confusing, since we understand that these are not intended to be WLAs. The numbers should be deleted and the current NPDES permit limits for bacteria should be retained. (63) The TMDL document needs to be clear that POTWs need only to comply with current permit limits (126/406 E. coli per 100 ml per standard) to satisfy proposed TMDL requirements. (55, 63)
Response	*Wasteload allocations for treatment plants are variable depending on effluent and river flow. Regardless of the actual load discharged by the treatment plants, they are required to meet bacteria water quality standards at the end of the pipe (prior to discharge). ODEQ has included an estimate of the potential loading based on a measure of flow from the treatment plants. This is only an estimate and not a regulatory limit. The estimate serves to demonstrate that loads from WWTPs are small relative to the loading we see from nonpoint sources. ODEQ has made this clarification in the Final TMDL.*

Comment 37.	Page 2-20: "Limno-tech, Inc. (2001) estimated that CSOs accounted for 54 % of the annual loading, upstream sources for 44 %, and stormwater runoff for 2 %." What is the reason for focusing on stormwater if it only contributes 2% of the bacteria load? Due to the large variability in bacteria measurements, even 100% control will not result in a statistically significant or measurable reduction. (46)
Response	*The Limno-tech estimate is based on a relatively small volume of stormwater that occurs in the Portland area which is served by the CSO system but is not part of the CSO system. This study did not address areas outside of the CSO area and is not a basin-wide estimate of stormwater loading.*
Comment 38.	Page 2-26 - The CSO allocation in Table 2.6 needs clarification. Table 2.6 presents the bacteria allocations for all sources in terms of E. coli organisms per day. The allocation for CSO is 2.0 x 10^13 E. coli per day; footnote c states that this allocation is the "30-day average based on no load except during overflow events allowed under Amended Stipulated Final Order (ASFO)." It's not clear what this allocation represents for the two NPDES permits for CSO communities in the Willamette Basin (Portland and Corvallis). Is this the allocation per day only when there is a CSO event, or is this the average daily allocation for a 30-day period? In other words, over a month, does this allocation represent 2.0 x 10^13 E. coli total? Or does it represent 6.0 x 10^14 (i.e. 2.0 x 10^13 E. coli/day * 30 days). Since the Portland ASFO specifies four overflows per year, would the allocation in the permit be equal to ¼ of this value? Is the CSO allocation only for Portland, or does it also include Corvallis. It's our understanding that Corvallis has essentially eliminated CSOs from their system. (65)
Response	*Corvallis has eliminated CSOs as a source of bacteria to the Willamette River, and has not discharged CSOs in the last 3 years despite occurrence of some very large storms (Tim McFetridge, ODEQ, personal communication). The allocation for CSOs is for the City of Portland only. The average E.coli load for any 30-day period that includes CSO events will not exceed this value. This assumes that the events are very rare due to effective elimination of CSOs except as allowed under the ASFO, which allows overflow during storm events with a return interval of 4 per wet season. This means there are unlikely to be more than 4 events in any given year, and there may be fewer. For every CSO event there will be a large number of non-CSO days to ensure the average never exceeds the allocation.*
Comment 39.	Page 2-27: "Therefore a range of 80-94% reductions are appropriate for urban planning and permitting and a range of 66% to 83% reductions are appropriate for agricultural management areas in other subbasins in the Willamette Valley that have not been listed as water quality limited." What does that mean for Tryon Creek and Balch Creek which are not listed for bacteria? Do we have to apply a reduction of over 80% even if there is no evidence of a bacteria problem? This statement must be removed. It is not based on any analysis of the data and therefore lacks scientific basis, and it is not in accordance with OAR 340-042, which requires analyses prior to establishing a TMDL. (46)
Response	*The intent of the TMDL is to allocate loads on a subbasin scale. Although Tryon and Balch Creek are not listed specifically, they occur within a subbasin that does have listed streams. Load allocations developed for the entire subbasin apply to all surface waters within its boundaries. The subbasin-wide application of reductions is meant to ensure that appropriate pollutant controls are in place regardless of whether a stream is listed as water quality limited. As the allocations are developed on a land-use-specific basis, it is expected that controls that will result in reducing bacteria concentrations to the levels required by the TMDL are also appropriate for creeks with the same land-uses occurring. In subbasins with no listings for bacteria, the allocations are still appropriate as planning targets to be applied based on land use.*
Comment 40.	Page 2-28 - The values in Table 2-7 do not agree with the values from Chapter 7 (Middle Willamette) i.e. Mill Creek Summer, 88% here but 89 in Ch 7. FWS 85 vs 81. Pringle FWS 78 vs 79. Page 2-29 Mill Creek text also reflects 88% vs 89% (65)
Response	*ODEQ has made these values consistent with the original analysis in the final document.*

Comment 41.	Page 2-28, Table 2.7: It seems inappropriate to base bacteria reduction in the WR watershed in general on required reduction in Johnson Creek especially since WR-specific modeling showed a reduction requirement of 46% instead of 78%. Also see P. 2-29 "Allocation Summary" Footnote "b = appropriate for use in MS4 permits and other planning document." The MS4 permit is not a planning document but a permit. Creating an allocation that has significant consequences for a permit and its implementation should not be made lightly. Further, as modeling has indicated, urban stormwater only contributes 2% of the total bacteria load in the Lower Willamette River. Increasing the reduction requirement from 46% to 78% will not result in a measurable improvement of the bacteria load to the Lower Willamette River. (46) Footnote "d = based on analysis of Johnson Creek as most urbanized waterbody, …" Johnson Creek is not the most urbanized water body in the Lower Willamette Basin, but the Columbia Slough is. The Columbia Slough TMDL requires much smaller bacteria reductions than Johnson Creek. Thus, the premise that bacteria reductions from one stream can be used as a surrogate for other urban stream is inconsistent with past DEQ permitting and TMDL practice. (46)
Response	*Landuse-specific load allocations are developed based on the improvement of conditions in tributary streams as well as the mainstem of the Willamette River. Even though the River appears to show only subtle impairment, tributaries commonly exceed water quality standards much more frequently. The load allocations are designed to meet WQS in the tributaries, which will also result in lowering loads in the mainstem. TMDLs in this basin are developed on a subbasin scale and applied to all surface waters in a subbasin. Although reductions were generally developed in waterbodies that are currently listed as water quality limited for bacteria, the TMDL seeks to comprehensively restore water quality to all surface waters in the Willamette Basin, rather than focus only on those reaches that are specifically listed. Load allocations are applied beyond the waters they were developed for, but usually are restricted to the same subbasin. The exception is Johnson Creek as a surrogate for the Clackamas Subbasin and for Urban Stormwater in MS4 permitted jurisdictions.*
Comment 42.	Page 2-32, Reserve Capacity. We would suggest making it more clear here that 'New' sources can discharge to the WQC limit if it does not otherwise cause a violation downstream. This will make it clear that new sources can enter the waterbody and be 'consistent' with the TMDL. (65)
Response	*ODEQ has made more explicit that new point sources may enter the basin providing they do not add or contribute to a Water Quality Standard violation and are consistent with anti-degradation rules that apply to new sources.*
Comment 43.	A statement should be made as to how the TMDL take into account critical conditions and seasonal variations. (65)
Response	*ODEQ has added the following underlined text to the Loading Capacity discussion following the load duration analysis:* This analysis indicates that loading at RM 18 exceeds the loading capacity of the river during some high to very high flow events. Moreover, the loading capacity is most likely to be exceeded during significant rain events. <u>From this we determined that the critical condition, when loading exceeded capacity, was during high flows, generally during or following rainfall events.</u> *The TMDL analyzed bacteria data by season (wet vs. dry) and took critical conditions into account by focusing effort on reducing loads during the types of flow events that were most commonly associated with violations. Violations were more likely to occur during mid-range to high-flow events (Figure 2.11 and 2.12), which were generally during the fall-winter-spring (wet) season. For modeling of bacteria accumulation, the critical condition was defined as the "reasonable worst case scenario" assuming average January (all years on record for each waterbody) flows and 90th percentile of bacterial concentrations based on historical sampling. Further analysis was performed on data from subbasins to determine whether water quality standards were met during different seasons (fall-winter-spring vs summer). Allocations are in the form of % reductions that rely on application of management practices that are required throughout the year, thereby requiring compliance in all seasons.*

	ODEQ has added the following underlined sentence to the discussion of Loading Capacity to clarify that the loading capacity would be protective under all conditions, and that it applies throughout the year. The loading rate that would meet the log-mean criterion during high flows was 2.40 x10^{14} *E. coli* organisms/day. Combined allocations that result in this loading rate during high flow conditions would be protective at all times of the year.
Comment 44.	[Bacteria Appendix] Page 5, Table 2: Though this information is cited from a reference by Cleland (2003) the source assessment classifications for failing on-site wastewater do not seem reasonable. The relative importance of on-site disposal systems to bacterial loads are generally considered high during low and dry flow conditions, assuming there is a discharge to surface water. This is because flow volumes through septic systems are not dependent on rainfall events, as opposed to stormwater and runoff to streams. DEQ should reconsider this information before presenting it in the TMDL. (6)
Response	*There are indications that failure rates are higher during wet weather due to saturated soils. Although there is more water to dilute runoff from this type of failure, they may still be significant to small streams.*
Comment 45.	The Water Quality Management Plan (Chapter 14) repeats that nonpoint source load allocations will be reduced via specified management strategies in order to meet designated criteria. For agricultural lands the Oregon Department of Agriculture (ODA) is the designated management agency and acts via the senate bill 1010 water quality management plans. We wonder what this means to those sectors of the agricultural industries within the Willamette River basin because your data indicate that the upper river meets the bacteria concentration criteria all year with the rare and unpredictable single sample spike. We find nothing in the ODA 1010 plans that can predict neither these rare spikes nor a mechanism using your sampling locations and time intervals that will document that the agriculture community is not causing E. coli bacteria concentrations to exceed determined limits at any place or time. (24)
Response	*Although sample concentrations of bacteria largely met water quality standards in the Willamette River, many of the tributaries to the River commonly violated water quality standards. The majority of agricultural operations in the Willamette Valley are physically associated with small streams and tributaries rather than the mainstem of the Willamette. A major aim of the TMDL is to control sources that cause these violations in rivers and streams prior to discharge to the Willamette River. In so doing, the reduced load to the Willamette should result in decreased concentrations of bacteria in the mainstem.* *The expectation for agriculture in the basin is to apply best management practices that will result in reducing runoff concentrations to meet requirements of the TMDL. The manner of meeting these allocations is through the SB1010 planning process, and the determination of appropriate control technologies will be decided by landowners and agriculture technical representatives (e.g., ODA, NRCS). Moreover, operations that are not sources of bacteria will not be required to reduce their contribution.*
Comment 46.	The TMDL should provide for exceptions regarding compliance with the Allocations in the event of unusual conditions beyond the discharger's control. In establishing the bacteria waste load allocations the Department relied on statistical analytical methods to quantify natural conditions. As with any statistical approach, there is some probability that the natural conditions will at times greatly exceed the modeled condition (for example, an extraordinary rain event or a period of excessive solar radiation). In most instances, the events are unusual, temporary and beyond the practical control of the discharger despite the use of prudent treatment and control measures. At a minimum the Department should establish exceedance criteria for bacteria. OLSD suggests that the Department utilize an approach to define unusual conditions similar to the 1 in 10 year storm event for summer conditions and the 1 in 5 year storm event for the winter conditions. (35)

Response	*See Response to Comment 34.*
Comment 47.	Page 14-54. The requirement to contact local media of discharges in exceedance of the bacteria criterion should be removed from the TMDL. This requirement should be addressed through the NPDES permit process. It should also only apply to illicit discharges or spills and not storm water. (37).
Response	*Requirements to notify local media of discharges, spills and other events that cause water quality standards to be exceeded will be included in NPDES as appropriate. ODEQ may ask that designated management agencies not regulated by NPDES permit prioritize protection of public health and such action may include public notification.*
Comment 48.	The WQMP should specifically state that compliance with Schedule D(2)(e) of the MS4 permit is compliance with the TMDL for both mercury and bacteria. Unlike other industrial discharge permits, MS4 systems are subject to the Maximum Extent Practicable (MEP) standard. The allocation of a waste load to MS4 permittees beyond what is required under the MEP standard would be arbitrary and not in accordance with the law. (44)
Response	*MS4 WLAs are implemented through BMPs to achieve MEP. Adaptive management and adjustments to these BMPs may be necessary to ensure adequate performance and attainment of MEP. Also, see response to comment 31.*
Comment 49.	The bacteria specific strategies section (page 14-54) discusses the need for sewage overflow notification procedures. Schedule C of the City's current NPDES permit already contains the requirement for notification procedures. These procedures have also been approved by ODEQ. Substitution of the City of Portland program in not appropriate and the City requests this be deleted (50)
Response	*See Response to Comment 47.*
Comment 50.	For stormwater, affected municipalities will continue to address bacteria as an aspect of their overall Stormwater Management Plan, using adaptive management techniques and a Maximum Extent Practicable approach to drive towards improved ambient water quality. For bacteria in stormwater, effective management techniques include investigation of cross connections between the sanitary and storm sewer system, working with the appropriate jurisdictions on failing septic systems, and education and outreach campaigns aimed at proper pet waste disposal. These are the types of programs we anticipate local governments undertaking related to developing bacteria TMDL implementation plans. (55)
Response	*See Response to Comment 32.*
Comment 51.	Table 2.7 needs to be corrected for the Middle Willamette summer contributions. While much still needs to be learned about the bacteria sources for these streams, both Mill and Pringle Creeks do indeed receive contributions from agricultural sources during the summer. The Santiam Water Control District (SWCD) distributes irrigation water to extensive acres under agricultural use, and flows (both surface and subsurface) from the SWCD system are returned to not only Mill Creek, but also Pringle Creek via a SWCD diversion (just south of Kuebler Boulevard) from Mill Creek into the "headwaters@ of the Middle Pringle/East Pringle system. Consequently, equity mandates a summer reduction from agriculture for the Mill and Pringle Creek systems. (63)
Response	*ODEQ has made corrections to the appropriate table. However, regardless of the details of this particular waterbody, management practices for all landuses are allocated throughout the subbasin for the entire year. Operations that occur in summer have effects on winter pollutant loads. Operations on creeks that are not formally listed as water quality limited must still manage pollutant runoff to ensure those waterbodies are not excessively polluted. Agricultural practices will be expected to control pollutants year around to ensure loads in runoff are controlled.*
Comment 52.	Three major concerns exist with respect to the proposed bacteria allocations within the TMDL. The concerns relate to the variability of E. coli concentrations across samples taken at the same time and place; the ability of management agencies to reduce E. coli levels from non-human

	sources; and the usefulness of E. coli (or fecal coliform, or Enterococcus) as a proxy for human pathogens. These concerns and their implications for the TMDL are addressed below.
Response	*The response to the last of these concerns is partially contained in the response to Comments 2 and 4. The other two are addressed in response to comments 53 and 54.*
Comment 53.	Sampling Methodology: Based on sampling that has occurred in other communities (i.e. the Cities of Pendleton and Klamath Falls) we are concerned with data quality. We respectfully request that: • All water quality sampling needs to strictly adhere to the Standard Methods 20th Edition (1998) collection guidelines: o Start microbiological analysis of water samples as soon as possible after collection to avoid unpredictable changes in the microbial population, o Ice samples during transport to the laboratory if they cannot be processed within 1 hour after collection, and o Do not exceed the 24-hour holding time. • All data should be of Data Quality A or higher, according to the ODEQ February 2004 Data Quality Matrix, Version 3.0.
Response	*Development of the Willamette TMDLs generally included data collected since 1996, when ODEQ adopted water quality criteria based on E. coli, and through 2003. 303(d) Listing of waterbodies as water quality limited was often based on fecal coliform data preceding this time period. Data used in the TMDLs met the quality assurance (QA) criteria adopted at the time of their collection, and all data used in the Bacteria TMDLs were from prior to the above cited data quality matrix. During this period of collection, processing of field samples was to begin as soon as possible, but not more than a 30-hour holding time following sampling. Current sampling standards still require samples to be processed as soon as possible, but not longer than 24 hours following collection. The difference between samples processed in 24 hours versus 30 hours, if discernable, is likely to reflect some modest decay in the latter samples. These slightly lower sample concentrations though unlikely to exceed the difference observed between split samples, would underestimate bacterial concentrations and add a margin of conservatism to analysis of a population of samples. For additional discussion of holding times and quality assurance, see the document on the ODEQ website at:* http://www.deq.state.or.us/lab/qa/ *The data quality matrix allows for use of B-level quality data if professional judgment supports its use. Although data that do not meet ODEQs QA criteria are generally not included in analyses, ODEQ is required to use all acceptable data that is available. This includes data from cities, watershed councils, water purveyors and other entities that meet these QA requirements.*
Comment 54.	Natural Variability: The data available to set the Willamette mainstem TMDL were limited, considering the geographic scope of the TMDL and the inherent variability of bacteria concentrations in the river. ACWA's concerns include: • Fecal coliform (FC) can be extremely variable (e.g. several orders of magnitude within 24 hours at the same location). This makes it very difficult to accurately estimate loads from various sources based solely on FC data. • Fecal coliform's extreme variability makes it very hard to detect upstream vs. downstream differences that might indicate a source. • Fecal coliform's extreme variability makes it very hard detect trends over time, thus the success of adaptive management can not be judged in the short-term on FC monitoring alone. These factors imply that a statistical approach to setting TMDLs can result in unreasonably stringent limits when the mean and/or median values aren't in fact very different from the standard. Such appears to be the case for the Willamette mainstem. Inferences from bacteria sampling should be confined to the statistical applicability of the data collected. In other words, if limited data has been collected, only limited assumptions can be made on the quality of the stream and how achievable and effective bacteria reduction will be on water quality. Another consequence of variability is that improvements are difficult to detect. As seen in Figure

	1, results of a statistical analysis on the Puyallup River illustrates that several hundred samples could be required per site to determine a 20% change in bacteria levels. In other words, significant work could be done in a watershed and the bacteria could be significantly reduced, but it would take hundreds of samples to determine any difference in bacteria levels. The TMDL should state that improvements may appear only as modeled changes, since actual changes will be hard to demonstrate without an inordinate number of samples. Further, modeled changes for stormwater (i.e. the benchmarks in the MS4 Phase I permits) will necessarily be based on broad assumptions regarding the efficacy of various management practices to affect bacteria concentrations.
Response	*ODEQ acknowledges that bacteria data are variable and that this makes precise estimates of current, future, or attainable concentrations difficult or impossible. Despite this difficulty, it is clear that many waterbodies are currently polluted with bacteria at varying frequencies and sources are identifiable (see in part response to comment 2). The focus of the TMDL on meeting the geometric mean E. coli concentration rightly places emphasis on protection of human health and acknowledgment of this variability. It also will allow ODEQ to observe long-term patterns rather than individual violations of the single-sample criterion.* *In general there are multiple sources of bacteria, all of which contribute, and that need to be controlled. Over time, it may become apparent that some sources cannot or will not be controlled (e.g., wildlife contributions) and that these sources are locally significant. The nature of controlling these sources will be adaptive, seeing what works and how instream concentrations respond. The perception of the problem will also be adaptive, by continuing to assess effectiveness of control measures and improvement or a lack thereof to the environment.*
Comment 55.	WES would like to review inspection records for permitted CAFOs within the Clackamas basin. (37).
Response	*These inspections and CAFO permits are managed by the Oregon Department of Agriculture. CAFO Inspectors are listed on the ODA website at: http://egov.oregon.gov/ODA/NRD/cafo_front.shtml*

References

Ritter, et al 2003; Stewart, et al 2003; Stoeckel, et al 2004. Microbial Source Tracking

City of Portland, 2003. http://www.cleanrivers-pdx.org/what_we_do/ east_side_cso_tunnel.htm

ODA. CAFO Inspectors are listed on the ODA website at:
http://egov.oregon.gov/ODA/NRD/cafo_front.shtml

ODEQ. Consolidated Assessment and Listing Methodology for Oregon's 2004 303(d) List of Water Quality Limited Waterbodies" at: www.deq.state.or.us/wq/303dlist/303dpage.htm).

ODEQ. Details of the Ambient Monitoring Network and sampling guidance are available at:
http://www.deq.state.or.us/lab/wqm/watershed.htm
and http://www.deq.state.or.us/lab/qa/techdocs.htm

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Great Lakes Recreation Waters; Final RuleFederal Register / Vol. 69, No. 220 / Tuesday, November 16, 2004 / Rules and Regulation.

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Comments on Chapter 3: Mercury TMDL	
General	
Comment 1. *Adequacy of the TMDL*	• The current effort does not constitute an actual TMDL, but rather a study that will lead to a TMDL in the future. The DEQ should not submit this document to the EPA as a TMDL. (52) • We do not feel that the TMDL represents a solid analysis for mercury and we suggest that the DEQ further delay adoption of the TMDL. (53)
Response	*The State Department of Human Services has issued fish consumption advisories for the Willamette River and Dorena and Cottage Grove Reservoirs because the levels of mercury in bass and northern pikeminnow routinely exceed the mercury criterion of 0.35 parts per million . ODEQ's mercury TMDL was developed to reduce the amount of mercury in the river so that mercury levels in fish will be reduced, with a goal of eliminating the fish consumption advisories. Because the fate and transport mechanisms for mercury can be very complicated, especially when it involves the legacy of abandoned mines and air deposition of mercury from outside the basin, ODEQ is taking a phased approach to reducing mercury. We are requiring actions to address mercury beginning in 2007, and we are taking actions to increase our understanding of mercury in order to update the mercury TMDL in 2011.* *ODEQ developed this mercury TMDL using a Basin-Specific Aquatic Food Web Biomagnificant Model for Estimation of Mercury Target Levels, and a Revised Estimate of a Mercury Mass Balance for the Willamette River Basin. A basin-wide mercury monitoring program was implemented to support the food web model and to estimate mercury mass loads and sources. ODEQ developed mean estimates of relative mass contributions for the following source categories: erosion of mercury-containing soils; runoff of atmospherically deposited mercury; landfill emissions; historical mining activities; municipal and industrial point sources; stormwater; and sediment resuspension. The load associated with the erosion of native mercury-containing soils (47.8%) and the runoff of atmospherically-deposited mercury from global and local sources (47.7%) are the two largest mercury inputs to the mainstem Willamette River. The estimated average input from municipal point sources is 2.7% and industrial sources contribute 1.2% of the total load. Beyond this mass balance estimate, there are significant data gaps that limit ability to accurately estimate the magnitude of source-specific mercury contributions. Following the issuance of this TMDL as an Order, ODEQ will be taking actions to fill in those data gaps leading to a revised TMDL in 2011.* *Beginning in 2007,ODEQ will require selected major NPDES domestic, industrial, MS4 and selected minor point sources with the potential to discharge mercury to increase monitoring and reporting of mercury. Major NPDES domestic and industrial point sources will also be required to develop and submit mercury minimization plans that identify and implement strategies to reduce mercury. For example, ODEQ and municipal facilities are working with dentists to install dental amalgam separators and implement best management practices when disposing of amalgam, to keep mercury used in dental office products from entering wastewater treatment plants.* *ODEQ will also work with communities and businesses to reduce soil erosion that can carry mercury to rivers. Some of this work will occur through existing stormwater general permits that control erosion and storm water pollution. Nonpoint sources will also be expected to incorporate mercury reductions and concerns into the established mechanisms for TMDL implementation pertaining to*

	agriculture, forestry, and urban land use activities, primarily through erosion control by stabilizing shorelines and reducing the upland sediment input into the river system. *At the same time, ODEQ will be developing a comprehensive framework for better understanding mercury in the Basin, along with the methodological and modeling tools needed to calibrate and validate this framework. To provide data for this purpose, ODEQ will: (1) conduct three years of water quality monitoring to collect additional information on ambient mercury and methyl mercury concentrations and (2) perform additional source characterization work to help refine the estimates of sector-specific source contributions. The availability of the expanded data set will help reduce uncertainties and enable the development of more refined estimates of the appropriate water column guidance values and sector-specific load and wasteload allocations. ODEQ also commits to the further evaluation of the methodological and modeling tools employed in this study. In the event new information suggests improved alternative methods for establishing water column guidance values and/or load allocations, this information will be incorporated into the 2011 revisions of the TMDL. In updating the TMDL ODEQ will be determining whether it is necessary and appropriate to assign facility-specific wasteload allocations and land use-specific load allocations and establish numeric permit limits.*
Comment 2. *Adequacy of the TMDL*	The draft TMDL would not ensure that mercury concentrations in fish are reduced to levels where Willamette River fish will be safe to eat and therefore fails to meet the fundamental purpose and requirements for a TMDL. Treatment of point and non-point sources will not ensure that the necessary reductions will occur. To the extent the proposed plan fails to be based on adequate data and information it fails to meet the requirements of state and federal law. (29)
Response	*ODEQ does not agree with these comments. See response to Comment 1 for further detail.*
Comment 3. *Adequacy of the TMDL*	We found the mercury TMDL well presented and well explained. The presence of excess mercury in fish tissue is an issue of great concern here in the Northwest and throughout the country. The quantification of the fate and transport mechanisms for mercury can be extremely complicated, especially when addressing instances where historic mining and deposition of atmospheric particles from outside the basin are suspected to be significant as in the Willamette. We have been impressed with how DEQ has faced these challenges, developed and implemented a monitoring program to assess multiple forms of mercury in water, fish and sediment, developed a food-web model specific to the Willamette to better understand the fate of mercury in the Willamette, and dealt with the uncertainties throughout the development of the TMDL. We believe that this phased mercury TMDL forms a solid basis for the implementation and monitoring programs described in the WQMP and look forward to your continued work in these areas as this TMDL is implemented and refined. This is a well-written description of the mercury problem and the necessary components of the water quality standards analysis and TMDL elements. The analysis of the pathways by which atmospheric mercury is transported to the Willamette River is an excellent contribution to our understanding of mercury pollution in this region. (65)
Response	*Comments noted.*

Comment 4.	Clean Water Act should not be used to regulate non point sources of pollution (including mercury). (27, 67)
Response	*ODEQ does not agree with this interpretation. Although nonpoint sources of water pollution are not subject to the National Pollutant Discharge Elimination System (NPDES) permit program established by Clean Water Act Section 402, they are addressed by other provisions in the CWA, most notably Sections 303 and 319. The Oregon Legislature has authorized ODEQ to implement all provisions of the CWA (ORS 468B.035).*
Comment 5. *Scope of TMDL*	The MOU between the ODF and the DEQ states that 'water quality impairment related to aquatic weeds, bacteria, chlorophyll a, dissolved oxygen, flow modification, many nutrients, total dissolved gas, or toxins are generally not attributable to forest management practices regulated by the EPA'. The mercury TMDL doesn't include any new or different information that would warrant a change in this determination. (47)
Response	*The TMDL for mercury and the Revised Estimate of a Mercury Mass Balance for the Willamette River Basin (presented in Appendix B) highlight the importance of nonpoint source categories in the loading of mercury to waterbodies of the Willamette Basin. This loading from various land use categories is attributed to the runoff of atmospherically deposited mercury and the erosion of native mercury-containing soils. Management activities in urban, agricultural and forested areas all have the potential to affect the movement of mercury from the landscape into adjacent waterbodies. Best management practices can reduce the erosion of mercury containing soil and the runoff of atmospherically deposited mercury from the landscape. In Phase II of this effort, ODEQ will work with its colleagues in forestry to better understand the importance and role of forest management in addressing water quality issues pertaining to mercury.*
Comment 6. *General approach: Implementation based on BMPs*	We are most concerned that DEQ is now on the pathway to requiring a mercury load reduction effort by the regulated community without having a true understanding of when, or if, commensurate reductions in fish tissue concentration could be achieved by the prescribed actions. We believe that DEQ understands some of the uncertainty with mercury cycling that could lead to this lack of predictable result, and has elected to phase this mercury TMDL. We are skeptical, however, that the science of mercury cycling, and the results of that science applied to the Willamette Basin, will be sufficiently advanced by the time the next TMDL is used to set a target water column concentrations such as envisioned by the current set of TMDL documents. This expectation, however, is presented in the current TMDL. The obvious downside of setting an overly aggressive target water column concentration is that one may never be able to meet it. This would set up unrealistic expectations in the citizens of Oregon that would damage the credibility of DEQ and the NPDES-regulated community alike. For this reason, we recommend that DEQ set up the expectation now that implementation of this and future TMDLs will be on the basis of mercury reduction best management practices (BMPs), rather than waste load allocations in permits. Identification of BMP-type approaches with high anticipated effectiveness could be identified in the TMDL, forming the basis of a plan to bring the Willamette River into compliance with the standard without the need for allocations (either by sector or by individual facilities). The Water Quality Management Plan for this TMDL suggests this approach, but language within Chapter 3 (i.e., that discussion that promises sector/source-specific waste load allocations by 2009) appears to negate this approach. Adaptive management could be pursued, with the option to monitor progress towards the target and make allocations at future times when the science has been advanced. Because allocations are premature, there is not a present

	need to translate from methyl mercury in fish to total inorganic mercury levels in water. Such a relationship would only be required to assist in identifying reductions in inorganic mercury from point or nonpoint sources). (55 (+35,40,46,56,63,68, by reference))
Response	*See response to Comment 1.*
Comment 7. *General approach: Implementation framework*	DEQ has stated that, "A calibrated [mass balance] model would allow us to predict the effectiveness of remediation efforts or sector-specific source category reductions in terms of ultimately achieving reduced environmental/fish tissue concentrations." It is not necessary to develop a mass balance model for mercury in the Willamette River if the approach to reducing mercury inputs is based on implementing consensus, cost-effective measures that will ultimately lead to compliance with the standard. An adaptive management approach suggests that the most cost-effective measures can be pursued first, with more expensive, less effective measures to be incrementally pursued if monitored progress toward the target were to dictate the need. For example, ACWA could continue to pursue dental amalgam recovery, which is a cost-effective way of eliminating hundreds of pounds of mercury from the system each year. As another example, jurisdictions in the San Francisco Bay Area are looking at more intense management of the disposal of fluorescent lights as a means of reducing local airborne mercury emissions. Responsible land development that reduces soil erosion also might pay big dividends at a low cost. Tree leaf litter contains on the order of several hundred parts per billion (µg/kg) of mercury. When land is cleared, if this organic matter is pushed aside, it can potentially be delivered to streams. If burned, it adds an additional load of particulate and gaseous mercury to the atmosphere. The mercury content of the organic layer of forest soils has been observed to range from 185 µg/m to 749 µg/m, or 1 to 4 pounds of mercury per square mile. Land developed irresponsibly could contribute mercury loads on this order to the Willamette River. With 4,000 squares miles of undisturbed forested land in the basin, the terrestrial reservoir amounts to between 4,000 to 16,000 pounds (1,800 to 7,300 kg) of mercury. Proper management of disturbed land also could pay big dividends. The mercury content of mineral soil in the area ranges from 50 µg/kg to 500 µg/ kg. With 6,000 square miles of potentially erodible land in the basin, the mercury load in the top 10 cm alone ranges from 46,000 to 460,000 pounds (101,000 to 1,010,000 kg). Mercury quantities of this magnitude with the potential to impact the river are important management targets. The development of accurate mass balance and food web models may never be possible, given the gaps in the current state-of-knowledge and the limited resources available to understand the science. The implementation of approaches to solve the mercury problem need not await this development. We do not believe that DEQ has established a sound scientific basis for estimating how to achieve necessary reductions in fish tissue methyl mercury concentration. We suggest that DEQ identifies BMPs that would reduce mercury loads to the Willamette River and rank them according to anticipated effectiveness and cost rather than identifying allocations. The most cost-effective approaches should be implemented first, in an overall adaptive management framework. Additional measures could then be implemented if the need is dictated by monitoring. Costs of implementation could be shared in an equitable way by all dischargers. This approach has been taken by Massachusetts for those watersheds affected solely by non-point mercury sources, for instance). (55 (+35,40,46,56,63,68, by reference))
Response	*See response to Comment 1.*

Comment 8. *Mercury fate and transport*	The establishment of standards for TMDLs related to mercury will be difficult due in part to the behavior of mercury in different environments. Depending on the local conditions, mercury entering the aquatic system may immediately become bound to sediments and clays, effectively making it unavailable to the aquatic biota, or it may form organic compounds converting to the extremely toxic methylmercury form. Without understanding the local conditions, form, fate and transport of the mercury or mercury compound, it cannot be determined which path the substance will follow. Because of these uncertainties, it will be difficult to establish a TMDL for mercury on a statewide basis. It must be kept in mind that the behavior of mercury in aquatic environments is poorly understood and that ideas are currently being refined and are changing. It should also be noted that potential sources to consider must include not only local origins, but airborne components as well. Despite a considerable amount of literature on the subject, the behavior of mercury and many of the transformation and distribution mechanisms operating in the natural aquatic environment are poorly understood, and it should be considered a developing science with new ideas and understandings being generated by the scientific community. (69)
Response	*See response to Comment 1.*
Comment 9. *Incremental sector-based allocations*	• We support the utilization of interim (sector-based) mercury allocations in the mercury TMDL (37, 48, 63). • We support the sector based approach utilized in the mercury TMDL. This approach is justified given the uncertainties in the mercury model and the lack of an adequate database for assessing relationships between mercury sources, in-stream concentrations of the various forms of mercury, transformations between the chemical forms of mercury and fish tissue concentrations (56 *(+ 68, by reference)*). • We agree with the proposed incremental approach to the mercury TMDL. This approach is warranted due to the limited information and understanding of the fate, transport, bioaccumulation, loading and sources of mercury (44, 61). • We support DEQ's proposal to take a phased approach to the mercury TMDL and to refrain from setting firm reduction requirements and effluent limits at this time (61, 66). • The reasonableness of DEQ's approach is borne out by the fact that numerous states have declined to adopt mercury limits and have adopted such a phased approach to mercury TMDLs (for example, Savannah River Watershed (Georgia), San Francisco Bay (California), Snake River (Idaho), Escatawa River (Mississippi), McPhee and Narraguinnep Reservoirs (Colorado), and Arkansas Watersheds (61). • The "Phased Approach" is the appropriate path forward for the Mercury TMDL using the current Oregon practice of adaptive management to gather additional data to revise water column guidance values and allocations by 2009 (66). • We support the Department's statements in the Adaptive Management section on page 3-40 that reiterate that there is significant uncertainty about mercury's behavior in the environment and much more research needs to occur in the Willamette Basin (66).
Response	*Comments noted.*

Comment 10. *Incremental approach and mercury allocations*	• DEQ lacks sufficient information to establish waste load allocations for mercury. DEQ needs to better establish and validate mercury sources, relationship between total and methylmercury, food web model, and feasibility of achieving reductions in fish tissue concentrations (35). • Given the level of uncertainty regarding the source, fate and transport of mercury within the Willamette Basin, we concur that there is no benefit in developing specific point source wasteload allocations or to develop numeric effluent permit limits at this time (50). • Due to the inherent difficulties in mercury sampling and analysis, the DEQ's caution in developing controls or numeric criteria is appreciated (24). • We are uncomfortable with assigning quantitative interim load allocation to the general source sector categories. We suggest that rather than set "interim allocation" to non-point sources, we in partnership agree to collect the necessary data and develop allocations at the time of the proposed final 2009 TMDL which would include point sources (62). • The proposed mercury TMDL is fundamentally flawed in its approach and therefore, we do not support the proposal to include mercury limits in permits by 2009 (68). • There are too many unanswered questions regarding mercury and fish accumulation in the Willamette and we do not support a timeframe that commits to mercury load allocations in permits by 2009 (55 *(+35, 40, 46, 56, 68, by reference)*, 63). • We have concerns with the scope of the TMDL as proposed by DEQ. Specifically, we question the need to develop mercury load reduction targets at this time. We also question the need to translate the estimated target concentrations in fish tissue to a water column based target. While we have no inherent problem with the concept of load reductions or allocations to meet the criterion, we agree with DEQ that any allocations are premature. Allocations are predicated on the ability to establish the current load of mercury to the waterbody. Quantifying necessary total mercury load reductions is also premature. While it is easy enough to calculate the required reduction in terms of fish tissue concentrations of mercury with regard to the tissue-based target concentration, the assumptions and uncertainties inherent in the calculation of the overall watershed load of inorganic mercury preclude the calculation of load reductions with any accuracy. Specific concerns with both the food web biomagnification and preliminary mass balance models are described elsewhere. In addition, the bioavailability of inorganic mercury from various sources (that is, the ability of inorganic mercury in various speciated forms and in various environmental media to be methylated and bioaccumulated) must be known with some degree of certainty in order to calculate meaningful allocations. In our opinion, the development of allocations is fraught with too many uncertainties at this time (55 *(+35, 40, 46, 56, 63, 68, by reference)*). • Given that there will not be formal waste load allocations in this phase of the TMDL, the interim load or wasteload allocation calculated in the TMDL should be eliminated (55 *(+35, 40, 46, 56, 63, 68, by reference)*). • All references to limits and/or loading targets in NPDES permits in 2009 should be removed (37, 44, 50, 55 *(+35, 40, 46, 56, 63, 68, by reference)*, 63).

	• As an alternative, DEQ could mention permit limits as one of many other options that will be considered in 2009 (50). • If BMP-based mercury reduction efforts are successful, there may not be a need for NPDES permits (37, 50, 55 *(+35, 40, 46, 56, 68, by reference)*, 63). • We do not agree with the conclusion that the revised allocations will be translated into water quality based effluent limits for wastewater point sources. This conclusion is premature. Since mercury control strategies are already in place and may be successful, DEQ should wait until new information is assessed before assuming these limits will be necessary (44).
Response	*See response to Comment 1.*
Comment 11. *Need for load reductions*	Reductions in mercury loads may be needed to bring fish tissue levels in the Willamette into compliance with the 0.3 ppm fish tissue criterion. However, it is also possible that the criterion may be met over time without significant source reductions due to mercury reductions shown to date and recent trend reductions in mercury fish concentrations (55 *(+35, 40, 46, 56, 68, by reference)*, 63).
Response	*A comparison of ODEQ fish tissue data collected prior to 1998 with that collected in 2003 does not show a clear downward trend in tissue levels in higher trophic level species such as large and smallmouth bass. This suggests that reductions in fish tissue levels are not likely to occur on their own.*
Comment 12. *Incremental approach and mercury allocations*	• Deferring specific reductions in mercury until 2009 puts 'political pressure from mercury dischargers ahead of public health and the Willamette River fish and wildlife' (29). It is unconscionable that DEQ proposes no remedial action for five more years (36). • Without binding load allocations for mercury, the TMDL does not meet the legal requirements of the Clean Water Act and Oregon Law (29). • We are concerned that DEQ will not set firm reduction requirements in the interim or 2009 TMDL. The text in the Executive Summary (page v) says that DEQ will develop a second mercury TMDL in 2009 which will likely have firm reduction requirements. We would like DEQ to ensure that firm reduction requirements are included in the interim and in the 2009 TMDL (58). • The TMDL should be revised to require specific wasteload allocations for point source dischargers (29). • We are concerned that DEQ is setting allocations (interim guidance values) by sector and not setting water quality based numeric effluent limits in permits for mercury in the interim TMDL. DEQ needs to require the reduction of mercury from all sectors and permits during this TMDL and not wait until 2009. DEQ should require monitoring within permits to ensure that all dischargers are complying with their permit limits and water quality standards for mercury for the life of their permits and not just for the three year period of the interim TMDL (58).
Response	*See response to Comment 1.*
Comment 13. *Effluent limits and water quality standards*	Troubled by DEQ's decision not to require effluent limits that would ensure that point source discharges are not exceeding chronic or acute toxicity standards for mercury. A TMDL that continues to allow dischargers to discharge mercury at

	concentrations that exceed acute and chronic standards is not consistent with the requirements of Section 313 of the Clean Water Act and EPA regulations on TMDLs (29).
Response	*The TMDL presented in this document establishes interim water column targets for mercury that are protective of the beneficial use of human health and fish consumption. The TMDL assigns preliminary reduction targets, sector-specific allocations, and a framework for implementation at this point in time. These mercury targets are below criteria established to protect against acute or chronic toxicity to aquatic life. The TMDL does not specifically address acute or chronic standards. Limits to ensure that point sources do not exceed chronic or acute standards are developed through existing permit requirements.* *Effluent limitations contained in NPDES permits are derived by a reasonable potential analysis (RPA) to determine whether the chronic and/or acute water quality criteria have the potential to be exceeded at the edge of the mixing zone and the zone of immediate dilution, respectively. If the potential to exceed the applicable water quality criteria exists, an effluent limit is calculated and included in the permit*
Comment 14. *Adequacy of incremental approach*	It is unclear how this phased incremental approach fulfills the regulatory requirements of a Clean Water Act (CWA) TMDL. Instead, the sector-specific allocation will not be translated into numeric water quality based effluent limitations and the interim targets are used to describe the problem rather than assign the specific point and non-point source reductions. Sources (both non-point and point) are not required to reduce their discharge levels of mercury except through a voluntary-only basis, providing little effective means of reducing mercury levels in the near-term. *(a)* The importance of this new policy direction cannot be understated as it establishes precedence for how future toxic contaminant TMDLs might be conducted in Oregon. DEQ must therefore provide adequate opportunity for public review of this policy pursuant to the Oregon Administrative Procedures Act (60). *(b)* This apparent change in policy also raises important questions that are left unanswered by DEQ in the draft mercury TMDL. For example, DEQ does not indicate whether they believe TMDL requirements are met once interim or revised water column guidance values are determined or when actual load and waste load allocations are established post 2009. *(c)* It is not evident that by itself, a multi-year strategy to enhance our understanding of mercury fulfills the requirements of a TMDL. Although data limitations confounded this TMDL, a preferred solution would be to obtain the necessary data (which we understand is part of the long-term strategy) without substituting process for the actual TMDL. *(d)* In addition, the TMDL should encourage discussion related to how non-enforceable guidance values and voluntary monitoring programs will ensure necessary mercury reduction. The TMDL should, at a minimum, include a list of performance measures DEQ will use to measure success and a more detailed time frame (e.g., compliance schedule) for achieving the necessary mercury reductions (as examples) in order to add specificity to the document and reduce uncertainty (60). *(e)* The development of a comprehensive framework to better understand the behavior of mercury in the Willamette Basin is needed and we support DEQ's efforts in this area. We also encourage DEQ to invest resources towards understanding how to reduce all contaminant loading in waters throughout Oregon. *(f)* However, in the effort to address water quality limitations of the Willamette Basin, DEQ appears to have placed the proverbial cart before the horse. In this TMDL DEQ cites data gaps as a significant limitation: "Lack of

	adequate information on mercury source contributions from the various source categories mentioned above is a significant limitation of this TMDL" (see pages 3-4, 3-19, 3-40). We strongly recommend that DEQ conduct the necessary monitoring and research to support a comprehensive mercury TMDL rather than substitute a process as a means to fulfill this CWA requirement (60). *(a + d)*
Response	*(a) See response to Comment 1 for how the Mercury TMDL fulfills the regulatory requirements of a Clean Water Act TMDL.* *(b) In response to the comment regarding the Oregon Administrative Procedures Act, TMDLs are issued by order, rather than as rule. This policy is allowed under ORS 468B.110 and OAR Division 42. The Oregon Administrative Procedures Act does not include any requirements for public notice or an opportunity to comment with respect to orders. The Environmental Quality Commission's Division 42 rules, however, require notice and opportunity for public comment. According to these rules, this public comment period "will generally be 60 days" (OAR 340-042-0050). The public comment period for the draft Willamette Basin TMDLs was open between 10/25/04 and 1/31/05 so ODEQ has complied with the public comment requirements specified in OAR Division 42.* *(c) The TMDL for mercury presented in Chapter 3 contains actual load and wasteload allocations and other key elements of TMDLs. The TMDL will ultimately be valid when signed as an order. The requirements of the TMDL will be met, as with any other TMDL, when the water quality standards are met and the beneficial uses are restored. The TMDL establishes a framework for implementation, adaptive management, with the possibility of establishing revised targets over time. The load and wasteload allocations have been established and will be implemented once the TMDL is signed as an order.* *(d) See response to Comment 1 for how the Mercury TMDL fulfills the regulatory requirements of a Clean Water Act TMDL.* *(e) The framework for the implementation of the mercury TMDL is described in detail in Chapter 14, the Water Quality Management Plan. The framework provides a path forward for gathering additional mercury information which will help us refine the analysis of mercury targets and loads in the future. In the meantime, the framework presented provides the mechanism for achieving significant mercury reductions across a broad spectrum of land uses in the Willamette Basin.* *(f) Comment noted.*
Comment 15. *Proportional framework for mercury allocations*	• We support proportional, equitable WLAs. The contribution of point sources in general, and POTWs in particular, is small compared to the overall loading—approximately only 4% of the total load. A prorated, or proportional, allocation of the responsibility to reduce emissions from all sources would be more equitable than the approach proposed in the draft TMDL (48, 56 *(+ 68, by reference)*). • We believe that controls on pollutant sources contributing to exceedances of water quality standards should be applied equitably and proportionally to their share of the overall loading. Wasteload allocations should reflect the true pollutant contributions from a source, be based upon accurate and representative data, and should be managed to a similar degree of responsibility regardless of the type of control mechanism used. For example, the draft Water Quality Management Plan outlines only voluntary BMPs for air sources of mercury, which are some of the largest contributors to the overall mercury load to the Willamette. Air emissions of mercury should be directly regulated under

	Clean Air Act permits to meet any necessary and appropriate mercury TMDLs. Non-point sources of mercury, such as those from the past and/or present application of pesticides and fertilizers in agricultural practices, should receive a similar degree of regulation as all other sources of the pollutant required under the final TMDL (56 *(+ 68, by reference)*, 63).
Response	*The issue of developing a proportional framework for mercury allocations was discussed in detail on numerous occasions at meetings of the Mainstem Willamette TMDLs stakeholder council. ODEQ received significant input on this topic and the general consensus was that an 'across the board' allocation framework was preferable at this point in time given the state of the science and the uncertainties associated with the quantification of the mercury contribution from the various source sector categories. The issue of proportionality, however, can still be a topic of discussion during Phase II of this mercury TMDL.* *ODEQ agrees with the general comment that all potentially controllable mercury source categories, including those associated with nonpoint source sectors, will need to address their mercury contribution. The importance of achieving reductions in nonpoint source categories is especially significant given that industrial and municipal point sources were estimated to have only minor contributions to the load of total mercury in the mainstem of the Willamette River. It should be noted, however, that some of the inputs of mercury in the Willamette system are not readily amenable to local controls. These inputs include the 'global' air sources (mercury originating from sources outside of Oregon's borders) and the resuspension of native sediments in the river.*
Comment 16. *Mixing zones*	Under the proposed TMDL, DEQ would continue to have the authority to renew NPDES permits with discharges of mercury into the Willamette River exceeding acutely toxic concentrations through the use of mixing zones and zones of immediate dilutions. The draft TMDL would continue to allow mixing zones for mercury discharges into the Willamette River and its tributaries. Does DEQ believe that there is an assimilative capacity for mercury in the Willamette (29)
Response	*See response to comments 1 and 13. The response to comment 1 describes the overall approach used to develop the mercury TMDL. The response to comment 13 describes the relationship between the mercury TMDL target concentrations and both the acute and chronic criteria.* *The Mercury TMDL provides a long term average value applied throughout the river that is designed to meet the standard for methyl mercury in fish tissue. Implementation will occur as described in the response to comment 1 above and include mercury monitoring and development of a mercury minimization plan. The acute and chronic criteria would be applied over much shorter time frames, would be regulated by mixing zone requirements, and where needed my result in effluent limits.. Mixing zone requirements are established for each permit and have not been addressed specifically in this TMDL.*
Comment 17. *Protection of wildlife*	• The TMDL for mercury fails to adequately address the narrative criterion for the protection of wildlife, as well as for providing for the protection of beneficial uses from toxics in combination with other pollutants. DEQ has the benefit of a tremendous amount of information already developed on the "safe" levels of mercury for piscivorus birds and mammals. The California Toxics Rule (CTR) Biological Opinion, comments by the U.S. Fish and Wildlife Service prepared on California TMDLs (provided to the Department by NWEA), and the Mercury Report to Congress all contain levels that are very similar for the protection of

	such wildlife as bald eagles. Bizarrely, DEQ rests its case in this TMDL on the fact that it did not list these waters on its 303(d) list for any impairment other than consumption of fish by humans. Therefore, it reasons that it need not prepare the TMDL to ensure the protection of any other designated or existing uses or to meet other criteria. This is simply a fallacy. A TMDL must demonstrate that it will meet water quality standards, not merely that portion of the standards the Department desires to choose. It is also poor policy. As the Mercury TMDL states, DEQ will take further action to protect species other than humans if at some point in the future it determines that the other species are being adversely impacted such that the waters are placed on the 303(d) list again. This policy calls for impairment of species to be measured before DEQ will take action. In other words, birds, mammals, and fish need to suffer measurable health defects, reproductive failure, or death before DEQ will act, despite its action now on the very same pollutant. Not only does DEQ not have a sufficient monitoring and research program in place to determine if these effects are occurring or will occur in the future but waiting for gross results of pollution before acting is an absurd approach to environmental protection when you have another alternative. For threatened or endangered species and for species that are not ESA-listed but are locally adversely impacted by toxic pollution high levels of mercury are likely to have impacts that are irreversible, contributing to possible extinction in the former species and local extirpation in the latter. DEQ should explain why this is a good policy particularly given the information on wildlife effects described above. To the extent that this Mercury TMDL is only an interpretation of DEQ's standards – in that it establishes an interim water column guidance value for human fish consumption – is it difficult to understand why DEQ didn't at the very least use this opportunity to fully interpret its water quality standards. In other words, since this isn't a TMDL but instead is the derivation of a value why not ensure that value is protective of subsistence fish consumers, aquatic life, and wildlife ? (52) • We are disappointed that DEQ chose not to include an examination of other sensitive beneficial uses, such as aquatic health, as part of this draft TMDL. Recent studies conducted by the City of Portland and the Oregon Department of Fish and Wildlife provide evidence of salmon rearing in the lower Willamette River. The longer residence time of these fish may increase the risk of adverse effects from exposure to mercury and should be addressed by DEQ. Mercury studies already conducted and proposed as part of this TMDL provide DEQ with an opportunity to examine these other potential impacts to aquatic organisms (60). • Identified in this paragraph (Appendix B, Food Web Model, Results and Discussion, page 16, 3rd paragraph) are observed mercury tissue concentrations measured in the Willamette River basin that have been shown in the literature to pose a risk to the fish themselves. We recommend that DEQ research and answer this important question: Do observed mercury concentrations cause adverse health effects in the fish themselves? (58)
Response	*The restoration of the beneficial use of protection of human health and fish consumption is the focus of the mercury TMDL documented in this report. Fish in the Willamette Basin are known to contain mercury concentrations at levels that exceed the established USEPA guidance value for methylmercury for the protection of human health (0.3 parts per million). As a result, there has been several fish consumption advisories issued for mercury in the Willamette Basin since 1997 and numerous listings on the State's 303(d) list. The implementation strategy presented in this TMDL document should achieve significant reductions in the load of total mercury entering the Willamette. The reductions will not only*

	benefit humans who may consume fish caught in the river but also the wildlife that feeds on the fish. The development of new standards is not a component of this TMDL. The State of Oregon does not currently have established numeric criteria specifically for protection of wildlife in its Administrative Rules. The USEPA has not yet developed national recommended criteria designed to protect wildlife.
Comment 18. *Air sources of mercury*	• Air sources should be expected to do more to address mercury emissions and the DEQ's Air Quality program should be designated as a DMA (23 *(+ 40, by reference)*). • Air emissions of mercury should be regulated under Clean Air Act permits to meet any necessary TMDL requirements for the Willamette River (48). • Airborne sources of mercury from activities permitted by DEQ's Air Quality program may be significant. Additional commitments are needed from the Department regarding the specific actions that will be taken by Air Contaminant Discharge Permit and Title V air permit holders to reduce the discharge of mercury into the air (37, 55 *(+35, 40, 46, 56, 68, by reference)*, 63). • Air permits and controls for area-wide sources will be essential for addressing the mercury issues in the Basin (40, 55 *(+35, 46, 56, 68, by reference)*, 57, 63). • Air borne sources of mercury from activities permitted by DEQ's Air Quality Program may be a significant source of mercury contamination in the Willamette River. Additional commitments are needed from DEQ regarding specific actions that will be taken by air contaminant discharge permittees to reduce their atmospheric mercury discharges. All municipal and industrial wastewater permit holders will be obligated by a TMDL implementation rule to develop and implement mercury reduction plans. We request that air permit holders that report mercury releases through any of the local, state, or federal Community Right-to-Know regulations also be included under this rule (50).
Response	*ODEQ is requiring the maximum level of mercury control for sources under its current rule authority. ODEQ has also proposed a rule to regulate mercury emissions from Oregon's only coal-fired power plant (PGE Boardman) that will require 90 percent capture of mercury. This proposal is significantly more stringent than the EPA's Clean Air Mercury Rule (CAMR) and will drastically reduce mercury emissions from the plant. Moreover, ODEQ is considering promulgating new stricter regulations for cement plants if action is not taken by EPA to regulate mercury emissions from this type of facility. In the meantime, ODEQ will work closely with air sources to explore different mercury reduction strategies. This includes employing various approaches to reduce air emissions from mobile, area and point sources. For example, ODEQ is working to remove mercury switches from automobiles and implementing mercury recovery programs for thermostats and light bulbs.*
303(d) Listing Process and Fish Consumption Advisories	
Comment 19. *Methods for establishing advisories*	A detailed description is needed in the TMDL that describes the sample collection, analysis, and calculation methods that the State of Oregon uses regarding fish consumption warnings (37, 48, 55 *(+35, 40, 46, 68, by reference)*, 56, 63).
Response	*Fish consumption advisories are promulgated by the Health Division of Oregon's Department of Human Services (DHS). A memo from DHS describing the policies and methodologies governing the issuance of fish consumption advisories for mercury has been added to the TMDL document as part of Appendix B.*

Comment 20. *Need for fish consumption advisories*	• We recommend that a consumption-weighted average of many fish species, not a single fish species, be used for calculating the mercury concentration in fish tissue for comparison to the listing criterion (37, 48, 55 *(+35, 40, 46, 68, by reference)*, 56, 63). • Although the TMDL specifically states that the analysis is "not designed to reevaluate the levels of mercury deemed safe for human consumption or to revisit the basic assumptions inherent in DHS's risk assessment analysis for mercury", we feel that a statement regarding observed fish tissue concentrations with respect to the standard is warranted. DEQ has used in their analysis for the TMDL the U.S. Environmental Protection Agency's (EPA) current tissue criterion of 0.3 mg/kg (i.e., slightly less than the 0.35 mg/kg value used by DHS to determine listing status). This was established as a trophic-level weighted value, where the weighting factors are based on the relative consumption rates of fish at each trophic level (55 *(+35, 40, 46, 56, 63, 68, by reference)*). • The need for a TMDL in the mainstem of the Willamette River has not been demonstrated when DEQ's fish tissue data are properly compared to the EPA tissue criterion (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*As state in the response to Comment 19, DHS promulgates fish consumption advisories. DEQ will share these comments with DHS.*
Comment 21. *Fish consumption advisories: spatial considerations*	• DEQ fish data from 2002-2003 indicates that for the mainstem Willamette (downstream of the Coast Fork) mercury concentrations in trophic Level 3 fish to be 0.21 mg/kg and in trophic level 4 fish to be 0.35 mg/kg. The weighted average of the two concentrations per EPA's methylmercury criterion document is 0.29 mg/kg, which is below the 0.3 mg/kg health-based criterion. When the result of fish in the Coast Fork are included in the analysis (as has been done in the TMDL) the criterion level is exceeded. The segregated results indicate that the mainstem Willamette is not impaired for mercury in fish tissue. We request that DEQ evaluate mercury in fish tissue separately for the Coast Fork, Middle Fork, and mainstem Willamette before finalizing the TMDL and determining if the mainstem Willamette is truly impaired (50). • Using the fish tissue data collected in 2002-2003 for the mainstem of the Willamette River (excluding the Coast Fork data), mercury concentrations in trophic level 3 and trophic level 4 fish are 0.21 mg/kg and 0.35 mg/kg, respectively. If one were to average these concentrations using the EPA consumption weighting factors in its methyl mercury criterion document (41.6% for trophic level 3, 58.4% for trophic level 4, and assuming no trophic level 2 consumption), the weighted average methyl mercury concentration would be 0.29 mg/kg. This suggests that the mainstem of the Willamette River is not now impaired for mercury in fish tissue. When fish in the Coast Fork are included in the analysis, the trophic level 4 geometric mean is calculated to be 0.43 mg/kg, and the consumption-weighted average is calculated to be 0.34 mg/kg, which exceeds the 0.3 mg/kg criterion (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The original listing and reason for the TMDL was because of the fish consumption advisories established by the Department of Human Services (DHS) health division. As noted previously, fish consumption advisories are promulgated by the (DHS) Health Division, and not DEQ. The DHS is ultimately responsible for the evaluation of the available dataset to determine if there is enough information to support a segment-by-segment analysis as related to the fish consumptions advisories as suggested in the comment above.*

	DEQ recognizes the importance of considering spatial factors in the evaluation of fish tissue mercury concentration data and, ultimately, the issuance of fish consumption advisories. Historically, there were separate fish consumption advisories issued for the Cottage Grove Reservoir, the Dorena Reservoir and the mainstem Willamette River. *DEQ recalculated mean tissue concentrations in northern pikeminnow and largemouth bass collected in the mainstem Willamette River. Fish collected in tributaries and tributary reservoirs were excluded, as were any fish collected in the Coast Fork. The pre-1998 and 2003 data sets were combined. Results were 0.66 $\pm$ 0.32 (1 standard deviation) mg kg^{-1} for northern pikeminnow and 0.40 $\pm$ 0.37 mg kg^{-1} for largemouth bass. ODEQ was also able to calculate mean concentrations that were below the 0.30 mg kg^{-1} tissue criterion by assuming various "menus" of different fish species; however, such calculations are not necessarily in accord with DHS methods. The DEQ's 2002-3 dataset was not meant to justify the 303(d) listings but rather to validate the Food Web Model developed as a part of this mercury TMDL study.* *The TMDL is based on a reasonable interpretation of the data and applicable standard. Proposed monitoring will help evaluate trend and improve understanding of mercury in the Willamette. DEQ will continue to evaluate data that is provided through phase II of the TMDL.*
Comment 22. *Fish consumption advisories: temporal considerations*	We recommend that during the next 303(d) comment period, the data on which DHS bases their fish tissue consumption advisory should be reviewed. DEQ subsequently uses this advisory as the basis for including mercury on the 303(d) list. More than one-third of the fish tissue samples used in the cumulative average tissue concentration come from pre-1990, and some are from 1969. These older samples cannot be considered representative of current environmental conditions. In addition, while the home ranges of most of the fish sampled is relatively small (a few kilometers of river at best), the location information used by DHS on the Willamette River is very crude (i.e., "Willamette River", with only one reference to "Center Fork" [Middle Fork?] and one reference to "Portland Harbor"). Information on fish size and age, also important correlates of tissue mercury concentrations, are not maintained for older data in either DHS's or DEQ's database. Once the data used by DHS are examined more closely, delisting of some or all of the Willamette exclusive of the Coast Fork may be warranted, eliminating the need for a TMDL in 2009. At a minimum, we comment on the need to revise DEQ's listing criteria (and potentially the criteria used by DHS). (55 (+35, 40, 46, 56, 63, 68, by reference))
Response	*ODEQ commits to working with the DHS to provide them information during Phase II of this effort to review the dataset for temporal and spatial considerations, to consider the newly established fish tissue criterion for methylmercury, and to determine the need for future or revised fish consumption advisories and 303(d) listings.*
Comment 23. *Methylmercury criterion*	We are concerned that the proposed fish tissue methyl mercury criterion of 0.3 mg/kg, that was approved by the Oregon Environmental Quality Commission (May 2004), has not been approved yet by the U.S. Environmental Protection Agency (EPA). We would like to know what DEQ will do if EPA does not approve the proposed criterion (58).
Response	*The 0.3 mg/kg methylmercury criterion was first established in January 2001 by the USEPA (see Water Quality Criterion for the Protection of Human Health: Methylmercury – January, 2001; EPA-823-R-01-001). DEQ proposed the 0.3*

	mg/kg methylmercury fish tissue criterion as part of its effort to revise the State's water quality criteria for toxic pollutants. The toxics criteria adopted by DEQ in May 2004 have not yet been formally approved by the USEPA. The more stringent values, however, including the methylmercury criterion, became effective in Oregon on February 15, 2005 pending USEPA approval or disapproval. DEQ will continue to apply this criterion. *In the event the USEPA ultimately disapproves the 0.3 mg/kg fish tissue criterion for methylmercury, either DEQ or the USEPA will need to ensure that some combination of mercury and/or methylmercury criteria are adopted for Oregon that adequately protect human health. ODEQ will respond to any new development regarding changes to the appropriate criteria as part of the adaptive management framework for revising and updating the mercury TMDL.*
Relationship between Hg and MeHg in Water, Sediment and Fish Tissue	
Comment 24. *General comments on the relationship between total mercury in the water and methylmercury in fish*	• We do not agree with the basic assumption that there is a direct linear relationship between the current load of total mercury that is present in the river and the accumulation of methylmercury in fish (37, 46, 48, 50, 55 *(+35, 40, 68, by reference)*, 56, 63). • Fish mercury does not correlate well with total mercury loading (37, 46). • The assumption that reducing total mercury will result in a corresponding reduction in methyl mercury (and fish tissue mercury) is not supportable. The net impact on fish tissue mercury associated with meeting the targeted reductions in total mercury cannot be predicted with any certainty. Without a significant breakthrough in the mechanistic understanding of the factors controlling methylation in the ambient environment there is effectively no remedy to this dilemma. Thus, at this point there is no scientifically defensible means for quantifying the impact of reducing the loadings of total mercury to the Willamette on fish tissue residues. This reality reinforces the need for DEQ to approach this TMDL in a phased manner and ultimately, the only means for assessing success will be by measuring mercury in fish tissue (66). • DEQ has stated (p. 3-15 of the Mercury TMDL) that "one of the basic assumptions inherent in the methodology… is that there is a direct relationship between the loading of total mercury and the formation of methyl mercury." This has been a troubling aspect of mercury TMDLs performed to date around the country. While this approach seems logical, it is unfortunately not supported by any evidence. In fact there are indications that fish tissue accumulation is not linear with loading. As pointed out in Porcella (1994), a ten-fold variation in mercury concentrations in fish of similar size - in locations where inputs are relatively uniform - does not suggest a linear relationship between fish tissue concentrations and loading. Engstrom and Swain (1997) show data from lake sediment cores indicating that deposition has decreased in northeastern Minnesota. Previously, Swain and Hedwig (1989) provided data showing that fish mercury concentrations had increased during the same time periods. The following discussion addresses the fact that fish mercury levels do not correlate well with total mercury loading. Much of the net methylation of mercury takes place in sediments. This occurs because the greatest mass of mercury is in sediments, and methylation is important in the surface (1-2 cm) layers of sediments (i.e. near the sediment-water interface). Levels of mercury in the water

	column are quite low in most bodies of water, and apparently do not support large amounts of net methylation. The relatively rapid transfer of mercury to the sediments lessens the probability that methylation will take place in the water column. Further, any one year's contribution to loading does not alter substantially the mass of mercury in the top layers of sediments. Even loadings over decadal periods of time do not appear to relate linearly to the accumulation of methyl mercury by fish. To make an analogy, the sediments are like a huge capacitor, slowing production and releases of methyl mercury into the overlying water. The relatively small fluctuations in the input "current" coming into this capacitor do little to change the output "current". Almost all methyl mercury accumulation in fish comes through the food chain. Only about 5 percent passes through the gills from water. Much of the accumulation in fish therefore depends on bioenergetics (that is consumption of food chain organisms that provide energy for the fish for reproduction, growth, and maintenance metabolism). Given that this is the case, the resulting concentrations in fish would appear to be much more dependent on methylation rates and the structure of the food web than on total mercury concentrations in the water column. In order for fish tissue mercury levels to be linear with respect to mercury loadings, a number of linear relationships would need to exist. First, there would need to be a linear relationship between methyl mercury concentrations in fish and methyl mercury concentrations in the water column. Next a linear relationship between total mercury and methyl mercury in the water column would be required. Finally, a linear relationship would need to exist between loadings of total inorganic mercury to the water body and total mercury concentrations in the water column. These linearities are described below. Not directly included in the FWM, but an integral part of the TMDL, is the assumed linear relationship between mercury in the water column and in underlying sediments. This assumption, too, is analyzed below (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*DEQ's approach makes use of the available site-specific data from the Willamette Basin, incorporates modeling tools developed specifically for mercury, and is consistent with established USEPA guidance on the use of translators and the implementation of the methylmercury fish tissue criterion.* *DEQ's use of a methylmercury translator is consistent with USEPA guidance for developing mercury TMDLs There are several ways to develop a translator. The simplest and most straightforward approach was utilized by DEQ. The translator was empirically determined as the ratio of observed dissolved methyl mercury to total mercury in the water column (with MeHg being 2-12% of total mercury depending on the season). DEQ acknowledges that a translator determined in this manner reflects only what is observed and does not shed any light on underlying mechanisms of methylmercury production or cycling or the linearity or non-linearity of the total - methylmercury relationship. The values measured by DEQ are similar to those reported by the USEPA (USEPA, 2001).* *ODEQ agrees that the connections between total mercury and methylmercury in the water column are poorly understood due to the many factors that influence methylmercury production. The relationship, however, between methylmercury in the water column and methylmercury accumulation in fish is much better understood and well documented in the scientific literature.* *ODEQ would be willing to work with the stakeholders during Phase II of this effort to further discuss and validate the methodological and modeling tools employed in*

	this study. In the event new information suggests improved alternative methods for establishing guidance values and/or load allocations, this information will be incorporated into the Phase II revisions as part of the adaptive management framework.
Comment 25. *Relationship between methyl mercury in the water and methylmercury in fish*	In the Willamette Basin, there is some evidence of a linear relationship between methyl mercury concentrations in the water column and methyl mercury in individual fish species. For instance, largemouth bass in Dorena Reservoir appear to have a similar ratio of tissue concentration to water column methyl mercury (i.e., bioaccumulation factor [BAF]) as largemouth bass in Cottage Grove Reservoir (18.1×10^6 vs. 17.4×10^6) – (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Comment noted. ODEQ also knows, from work performed by the USGS, that for river systems, the methylmercury concentration in surface water can be closely associated with methylmercury levels in fish tissue.*
Comment 26. *Relationship between total mercury in the water and methylmercury in water*	• Analysis recognizes that there is no correlation between dissolved and elemental forms of mercury and methylmercury and that the sources of methylmercury are unknown at present. The analysis then proceeds under the assumption that there must be a correlation between total and methylmercury and based on that unsupported assumption, establishes preliminary TMDLs (47). *(a)* • In DEQ's present mercury TMDL, a predictive relationship between total and methyl mercury is not supported by field data. In our view of the Willamette mercury TMDL, there is not a well understood relationship between the presence of total mercury in sediments and methyl mercury in the water column for the Willamette river system. Prior to taking any specific regulatory action (i.e., waste load allocations in Phase II of the TMDL), we urge DEQ to verify that any reduction in total mercury load to the Willamette River system will directly result in methyl mercury reductions. At present we don't believe this linkage can be demonstrated and science shows that other factors (e.g., dissolved oxygen concentration) are much stronger factors in the formation of methyl mercury. In other words, a reduction in total mercury loading to the Willamette River may have little or no impact on methyl mercury formation. Public and private resources should only be expended when a demonstrable result can be reasonably expected (59). *(a)* • There is not a direct relationship between the loading of total mercury and the formation of methylmercury (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* • The assumption that the ratio of dissolved methyl mercury to total mercury (termed the "omega" factor by DEQ) in the water column is a constant does not reflect current science (66). *(b)* • Evidence of a linear relationship between total and methyl mercury in the water column is lacking in most systems, and this appears to be true for the Willamette Basin as well. DEQ has used the ratio (Ω) between total mercury and dissolved methyl mercury in the water column as a translator to establish interim water column guidance values. The interim values proposed in the TMDL are based on the assumed "direct relationship between the loading of total mercury to waters of the Willamette Basin and the formation of methyl mercury". This approach, similar to that used by EPA (2001), assumes that the methyl mercury formation is a function of the total mercury concentrations in the water column. If this assumption were true, there should be a relationship between total and methyl mercury concentrations in the water column.

To investigate this for the Willamette River, coefficients of determination (R2) were calculated for regressions of dissolved methyl mercury concentrations on total mercury concentrations. The R2 values are provided below:

Sampling Period	Regression Coefficient (R2)	
	Total Mercury vs. Total Methyl Mercury (water)	Total Mercury vs. Dissolved Methyl Mercury (water)
1st Quarter (Fall 2002)	0.13	0.25
2nd Quarter (Winter 2003)	0.21	0.23
3rd Quarter (Spring 2003)	0.47	0.52
4th Quarter (Summer 2003)	0.004	0.23
All Data	0.001	0.10

As the table highlights, little of the variance in dissolved methyl mercury concentrations is explained by variation in the concentration of total mercury. Methyl mercury (total) at the various sampling locations constituted only 0.8% to 15.5% (average of 5.2%) of the total mercury in the water column, suggesting that total mercury concentration is not the factor that limits methylation.
The lack of correlation between total mercury and methyl mercury concentrations is not unique to the Willamette River. Total mercury concentrations account for almost none of the variance in methyl mercury concentrations (R2 = 0.007, N = 38) in various streams in the Experimental Lakes Area in Northwestern Ontario, and sites with one of the highest total mercury concentration also had the lowest average methyl mercury concentration. Based on this, Kelly et al. (1995) concluded that, “total mercury concentration is not a good predictor of methyl mercury concentration in stream water or in lakes”. Other examples come from recent mercury TMDLs in Georgia, where the EPA collected total mercury and methyl mercury samples of water, sediments, and fish. No significant relationship was found between these two parameters in the Savannah River water column data (R2 = 0.003) or in water column data from South Georgia rivers (R2 = 0.28).

The absence of this relationship has been observed between total mercury and methyl mercury in a number of other studies as well. This conclusion is further supported by the data from the nationwide study conducted by Krabbenhoft, et al. (1999), where sub-basins with mining operations that had the highest total mercury concentrations in sediment and water had low methylation rates, whereas methylation rates were highest in basins with the more wetlands. Gilmour et al. (1991) concluded that, “in general, the percentage of methyl mercury does not appear to be a function of total mercury, i.e., contaminated systems do not have consistently higher or lower % methyl mercury than pristine waters”.
Several studies have indicated that the proportion of total mercury present as methyl mercury is inversely related to the total mercury concentration in the water column. Such data were plotted by Schaefer et al. (2004) and found to show an

	inverse relationship between total mercury in water and % of methyl mercury. The authors hypothesized that this "methyl mercury accumulation paradox" is a result of an abundance of certain bacteria that demethylate methyl mercury in waters contaminated with mercury. Thus, rates of methyl mercury production and degradation in the Willamette River are important, but unknown, variables that need to be further studied. As pointed out by Ullrich et al. (2001), despite the vast body of literature on the subject (348 publications cited in Ullrich et al., 2001), one is still unable to predict mercury methylation rates or the likely effects of reducing mercury loadings to the environment on methyl mercury production (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*
Response	*See response to comment 24 above. The relationship between total mercury and methylmercury used in the TMDL was empirically derived. Evidence for an empirical relationship has been reported by USEPA throughout the U.S. The USEPA utilizes the term 'translator' to describe this relationship. The translator does not attempt to explain the mechanism of the observed relationship between total and dissolved methylmercury or substantiates cause and effect. Should the underlying mechanism change the observed relationship may also change.*
Comment 27. *Relationship between mercury loads and water column concentrations*	Linearity of total mercury loadings to total mercury in the water column is purely speculative because loads to the waterbody from the watershed can only be estimated. However, due to the fact that inorganic mercury and methyl mercury have an affinity for solids, these measurements would more likely be a function of particle settling and resuspension, and correlated with flow patterns rather than mass loading in any given hydrologic system. Furthermore, the fact that inorganic mercury may precipitate out as insoluble sulfides under the same conditions in which it is methylated (reducing conditions) suggests a non-linearity. (a) Levels of mercury found in natural streams may be biogeochemically regulated by processes that occur in both terrestrial and aquatic systems. Changes in loadings may have little effect on water column concentrations because of the huge reservoir of mercury that exists in both watershed soils and river and lake sediments. Methyl mercury concentrations in the Dorena and Cottage Grove Reservoirs may be higher than observed elsewhere in the system, not necessarily because of the mercury load (which may in fact be greater) but because conditions in the reservoir sediments are more conducive to methyl mercury formation than in sediments elsewhere in the Willamette Basin (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(b)*
Response	*See response to comments 24 and 27.* *The additional data collected through phase II of the mercury TMDL will help understand mercury loadings and mass balance in the mainstem Willamette. Although resuspension and deposition certainly can reasonably be expected to play a role in changes in mass loadings over time, other sources, most notably air deposition and overland runoff, also play a significant role.* *Data collected by ODEQ and researchers at Oregon State University clearly indicate that Cottage Grove Reservoir receives significant loadings from historical mining operations within its watershed (Dorena Reservoir also receives such loadings, but to a lesser extent). There are areas of the reservoir which are particularly conducive to methylmercury formation but not necessarily more so than similar areas (e.g., wetlands) in the mainstem river.*

Comment 28. *Relationship between total mercury in sediment and methylmercury in water*	The TMDL states that "as more total mercury, bound to sediments and organic matter, enters the Willamette River, more methyl mercury can eventually be produced by bacteria." Such a prediction is not supported by available data. There is no linear relationship (R2 = 0.067) between sediment total mercury concentration and the water column methyl mercury concentration (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The cited statement should not be interpreted as implying a direct linear relationship between mercury in sediment and methylmercury in the water column. It simply suggests that the availability of total mercury could influence, to some extent, the production of methylmercury.*
Comment 29. *Sediments, mercury methylation and bioaccumulation*	Much of the mercury in fish tissue is in the form of methylmercury and much of the net methylation in the watershed appears to be occurring in sediments (37). *(a)* The TMDL document and supporting analysis is focused on water column conditions. We would recommend additional discussion of the potential sediment pathway for mercury biomagnification. The TMDL document only discusses sediments with respect to re-suspension into the water column. Table 2 of the Food Web Model document notes that mercury uptake by worms and macrophytes and insects from bottom sediments is not included, and the discussion of this topic is very brief - "MeHg concentrations in surface water may be better predictors of MeHg levels in fish than are MeHg levels in sediment." This is not a very strong assertion, and we wonder what we may be missing by not including this pathway in the analysis. What are the ramifications of the simplification that sediments are not part of the mercury biomagnification process? Does this simplification bias the analysis toward over-optimism that water column reductions alone will result in the desired improvement in fish levels (65)? *(b)*
Response	*(a) ODEQ agrees with this comment.* *(b) The assertion regarding the importance of surface water concentrations, as opposed to sediment, is based on considerable work by the U.S. Geological Survey.*
Comment 30. *Factors influencing mercury methylation*	• Mercury methylation is primarily a microbially mediated process, and the precise mechanism of methyl mercury formation is still unclear. Mercury methylation and demethylation rates in aquatic systems are influenced by both the speciation and biochemical availability of mercury and environmental variables such as biological activity, nutrient availability, pH, temperature, redox potential, and inorganic and organic complexing agents. Each of these variables may have multiple influences on the methylation and demethylation process. For example, low concentrations of sulfate can limit microbial methylation while high concentrations of sulfate can result in the formation of excess sulfide concentrations that complex with mercury and inhibit mercury methylation. Some of the above parameters can alter the effect of other influencing factors on mercury methylation. For example, pH and redox can directly affect methylation and bioaccumulation, as well as alter mercury speciation, sulfur chemistry, and microbial activity. Due to the complex role of any one of the above parameters on methylation, it is difficult to predict their combined effect in natural systems with existing models. • While additional research in the next 4-5 years may or may not produce a predictive tool, measuring certain important environmental parameters (e.g., pH, redox, sulfate, sulfide, dissolved organic carbon [DOC]) in the Willamette Basin could shed light on the factors that enhance or inhibit methyl mercury production. We recommend that such data be collected. We also recommend

that future sampling efforts be planned explicitly to include places (e.g., small tributaries, any wetland drainage areas, and impounded waters), and times (e.g., summer, fall) when methylation is likely to be highest. We realize that there are many unknowns surrounding the mercury TMDL and that progress must be made in the face of these uncertainties. We believe, however, that progress can be made in an adaptive management framework without making decisions based on tenuous hypotheses (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*

- Key to understanding the relationship between local anthropogenic releases of mercury and mercury concentration in fish tissue is an understanding of methylation processes. Without a more thorough understanding of these processes, major cost-effective and appropriate investments in mercury reduction are more difficult to identify, select, fund, and implement. Based on our review of the data presented by ODEQ and USGS, several issues appear to be unaddressed but are likely to be important in guiding mercury reduction efforts. Most important of these are the spatial and temporal issues described below. One other avenue of investigation was clearly envisioned by DEQ (they collected some data toward this) but was not pursued in the TMDL analysis presented to date. We urge DEQ to continue to investigate the relationship between methyl mercury production and other biogeochemical conditions of the sites from which samples have been and/or will be collected. Important site-specific conditions would include organic carbon that binds methyl mercury (collected but not evaluated by DEQ), and pH, redox, and sulfate/sulfide conditions that govern habitat conditions for the sulfate reducing bacteria that mediate methylation (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a + b)*

- Efforts should be made to move toward characterization of methylation mechanics rather than simply describing the spatial distribution of methyl mercury loading. This can be done by evaluating upper watershed reservoir operations, loading from significant point sources (e.g., Clackamas River hot springs, gold vs. mercury mines), legacy concentrations in river sediments (as a source of methyl mercury subject to equilibrium partitioning, not just resuspension of total mercury), the role of wetlands, and bioavailability of mercury in topsoil. DEQ should also look more closely at patterns of at-a-station variation in methyl mercury results. *(a)*

Here, DEQ can make great use of the relative explosion of mercury studies, including but not limited to those ongoing in the San Francisco Bay/Delta region, to focus on understanding the role that specific methylation processes have in determining the water column methyl mercury concentrations observed to date in the Willamette River. DEQ needs to make use of the DOC and particulate data collected to date and in the future, and should strongly consider characterizing sites and individual samples for sulfate/sulfide, pH (in solids), and total organic carbon (TOC; in solids). *(b)*

Potential Controls On Methylation Processes

Physical or Chemical Condition	Qualitative Influence on Methylation Activity
Low dissolved oxygen	Enhanced
Decreased pH	Enhanced in water column, soil Decreased in sediment
Sulfate <200 or >500 mM	Decreased

	<table><tr><td>Increased dissolved organic carbon (DOC)</td><td>Enhanced in sediment, soil Decreased in water column</td></tr><tr><td>Increased nutrient concentrations</td><td>Enhanced</td></tr><tr><td>Increased selenium, molybdenum concentrations</td><td>Decreased</td></tr><tr><td>Increased temperature</td><td>Enhanced</td></tr></table> Examination of DEQ's limited water quality sampling to date suggests that the upper watershed reservoirs are generating methyl mercury in the summer that is flushed out of the reservoirs in the fall and winter. Mid-valley stations have relatively constant concentrations in methyl mercury, and lower-valley stations have methyl mercury production high in the summer only. These patterns suggest specific, substantial controlling mechanisms on instream methyl mercury concentrations that have not been illuminated in DEQ's discussion that focused on the mass balance of total mercury. *(c)* • DEQ's future work should be focused on better understanding the methylation processes and the spatial and temporal distributions of these processes. This information should be used to focus future TMDL efforts and guidance regarding selection of implementation strategies (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*
Response	*(a) ODEQ agrees with the need to gather additional region-specific data to increase our understanding of factors that affect methylation and de-methylation processes in this system. ODEQ looks forward to working with stakeholders during Phase II to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.* *(b) ODEQ agrees with this comment and is considering adding collection of these water quality parameters to its on-going monitoring program.* *(c)ODEQ does not fully agree with this comment. Methylmercury concentrations throughout the mainstem exist within a fairly narrow range, making it difficult to clearly discern segments on the basis of such concentrations. In addition, there is no evidence to suggest that there are significant discharges of methylmercury from the reservoirs and, if there were, it is not evident that methylmercury from such a source is sufficiently persistent to be transported significant distances downriver.*
Comment 31. *Factors influencing methylmercury production: spatial considerations*	• In order to more fully understand methylation processes, a reach by reach evaluation is needed. At a minimum, the Coast Fork should be evaluated separately (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* • Additional co-located fish and water sampling is needed in the mainstem and the tributaries where higher methylmercury production may occur. Temporal and seasonal patterns in results from the above sampling should be evaluated. Redox, pH, sulfate, sulfide and dissolved organic carbon should be added to analytes and these results should be used in interpretation. Targeted sampling should occur in locations and at times when methylation might be high (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(b)*
Response	*(a) ODEQ believes that it, and other investigators, have collected sufficient data to adequately characterize the Cottage Grove / Coast Fork system, and to evaluate it*

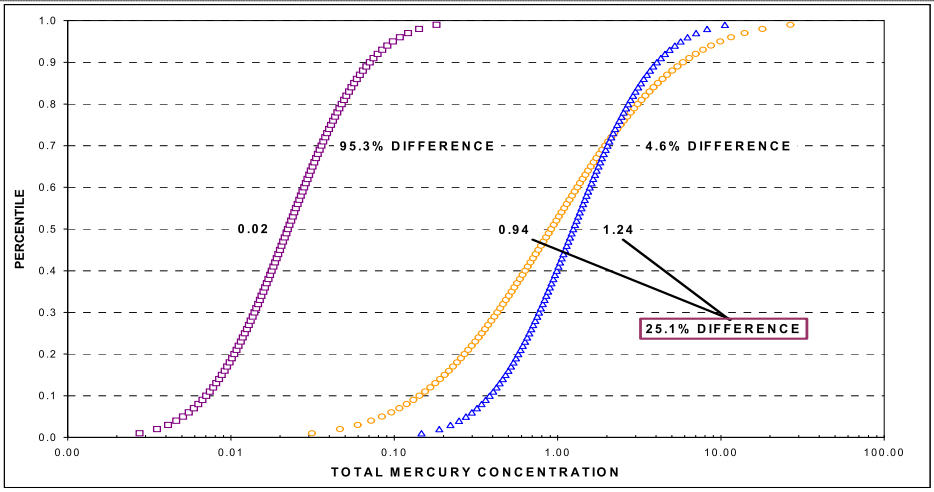
	separately from the mainstem. Whereas we can agree that it would be useful to divide the river itself into individual segments for more detailed analysis, ODEQ simply does not have data at this point to support an analysis at any greater level of spatial detail other than potentially separating out the Coast Fork. This is certainly something ODEQ could consider doing during Phase II of this study. *(b) ODEQ agrees with the need to gather additional region-specific data to increase our understanding of factors that affect methylation and de-methylation processes in this system. ODEQ looks forward to working with stakeholders during Phase II of this study to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.*
Comment 32. *Factors influencing mercury fate and transport*	Mercury is a complicated element which behaves in very different ways depending on the form that it is in, the climatic environment, the host geology and mineralogy, vegetation, surface water composition, reducing or redox conditions (Eh), acidity (pH), etc. Because of these differing behaviors exhibited by mercury in response to physical conditions, it is not possible to make blanket predictions as to whether Hg will enter the environment and, if it does, whether it will be found in a form that will bio-accumulate. For an understanding of mercury transport and fate, solubility data on elemental mercury and mercury compounds, especially in water, are necessary. One of the potentially most serious environmental issues related to mercury is the chemical dissolution and the movement of elemental mercury, mercury ions, and mercury compounds in surface waters and ground water. Compared to some compounds, elemental mercury tends to be relatively insoluble in water. In addition, dissolved mercury tends to be rapidly absorbed by inorganic and organic materials in soils, sediments, and water making it less available to the environment. These factors can explain why sediments and soils with high levels of elemental mercury can have very low levels of dissolved mercury in associated surface or ground waters. Although elemental mercury is not as soluble as other forms in water, it can be converted to organic and inorganic forms under certain near surface conditions. Once in a soluble form, it may then convert to methylmercury and become readily available to the aquatic biota, or under certain aquatic conditions, it may de-methylate and once again become unavailable. Thus without a detailed understanding of current conditions, it is not possible to predict the path mercury or mercury compounds may take in the environment. Because of this unpredictability, it is essential that any limits that are established be based on an understanding of local conditions as well as potential sources and possible changes to the local environment (69).
Response	*ODEQ agrees with many aspects of the comments listed above and the considerations listed above support and validate the incremental approach ODEQ has taken. ODEQ agrees that understanding the behavior of mercury is challenging, particularly with respect to its speciation. ODEQ does not, however, agree that "...it is not possible to make blanket predictions as to whether Hg will enter the environment..." since it clearly does, from both natural and anthropogenic sources.* *ODEQ agrees with the need to gather additional region-specific data to increase our understanding of factors that affect the movement and speciation of mercury within this system. ODEQ looks forward to working with stakeholders during Phase II of this study to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.*
Development of Guidance Values and Reduction Targets for Total Mercury	

Comment 33. *Guidance values in units of total mercury*	Establishing interim guidance on total as opposed to methylmercury is a sound policy approach (6) Text should be added to page 3-13, 5th paragraph to better justify the decision to use total mercury as opposed to methylmercury (6)
Response	*Comment noted. Additional text has been added to better justify the decision to use total mercury as opposed to methylmercury.*
Comment 34. *Use of pikeminnow in establishing guidance values*	• The use of the pikeminnow in the development of the guidance values is questionable due to the fact that the pikeminnow is caught and consumed only on an occasional basis. The choice of a species not normally consumed, but known to be the most efficient bioaccumulator of mercury serves to bias the results of the analysis (47). • There is no data to support frequent consumption of the pikeminnow. ODEQ acknowledges that the northern pikeminnow is not a targeted commercial species and may be caught and consumed on an occasional basis by recreational and subsistence fishermen. There is no need to protect to this level, since occasional consumption does not present a health hazard. We suggest that large mouth bass would be a more appropriate indicator species since it is a targeted species that is frequently consumed. Guidance values based upon large mouth bass would be protective for other regularly consumed fish species (61). • The choice of fish species (northern pikeminnow) for the water column guidance values is an overly conservative technical choice in the Food Web Biomagnification Model (66). The focus on the northern pikeminnow is overly conservative in that it assumes that only this single trophic level 4 species is consumed by humans. DEQ should use a different fish species in the model that is more commonly and widely consumed by Willamette Basin residents, and determine water column guidance values accordingly (66).
Response	*The use of the northern pikeminnow in establishing guidance values was justified because this particular fish species was identified as a species of concern in the original fish consumption advisories issued by the DHS. The TMDL was developed in response to the DHS advisories. Studies referenced in this TMDL suggest that the pikeminnow is indeed consumed on an occasional basis.*
Comment 35. *Methodology for establishing guidance values*	• DEQ acknowledges that there is considerable uncertainty in translating fish tissue concentrations to an equivalent water column-based target value. We believe that a better approach is to compare measure fish tissue data (based on spatial considerations) to the fish tissue standard (50). • We have concerns over the way in which DEQ has made use of its modeling results to compare to the methyl mercury criterion. DEQ has calculated a total mercury water quality target of 0.92 ng/L based on modeled biomagnification factors (BMFs) for the northern pikeminnow and percent methyl mercury (ratio of dissolved methyl mercury to dissolved total mercury). Comparison of this number to the calculated average annual mercury concentration of 1.25 ng/L suggests that a 26.4 percent reduction would be needed to bring the

	Willamette River back into compliance with the 0.3 mg/kg criterion. As DEQ admits, there is considerable uncertainty associated with the translation of fish tissue concentration to an equivalent water column-based target. There is additional uncertainty associated with the calculation of an "annual average" total mercury concentration for the Willamette River. On top of the significant uncertainty associated with these calculations, DEQ has added an additional "margin of safety" by using only the data from the northern pikeminnow to calculate the target; the logic being that if and when the northern pikeminnow is safe to consume with frequency, then all other species would also be safe to consume. Because the uncertainties propagate in these calculations in ways that may not be fully understood or quantified, it would seem that the most direct way to calculate a required percent reduction would be to compare fish tissue concentration data to the EPA tissue criterion. However, it is inappropriate to compare the tissue concentration in only one species to the criterion, which was derived assuming the consumption of numerous fish species in three trophic levels. Furthermore, by utilizing all the relevant fish tissue data, the uncertainties inherent in a single species' tissue concentrations are further reduced. Based on the consumption-weighted concentrations in the discussion of impairment of the Willamette River mainstem no reduction in tissue mercury concentration would appear to be required, and many portions of the Willamette River could be removed from the 303(d) list. If the fish taken from the Coast Fork were to be included in the analysis, a reduction of 13% would be suggested (comparing the consumption-weighted value of 0.34 mg/kg to the standard of 0.3 mg/kg). Alternatively, the geometric mean tissue concentration of fish above the Cottage Grove and Dorena reservoirs was computed to be 0.98 mg/kg, implying a 69% reduction in these reaches overall or an 80% reduction in Cottage Grove Reservoir and 52% in Dorena Reservoir. These percent reductions are based only on trophic level 4 fish and are therefore overly aggressive; they are intended to serve only as illustrations. We recommend that DEQ reconsider its approach. We believe that DEQ's approach may result in an inaccurate assessment of the fish tissue concentration reductions and associated mercury load reductions that would be needed to meet the standard. As it now stands, the percent reductions calculated by DEQ may be overly aggressive. It is our opinion that the comparison of two highly uncertain calculated quantities (i.e., the target level and the "annual average" total mercury concentration in the Willamette River) is a less defensible approach than the comparison of measured fish tissue data to the standard. This direct comparison should be the first step in the TMDL. Once a percent reduction in fish tissue concentration is determined from this direct comparison, existing data relationships and relevant portions of the FWM could be used to estimate a target reduction in water column methyl mercury concentration that would be the basis of the TMDL instream concentration. DEQ should use a direct comparison between measured trophic level weighted fish tissue concentrations and EPA's 0.3 mg/kg fish tissue mercury criterion (that was determined on a trophic level weighted basis) as the basis for setting a TMDL. This would require limited use of the food web model without the omega translator as necessary to develop a target water column methylmercury concentration (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ recognizes that the USEPA has apportioned its methylmercury fish tissue criterion on the basis of fish at different trophic levels. ODEQ has, however, chosen to use one fish species, the northern pikeminnow, for the establishment of*

	guidance values for the reasons specified in the TMDL document and in the response to public comment document (see response to Comment #34 above). Ultimately, comparisons by DHS (and not ODEQ) between measured fish tissue levels and the fish tissue criterion will determine whether fish advisories can be modified or lifted. ODEQ will explore working with DHS to revisit the pertinent issues pertaining to the fish consumption advisories for mercury. *Fish tissue monitoring can be considered a more robust, but considerably more expensive, approach as compared to water quality monitoring. Fish tissue sampling also does not lend itself readily to the needs associated with effectiveness monitoring and NPDES permitting. ODEQ would be willing to consider alternative approaches provided that funding mechanisms could be identified that would support these efforts over the time it would take to see a system response to changes in loadings.*
Comment 36. *Appropriate fish consumption rates*	• The TMDL neglects to provide protection for people who consume higher than average amounts of contaminated fish (52). • Tribal members consume fish at higher rates than the average American, therefore placing them at higher risk of exposure to contaminants through the consumption of contaminated fish (58).
Response	*Comments noted. The Environmental Quality Commission recently adopted water quality criteria for the protection of human health based on the nationally recommended fish consumption rate of 17.5 g/day (which is calculated as the 90th percentile fish consumption rate of the general population, i.e. 90% of the general population eats less than this amount). This particular fish consumption rate was also an integral part of the established USEPA fish tissue criterion for methylmercury, a criterion that ODEQ adopted without modification. The TMDL was based on consumption of pike minnow and relative risk would be dependent upon which fish are actually.*
Comment 37. *Focus on the bass and the pikeminnow*	The scope of this TMDL is restricted to the restoration of a select fishery (i.e., bass and northern pikeminnow) without consideration to other important fishery resources in the basin, specifically those of the CRITFC member tribes (see page 14-23). Northern pikeminnow is an exotic, warmwater fish and a major predator to salmon. The selection of the northern pike minnow as the target species and the median value for methylmercury bioaccumulation in the northern pikeminnow will likely not be representative of the treaty resources and does not reflect other fishery users such as Native Americans and others whose high fish consumption rates create an increased exposure risk to contaminants such as mercury (60).
Response	*The northern pikeminnow is the most efficient bioaccumulator of mercury of all the fish species considered in the Basin-specific Aquatic Food Web Model due primarily to dietary considerations. This species is eats other fish and occupies the highest trophic level of the aquatic food web. The northern pikeminnow (or squawfish) consistently exhibits the most elevated concentrations of mercury of the fish species sampled in the Willamette River system with the possible exception of fish caught from the two reservoirs in the Coast Fork Subbasin. The pikeminnow's place as one of the highest trophic level fish species in both the Columbia and Willamette River Basins means that protections based on its exposures will protect the consumers of other fish species. Anadromous or ocean-going fish (e.g., salmon), which may obtain contaminant loads while outside the Basin and beyond ODEQ's control, are not considered in this analysis.* *The response to Comment #36(above) addresses the issue of protecting those who may traditionally consume more fish than the general population.*

Comment 38. *Degree of protectiveness*	We are concerned that DEQ's decision to use the median level (50th percentile) of the Translator Value (developed in the Food Web Biomagnification Model (FWM)) for the Interim Species-Specific Water Column Guidance Value is not protective or conservative enough. As outlined, this means that there is a fifty percent likelihood that any given fish species will have a fish tissue concentration at or above the EPA fish tissue criterion for methyl mercury (0.3ppm). We would like to know why DEQ is not using the 95th percentile for the water column guidance value to increase the protectiveness to aquatic organisms and to tribal consumers (58).
Response	*ODEQ's use of the median value in developing guidance values is consistent with the methodology utilized by the DHS when issuing their fish consumption advisories and application of the water quality standard.. The DHS compares average contaminant concentrations in fish with the appropriate threshold to determine if fish consumption advisories are justified. The methodology utilized by the DHS for issuing fish consumption advisories has been added to Appendix B of the TMDL document.*
Comment 39. *Range of values*	There is a great degree of uncertainty in the calculations and analysis used to demonstrate that a 27% reduction is necessary to restore the beneficial use of fish consumption. We believe that using a range of values, as opposed to a single figure, is a preferable approach (37, 55 *(+35, 40, 46, 56, 68, by reference)*, 63).
Response	*ODEQ acknowledges the considerable uncertainty inherent in the preliminary calculations and analyses presented in this document. Phase II of this study will help reduce the uncertainty and provide additional statistical confidence in the estimates of the percent reduction required in order to restore the beneficial use of fish consumption.* *The chart below shows three distributions of total mercury; A distribution for total mercury estimated from the ambient water quality data from the Willamette (open triangles), the output from the Food Web Model for the northern pikeminnow (open circles) and a hypothetical data distribution with a median value of 0.02 ng/l (open squares). The median values for the distribution estimated from ambient data and the distribution from the model simulation for the pikeminnow were approximately 25% different. There is, however, significant overlap between the two distributions. There is a significant chance that a limited set of data would not be able to demonstrate a significant difference between two such similar distributions. If we were to reduce the ambient concentration to 0.02 ng/l (as indicated by the plot on the left), then we would be virtually certain that the ambient data would be significantly different from the target output from the Food Web Model.*

	 *The uncertainty faced today is due in part to the paucity of data from the Willamette. If more data were at our disposal then it would be possible for there to be less of a required percent reduction in terms of ambient water column levels. In Phase II of this study, ODEQ will revisit the degree of reduction required in light of the additional data and the observed variations in mercury levels.*
Comment 40. *Level of confidence*	The number of samples to get a reasonable level of confidence in target water column concentrations is in the hundreds to thousands (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ agrees that additional data would provide a higher level of confidence in the water column guidance values. The phased incremental approach outlined in this TMDL allows ODEQ to revise the analysis and the targets during the next incremental phase of the TMDL as the expanded dataset is incorporated. ODEQ would be willing to explore techniques such as probability or composite sampling that may increase the level of confidence without creating unmanageable cost constraints. ODEQ would be willing to consider these options provided that a funding mechanism can be found that would support this effort for the time it may take to see a system response to changes in loadings (possibly 5-15 years). ODEQ looks forward to working with stakeholders during Phase II to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.*

Margin of Safety	
Comment 41. *General*	The DEQ should clearly identify the range of conservative assumptions in this phase and in future phases of the mercury TMDL (66).
Response	*The conservative assumptions used in this TMDL analysis have been presented in the text of Chapter 3 in the Section entitled 'Margin of Safety'.*
Comment 42. *Conservative assumptions*	We assert that the assumptions in the technical work and modeling are very conservative, especially in the choice of the fish tissue criterion of 0.3 mg/kg and the choice of the northern pikeminnow in the food web model and thus the TMDL's policy choices on the Margin of Safety and Reserve Capacity are appropriate and protective of beneficial uses during the interim time period (66).
Response	*Comment noted.*

Comment 43. *Conservative assumptions*	• Page 3-19 of the document states that 'the use of a lower more conservative 0.3 mg/kg represents a conservative margin of safety on the order of 15%. The limits established by the Health Department already have a variety of safety factors built in based on a number of considerations. This represents an implicit margin of safety. Adding a 15% explicit margin of safety appears excessive (46). • We believe that DEQ has applied an overly conservative and unnecessary margin of safety by using 0.3 mg/kg (as opposed to the threshold 0.35 mg/kg) along with the northern pikeminnow as the indicator species (61).
Response	*See response to comment 34 above. ODEQ's use of the 0.3 mg/kg fish tissue concentration in the setting of water column guidance values is appropriate for this TMDL and is consistent with the methylmercury criterion established in January 2001 by the USEPA (see Water Quality Criterion for the Protection of Human Health: Methylmercury – January, 2001; EPA-823-R-01-001). ODEQ recently proposed the 0.3 mg/kg methylmercury fish tissue criterion as part of its effort to revise the State's water quality criteria for toxic pollutants. Whereas the toxics criteria adopted by ODEQ in May 2004 have not yet been formally approved by the USEPA, the more stringent values (including the methylmercury criterion) became effective in Oregon on February 15, 2005 pending USEPA approval or disapproval.*
Reserve Capacity	
Comment 44. *Use of reserve capacity*	In any instance where a TMDL or alleged TMDL does not demonstrate that it will result in any reduction of a pollutant, let alone compliance with standards, any reserve capacity created cannot be used for future discharges. While we support the idea of developing a reserve capacity, such capacity cannot be used until compliance with load and wasteload allocations is achieved (52).
Response	*ODEQ does not necessarily agree with this interpretation. It is yet to be determined when the reserve capacity for mercury will actually be available for use. This issue will be discussed with our stakeholder community during Phase II of this effort.*
Food Web Model (FWM)	
Comment 45. *Use of FWM to set guidance values*	We disagree with many components of the food web model used by DEQ to determine an acceptable mercury level in the water column. While it appears that the model may in fact be robust and technically credible, any model is no better than its weakest assumption. The model incorporates fish consumption based on a fish that readily takes up mercury but that is not commonly consumed. Further complicating the issue, DEQ does not adequately describe the process by which total mercury is converted into methyl mercury. This means that the correlation of the total mercury in the water column to the amount of methyl mercury which fish ingest and accumulate then is uncertain. The range of the possible outcomes is large, meaning that it is possible that DEQ has misrepresented the scope of the problem (53).
Response	*ODEQ agrees that the processes by which total mercury is converted to methyl mercury are poorly documented for the Willamette. However, the model can be run without use of a translator to directly generate a methylmercury target level, thereby by-passing this issue. Due to the very high (10^6) biomagnification potential of methylmercury, however, this target level is approximately 0.05 ng L^{-1}. A similar result would be obtained even if the model was put aside in favor of*

	biomagnification factors typically employed by USEPA. The relationship between methylmercury in the water column and bioaccumulation in fish has been well established in the scientific literature. *Note that the human fish consumption rate (17.5 g day^{-1}) is an integral part of the USEPA criterion for methylmercury and not of ODEQ's food web model. In the model, fish consumption rates apply only to fish-eating-fish and not to humans-eating-fish.* *The use of the pikeminnow in establishing water column guidance values was a policy decision made in consultation with stakeholders and is addressed specifically in the response to Comments #34 and 37 above.*
Comment 46. *Overall utility of the FWM*	Fundamental flaws substantially reduce the utility of the Food Web Biomagnification Model in the TMDL analysis (55 *(+35, 40, 46, 56, 63, 68, by reference)*). (a) DEQ must recognize that several key assumptions in the FWM are not met and should not be expected to be met. Specifically, there is not a 'direct relationship between the loading of total mercury and the formation of methylmercury' as described in the TMDL (p. 3-15) or between total and methylmercury in the water column as described by the omega function. (b) In addition, the number of samples necessary to produce an acceptable estimate of a target total mercury concentration if a relationship could be found is very large. These factors substantially reduce the utility of the FWM in the TMDL analysis (55 *(+35, 40, 46, 56, 63, 68, by reference)*). (c)
Response	*(a) Comment noted.* *(b) The relationship between the loading of total mercury and the formation of mercury has been addressed in Comments # 24, 26, and 27.* *(c) ODEQ would be willing to explore techniques such as probability or composite sampling that may increase our level of confidence without creating unmanageable cost constraints.*
Comment 47. *Use of translator (omega)*	Food web model translator is very sensitive. The translator's response to the additional data used in the model assessment reveals basic instability of the model and demonstrates that more work will need to be done on the model before TMDLs can be implemented with any confidence (48).
Response	*As noted previously, it is possible to use the model without the translator. Doing so simply demonstrates that very low levels of methylmercury would need to be achieved in order to meet the fish tissue criterion. It is possible to revise the model to include a seasonally varying translator, which would make it possible to better approximate the observed magnitude and timing of dissolved methylmercury concentrations over the course of a year. This revision may be incorporated into Phase II of the TMDL.*
Comment 48. *Characterization of random variables: spatial considerations*	The accuracy of the food web model (FWM) relies on the proper identification and characterization of the distributions of random variables that affect the biomagnification process. In environmental observations, truly random variables are difficult to measure. For example, the value of a water quality variable may be affected by conditions that vary spatially in the waterbed such as depth of water, light penetration, water temperature, microbial activity, and pH. The challenge is to sample and analyze the data in such a way that spatial trends do not bias the random nature of the distributions of the variables of interest. Fish accumulate

	methyl mercury from food prey over space and time; water column measurements are discreet descriptions. Unless water column samples are taken from areas where fish feed and spend most of their time, bio-accumulation factors calculated from fish tissue and water column data can be misleading (50). DEQ collected water column data from 18 locations with most of the sampling points located on the Coast Fork Willamette and its tributaries, however very little fish tissue data was collected. Fish tissue data was collected from seven locations with corresponding water column data at six of the locations. At the six locations where both fish tissue and water column data were collected, the northern pike minnow was collected at only three locations. This sample size is small considering the northern pike minnow is the species that triggered the development of the TMDL. Four species of fish were collected at only two locations. Fish tissue samples were collected between July and September 2003. However, all water column samples were collected between October 2002 and June 2003. Data collected from different locations within a waterbody, which may represent different populations of the same random variable, should not be lumped together as the DEQ appears to have done. The lumping of data from different populations can result in biasing means and medians, and inflating the variance of distributions which will result in larger confidence intervals. Areas within the waterbody that exhibit obvious differences in collected data should be analyzed separately especially in a case where 'little is known regarding the precise rates and locations of mercury methylation in the Willamette Basin' (50). The FWM is a stochastic model that relies on the identification and characterization of the distributions of random variables that affect the biomagnification process. The accuracy of the FWBM results relies on the proper identification and characterization of these distributions. In environmental observations, truly random variables are difficult to imagine. The challenge is to sample and to analyze the resulting data in such a way that temporal and spatial trends do not affect the "random" nature of the distributions of the variables of interest. Of obvious importance to DEQ's analysis are the spatial patterns variables such as water column methyl mercury and total mercury, and fish tissue. However, on page 3-40 of the TMDL, DEQ states that, "little is known regarding the precise rates and locations of mercury methylation in the Willamette Basin". The synoptic sampling that has and will continue to occur has provided important information for the characterization of these variables. DEQ's data can be supplemented with the USGS NAWQA mercury data for the Willamette Basin (described below). However, significant limitations in the data still exist. These are important to note so that the results of these investigations can be properly interpreted. One very important limitation is the difference in spatial and temporal scales of water column methyl mercury sampling and fish tissue sampling. Fish tend to integrate methyl mercury concentrations in water and food prey over space and time whereas water column measurements are discreet snapshots. Unless water column samples are taken from areas where fish spend most of their time, especially where they tend to feed, bioaccumulation factors (BAFs) calculated from fish tissue and water column data can be misleading. Care should be taken not to place too much confidence in BAFs calculated from such data. We offer the following observations in this regard: • Although water column data were collected at 18 locations, most of those sampling locations were in Coast Fork Willamette River and its tributaries, where very little fish tissue data were collected. • Of the seven (7) locations where fish tissue were apparently sampled

(Table 3.2 in TMDL document), only six of those locations also have corresponding water column data (Appendix B).

- Of the six locations where both fish tissue and water column data were collected, the northern pikeminnow, the species used for the development of TMDL was collected only at three locations. All four species of fish were collected only at two locations – Willamette River at Rogers Landing and Willamette River at Wheatland Ferry.
- Fish tissue samples were collected between July and September of 2003, whereas all water column samples were collected between October 2002 and June 2003. It is also unclear whether fish tissue samples were collected at approximately the same locations as the water column samples.

Care should also be taken to assure that data collected from different locations in the waterbody, which may represent different populations of the same random variable, are not lumped together for the purposes of analysis. As an example, data from the Savannah River show that average methyl mercury in the tributaries was clearly higher (by over a factor of two) than average methyl mercury in the mainstem of the Savannah River. Consequently, fish tissue concentrations were also a factor of two higher in the tributaries. The BAF calculated from fish caught in a tributary with water column methyl mercury from the tributary is 3.2×10^{6}. The use of fish caught in a tributary with water column methyl mercury data from the mainstem on the other hand results in a BAF of 6.4×10^{6}, a factor of two too high. If this result were translated to an equivalent target water column concentration, that concentration would be too low by a factor of two.

Similarly, data from the Willamette Basin show that trophic level 4 fish from Cottage Grove Reservoir have tissue concentrations over 5 times as high (1.54 mg/kg) as trophic level 4 fish in the mainstem (0.27 mg/kg). Trophic level 4 fish from Dorena Reservoir have tissue concentrations on the order of 2 times as high (0.63 mg/kg) as trophic level 4 fish in the mainstem. Mean dissolved methyl mercury concentrations in the Coast Fork (0.52 ng/L) are almost twice as high as the mean concentration in the mainstem of the Willamette River (0.31 ng/L).

If the data from different populations were to be lumped together, not only would the indicators of central tendency (means, medians) be influenced, but their variances and variances of quantities calculated from them would be inflated. As an example, the Coefficient of Variation (CV) for the Cottage Grove fish data is 36% and the CV for the Dorena fish data is 17%. However, when the data are lumped together, the CV for the combined data is 65%.

Lumping data from different populations may have the effect of biasing means or medians and inflating the variance of distributions, thus leading to wider confidence bands. The way to address this issue is to do separate analysis of areas where there are obvious differences in indicators of central tendency or distributions of the data. Verification that the data are drawn from different populations can be performed using t-tests on the mean or non-parametric tests for distributions such as the Kolmogorov-Smirnoff two-sample test.

We recommend that co-located samples of water column mercury and fish tissue mercury be collected. We acknowledge that resident fish species move around inside their home territories, and that it is likely that concentrations of mercury detected in the water column do not relate directly to the existing concentrations of mercury in fish tissue in that same location, due to the lag time associated with uptake of mercury from the environment into fish tissue. However, collecting co-located samples of surface water and fish tissue may provide information that would allow identification of indirect relationships between these two types of

	samples and the better predict the relationship between total and methyl mercury concentrations (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*It is important to note that the model was calibrated using data from almost 1,000 pre-1998 fish samples, then verified against more limited data (mentioned in the comment) collected in 2003. The fish tissue data collected in the study was not used to justify the need for fish consumption advisories but rather to validate the model and fill data gaps. The intention was to co-locate the samples of fish tissue with water column samples.* *ODEQ has analyzed the Coast Fork fish data separately from mainstem samples and has shown higher tissue levels in the Coast Fork, as would be expected in a reach directly impacted by mining releases. It would be possible to separate the Coast Fork data from the mainstem in future analyses.* *ODEQ notes that regional bioaccumulation factors estimated by the model closely approximate those developed independently by USEPA on a national basis. Thus, even if ODEQ's food web model was ignored, and USEPA's factors used instead, similar target levels would result.* *ODEQ agrees with the need for synoptic sampling of fish and water and looks forward to working with stakeholders during Phase II to obtain the resources and the funding that will be required to undertake additional work in a timely and efficient manner.*
Comment 49. *Characterization of random variables: spatial considerations*	We recommend that DEQ identify and perform separate analyses for reaches of the Willamette River that exhibit obvious differences in key variables of concern, including, water column methyl mercury, fish tissue mercury concentrations, and methylation translators. At a minimum, DEQ should be urged to separately evaluate the Coast Fork of the Willamette River (50, 55 *(+35, 40, 46, 56, 63, 68, by reference)*). The Willamette River should be subdivided down into reaches where there are obvious differences in the key variables, and perform separate TMDL analyses for these reaches. At a minimum, the Coast Fork should be evaluated separately. This would allow improved understanding of methylation processes (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ has analyzed the Coast Fork fish data separately from mainstem samples and has observed higher tissue levels in the Coast Fork, as would be expected in a reach directly impacted by mining releases. ODEQ sees the merit in addressing the Coast Fork of the Willamette apart from the mainstem system, as suggested in the comments above. It will be possible to conduct this additional analysis during Phase II of this TMDL.* *Whereas there are clearly hydrological and biological differences along the mainstem, data on "key variables" (as well as knowledge of what might constitute a key variable) are too limited at present to support a segment-by-segment analysis of the system (apart from separating out the Coast Fork). ODEQ looks forward to working with stakeholders during Phase II of this study to obtain the resources and the funding that will be required to undertake this additional work in a timely and efficient manner.*
Comment 50.	The accuracy of the FWM relies on the proper identification and characterization of the distributions of random variables that affect the biomagnification process. The value of a water quality variable may also be affected by temporal variations such

Characterization of random variables: temporal considerations	as time of day, season, or long term trends. Uncertainty also results from discreet sampling in water bodies that exhibit large seasonal or year-to-year variations in total and methyl mercury concentrations. Many scientific studies have confirmed that mercury and methyl mercury concentrations vary seasonally in water bodies. Changes in mercury loads are often related to runoff events in streams, the redox cycle, concentrations of organic matter, and changes in temperature and pH. Also, methylation rates are thought to be higher in summer due to higher temperatures, increased microbial activity, and higher organic carbon due to higher bio-productivity. As a result, mercury and methyl mercury concentrations can change significantly from one sampling event to the next if the sampling events are widely spaced. These changes in mercury and methyl mercury concentrations between different sampling events can cause large variations in calculated mercury loads and water quality targets. Total mercury and methyl mercury data from the Willamette show differences through time. The mean dissolved total mercury concentrations, averaged by quarter, ranged from 0.42 ng/L to 1.79 ng/L, a factor of more than four. The mean dissolved methyl mercury concentrations, averaged by quarter, ranged from 0.25 ng/l to 0.75 ng/L, a factor of three. It is our opinion that adequate data to characterize the temporal variations in key variables has not been collected. Therefore, we request that additional data be collected in order to mitigate yearly and seasonal variations before establishing loads, limits, allocations, and numerical water column targets (50).
Response	*ODEQ agrees that there is considerable variability in available data and that additional data would be welcome to help better characterize this variability. It is possible to revise the model to allow for both seasonal and stochastic changes in selected parameters, which, in turn, would allow model estimates of surface water concentrations to more closely approximate observed values, even allowing for variability in both modeled and observed values. ODEQ looks forward to working with stakeholders during Phase II to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.*
Comment 51. *Uncertainty analysis*	If using the FWM, certain useful components should be improved. DEQ should explain or remove the uncertainty analysis in Monte Carlo simulations (55 *(+35, 40, 46, 56, 63, 68, by reference)*). If the identified weaknesses in the FWM can be overcome, there is still room for improvement in the model as presented. At this time, DEQ should remove the uncertainty discussion of the Monte Carlo estimates from the TMDL documents, or provide sufficient detail concerning the analysis to allow it to be properly evaluated. If an evaluation suggests that the analysis should be revised substantially, it should be so revised in the TMDL documentation (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ has removed the two-dimensional component of the uncertainty analysis, as it was ultimately not a factor in the selection of target levels. However, the one-dimensional analysis was retained as it gives insight into variability and where additional data could be collected to reduce such variability.*
Comment 52. *Uncertainty analysis*	The number of samples required to achieve a level of certainty in estimates made in calculated quantities like the target level depends on: the uncertainty in the variables used in the calculation, the way these uncertainties propagate through the calculation, and the degree of certainty desired in the answer. Because of the large uncertainties associated with the key variables, only approximate guesses at the number of samples that may be required to set a target water column mercury concentration (i.e., target level) can be made. A simple example using the FWM as currently conceived illustrates this point. First, one calculates the means, standard deviations, and CVs of the largemouth bass fish tissue mercury, all dissolved methyl mercury, and all dissolved total mercury data in the appendices to the mercury TMDL document, and the calculated quantity Ω. These statistics are:

	Fish Tissue (mg/kg)	Dissolved Methyl Mercury (ng/L)	Dissolved Total Mercury (ng/L)	Dissolved Methyl Mercury/Total Mercury
Mean	0.70	0.053	1.23	0.097
Std. Dev.	0.63	0.032	1.20	0.124
CV (%)	90%	61%	81%	127%

Ratios of environmental data, such as BMFs, are inherently more uncertain than the underlying data. When two random variables are multiplied or divided, their fractional uncertainties add. Thus, when fish tissue is divided by methyl mercury concentration to obtain a BAF, the fractional uncertainties (the CV expressed as a fraction) add, and when methyl mercury is divided by total mercury to obtain Ω, the fractional uncertainties add. Therefore, the uncertainty associated with the calculated BMF would be 0.90 + 0.61 = 1.51. The uncertainty associated with the Ω calculation would be 0.61 + 0.81 = 1.42. When the BMF and Ω functions are multiplied to form the product that is the target level, the fractional uncertainties of these variables also add, and the resulting uncertainty is 1.51 + 1.42 = 2.93 (293%). Thus one sees that the uncertainty in the target level is on the order of 300%, whereas the uncertainty in any of the component data used to calculate it are in the range of 60% to 90%.

One can calculate the number of samples (N) required to reduce the uncertainty estimate in the target level. In the foregoing example, the mean (target level) is 0.23 ng/L, and the standard deviation is 0.67 ng/L. If one wants to have 80% confidence that the standard error (SE) of the target level is within 20% of the mean (= 0.046 ng/L) where s is the standard deviation and zα/2 is the standard normal deviate for the desired probability level, then

$$N = [z\ (0.10)\ (s / SE)]2$$

$$= [1.28\ (0.67/.046)]\ 2$$

$$= 352$$

If one wants to have 90% confidence that the SE is within 10% of the mean, the required number of samples would be 2,310! Thus, one sees that a very large number of concurrent water and fish tissue samples would be required to have even moderate certainty about the target level in water, given the magnitude of the propagated error in its calculation. Bear in mind that DEQ has compared this number, which has a large uncertainty, to the “average annual” total mercury concentration in water, a calculated quantity that also has a large uncertainty, in order to estimate the target percent reduction in the load. If a variance estimate were developed for the “average annual” concentration as well, statistical tests could be used to tell whether these two quantities are really different.

If fish tissue level instead of the target level were used to calculate percent reductions required (one can continue to assume linearity between mercury loads and fish tissue concentrations) then the number of required samples is smaller, because the fish tissue concentrations are known with greater certainty. Thus, to continue with the example above, the number of samples required to have 80% confidence that one is within 20% of the mean for fish tissue would be:

$$N = [z\ (0.10)\ (s / SE)]^2$$

$$= [1.28\ (0.63) / 0.14]^2$$

$$= 33$$

To be 90% confident that the SE on largemouth bass fish tissue is within 10% of the mean would require 220 samples. This is an order of magnitude fewer samples than would be required if the target level in water were used. We remind

	DEQ that the uncertainties in translating the fish tissue-based criterion for methyl mercury to a water column criterion were paramount in the EPA's decision to develop a tissue-based, rather than a water column-based, criterion. Based on the foregoing analysis, we believe that the existing body of data is inadequate to establish mercury load reductions using DEQ's current methodology. If DEQ chooses to establish reductions in mercury load to the Willamette River, we recommend to DEQ a reconsideration of the use of target methyl mercury levels in water for estimating the magnitude of the required load reduction (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ agrees with the efficacy of a tissue-based approach but notes that while fish tissue monitoring is more robust, it is also a considerably more expensive, labor intensive, and more difficult than water quality monitoring. Fish tissue monitoring also does not address inputs from specific sources, only the integration of inputs from numerous sources, making it difficult to target control actions. The comment also does not appear to take spatial factors into consideration. Would 220 samples across the entire Basin be sufficient, or would we need that number in different locations? If stakeholders were willing to trade greater certainty for greater cost, this approach should be given serious consideration. ODEQ would be willing to consider this option provided that a funding mechanism could be found that would support this effort for the time it may take to see a system response to changes in loadings (possibly 5-15 years). ODEQ looks forward to working with stakeholders during Phase II to obtain the resources and the funding that will be required to undertake this work in a timely and efficient manner.*
Comment 53. *Uncertainty analysis*	DEQ provided very little information in its FWM documentation concerning how the estimates of uncertainty in the 11 parameters used in the 2-D Monte Carlo analysis were derived. We would like to know more details in order to make a meaningful assessment of this analysis. (a) Our concern is similar to that stated in the foregoing paragraphs; in essence how this information is likely to be used. As long as the policy decision is to use the median values of the distributions, as DEQ has done, then the estimates of uncertainty are of little consequence. However, the fact that these estimates have been made allows for the possibility that they will be used, and this gives substantial cause for concern. For instance, if the 90% confidence value for northern pikeminnow is used to calculate the target level, a value of 0.03 ng/L results (Table 9 in the FWM documentation). This would require, according to DEQ's methodology, a 98% reduction in mercury load to the Willamette River; a target that is probably unachievable and unjustified. (b) The team notes that, assuming the northern pikeminnow data are normally distributed with a mean of 0.6 and a variance of 0.31 (Table 7, FWM documentation), a value of 5.12 mg/kg for the northern pikeminnow (whose corresponding standard normal deviate is 14.58) is greater by far than the 99.9999% value from the distribution (2.08 mg/kg). Thus, this value seems unreasonably high. (c) Based on the above assessment, DEQ should remove the uncertainty discussion from the TMDL documents, or provide sufficient detail concerning the analysis to allow the methods and results to be properly evaluated. If an evaluation suggests that the analysis should be revised substantially, it should be so revised in the TMDL documentation (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*(a) ODEQ has removed the two-dimensional component of the uncertainty analysis, as it was ultimately not a factor in target level selection.* *(b) It is misleading to suggest that uncertainty exists only when we choose to*

	estimate (reveal) it. Rather, it should be acknowledged, that it's always with us. In the past, stakeholders and decision makers have proceeded unaware of the ranges in the values they are working with. One of the goals of quantitative uncertainty analysis was to provide explicit information for these ranges. *(c) The reviewer is confusing the 1-dimensional and 2-dimensional results. The 5.12 value is the upper bound of the upper bound of the 2-dimensional run and is thus different than the upper bound of the 1-dimensional run. It should be higher than the central tendency of the measured concentrations.*
Comment 54. *Uncertainty analysis and variability*	We understand that the model was originally run in a forecasting mode to estimate fish tissue concentrations, given methyl mercury concentrations in water. When this was done, many of the generated cumulative distribution functions (CDFs) underestimated the observed data. Calibration involved minimizing the differences of the distributions, particularly at the median values. In post-calibration runs, the median concentrations were shown to match the observed concentrations reasonably well. Our concern is with the tails of the distributions; in particular, the typical overestimate of the 95th percentile values for most species. In the cases of northern pikeminnow, largemouth bass, and smallmouth bass, the 95th percentile tissue concentration is overestimated by a factor of 2 approximately. As long as the median value is being used to set the target level this is not a concern. However, if a policy decision were to be made to use a higher percentile to provide a greater level of protection, then the simulation of the tails of the distributions would be critical. *(a)* Two important questions need to be answered in this regard. First, which variables tend to have the greatest effect on the variability of the estimates about the median value, and second, how can the uncertainty in these parameters be reduced? DEQ has anticipated this and presented a sensitivity analysis that shows the contribution of various parameters to the variance in fish tissue concentrations. As observed by DEQ, the variables with the greatest impact on variance tend to be methyl mercury assimilation efficiency, methyl mercury elimination rates, and bioconcentration factors. Of these three, only bioconcentration factors and elimination rates can be readily measured or calculated from readily measured data. We are somewhat surprised that the water column methyl mercury concentration does not have more of an effect, given that the CV of all the methyl mercury data taken together is 73%. We also note that the CVs of the Coast Fork dissolved methyl mercury data and the mainstem Willamette River data are 68% and 64%, respectively. *(b)* Thus, it would appear that analyzing the Coast Fork separate from the rest of the mainstem would reduce the variability in the outcome. *(c)* We are also unsure why Table 3 in the FWM documentation indicates that 20 values were used to estimate the distribution of dissolved methyl mercury in the water column, when there are clearly a greater number of values (N = 72). (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(d)*
Response	*(a) Within a factor of 2 is generally considered good for a model; up to a factor of 10 would have been acceptable. The goal of the modeling approach was to give stakeholders and decision makers a sense of the range in the results before them. How they use this knowledge to make policy decisions is a matter separate from the operation of the model. The policy debate is not enhanced by efforts to downplay or ignore the possible range in results.*

	It is also important to note that the USEPA offers a range of directly estimated bioaccumulation factors for higher trophic level fish species that spans 2 orders of magnitude (3.26×10^5 to 1.42×10^7 L kg^{-1}), making it possible to choose a high-end percentile value without recourse to the operation of ODEQ's Food Web Model. Bioaccumulation factors generated with ODEQ's FWM are within a factor of 4 of those produced by USEPA. *(b) The impact of the methylmercury concentration is dampened because the raw concentrations vary over a relatively narrow range and because other parameters have a greater effect of the biomagnifying aspects of the model.* *(c) ODEQ agrees with this comment.* *(d) The model was actually run with 64 samples taken over 4 quarters (16 x 4). The samples from tributaries (Santiam and Clackamas Rivers) were excluded. The text has been revised to reflect this.*
Comment 55. *Lognormal distributions*	We question the parameters of the lognormal distributions used for dissolved total mercury and dissolved methyl mercury in Table 3 of the FWM. The values shown do not appear to correspond with either the mean or standard deviations of the common or natural logs of these parameters for the cited 2002 ODEQ water data, either in log space or in arithmetic space. Our calculated values for these parameters are shown below (55 *(+35, 40, 46, 56, 63, 68, by reference)*).

	Dissolved Hg	**MeHg**	**Ln (Total Hg)**	**Ln (Meg)**	**Log (Total Hg)**	**Log (MeHg)**
Mean	0.82	0.04	-0.196	-3.20	-0.085	-1.390
SD	-	-	0.923	0.750	0.401	0.326

Response	*Based on 64 samples (excluding samples from the Santiam and Clackamas Rivers), the total dissolved concentration is lognormal with an arithmetic mean of 1.32 (-0.12 in log space) and an arithmetic standard deviation of 1.45 (0.89 in log space). The methylmercury concentration is lognormal with an arithmetic mean of 0.06 (-2.92 in log space) and an arithmetic standard deviation of 0.03 (0.47 in log space).*
Comment 56. *Uncertainty analysis and variability*	We are concerned about the variability in bioconcentration factor estimates for organisms low in the food chain. The issue is that variability in the estimates of these parameters becomes compounded as they are used in subsequent model calculations. According to Taylor (1982), the errors of random variables multiplied together propagate with the fractional uncertainties being additive. The uncertainty in BCF1 makes a contribution to the uncertainty in BAF4, which is the sum of the fractional uncertainties of the variables BCF1, and the food terms (f2, f3, f4). Thus, uncertainties of BCFs for organisms low in the food chain may contribute to the variance of the output in a disproportionate way. We note that the BCF for zooplankton ranges over a factor of 870, and further notes that the highest value in this distribution is taken from data for a marine organism 70 times higher than the next nearest value for a freshwater organism used to define the distribution. We also note that the upper value of the distribution for aquatic mollusks, which also spans several orders of magnitude, is for a marine bivalve. We have questions about the distributions used for methyl mercury assimilation. According to Table 3 in the FWBM, many of these distributions were established during calibration. Since this variable contributes significantly in some cases to the variance of the output and the distributions of this variable appear to be highly uncertain, it would seem that the minimum and maximum values of these variables should be reduced in an attempt to reduce the variability in the modeled fish tissue concentrations (55 *(+35, 40, 46, 56, 63, 68, by reference)*).

Response	*The high variability in all of these estimates and the use of data from marine species are simply reflective of our general lack of knowledge of the behavior of mercury in these lower trophic level freshwater species. However, it is not possible to simply reduce these estimates of minimum and maximum values unless new data or information is presented on which to base such a reduction.*
Comment 57. *Model utility and model calibration*	DEQ used the FWM to forecast fish tissue concentrations from methyl mercury concentrations in water and other factors descriptive of the food web in the Willamette River. When DEQ observed that these concentrations did not fit the observed empirical density functions (EDFs) well, DEQ chose to "calibrate" the model using the fish tissue EDFs. BMFs were adjusted so that the median values of the observed and simulated CDFs would match. Essentially, then, observed fish tissue data were used to calculate the BMFs. The BMFs for the individual fish species could have as easily been calculated by dividing the median fish tissue concentration for a given species by the median methyl mercury concentration in water. In fact, if one were to take the consumption-weighted value of 0.34 mg/kg in fish tissue and computes the target level using median values of methyl mercury (0.0469 ng/L) and Ω (0.0369) from the water database, the calculated target level would be 1.04 ng/L. This implies a percent reduction of 17%, a result remarkably similar to that obtained by using the difference in consumption-weighted tissue concentration and the criterion (13%). *(a)* The power of the FWBM is its use to estimate the variance associated with the estimates of target levels. Currently, DEQ has not used its FWBM for this purpose in the TMDL analysis. This raises the question of its ultimate utility. In fact, inaccuracies in the stochastic analysis could be detrimental if policy makers were to decide to use percentiles other than the median to establish the TMDL. We recommend that the food web biomagnification model be used in only a very limited application (i.e., estimation of target water column concentration for methyl mercury on the basis of fish tissue values) – (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(b)*
Response	*(a) As noted previously, USEPA offers a range of directly estimated bioaccumulation factors for higher trophic level fish species that spans 2 orders of magnitude (3.26 (105 to 1.42 (107 L kg-1), making it possible to choose a high-end percentile value without recourse to ODEQ's FWM. Bioaccumulation factors generated with ODEQ's FWM are within a factor of 4 of those produced by USEPA. This also reflects that such estimates are inherently highly variable, regardless of who is developing them.* *(b) See the response to comment 39 above. In Phase II of this study, ODEQ will consider the degree of reduction required in light of these variations in the mercury levels.*
Comment 58. *Model inputs*	We note that the distribution of methyl mercury assimilation efficiency varies widely among trophic level 4 species. It does not seem reasonable that the assimilation efficiency parameter for largemouth bass is reported to range from 0.5 to 0.6 (~20%), whereas the same parameter for smallmouth bass is reported to range from 0.5 to 0.95, over an order of magnitude. We note that some of the uptake

	efficiency data for lower trophic level organisms is taken from marine bivalves, raising concerns about their applicability to freshwater systems. We note that some of the minimum, median, and maximum values of this parameter in Table 3 appear to be incorrect. For instance, the efficiency factors for bluegill and rainbow trout are based on data with a minimum reported value of 0.15; however the minimum value assumed for the distribution was 0.05. For the carp and cutthroat trout, the peak of the triangular distribution was reported to be the same as the lower end value (0.05). (a) The same concerns can be stated for methyl mercury elimination rates. Are the log triangular distributions based on natural or common logarithms? In the case of the aquatic mollusk elimination rate, the values are quoted to be 0.0003 and 0.001 for two marine bivalves and the log-uniform distribution range is from –3.00 to –0.22. The natural logs corresponding to these values, however, are –8.11 and –6.91, and the common logs are –3.52 and –3.00. Something appears to be incorrect. If this variable is contributing to higher-than-observed variance in fish tissue data, then some effort should be made to check these values and perhaps recalibrate the model (55 (+35, 40, 46, 56, 63, 68, by reference)). (b)
Response	*(a) Differences in estimates of assimilation efficiency between the two bass species could be attributable, in part, to actual differences in species physiology. They could also be due to differences in sample size (many fewer smallmouth than largemouth bass were collected), differences in where the fish were collected (the majority of the largemouth were caught in reservoirs), the size distribution of the samples, and when samples of each species were collected. Overall, the high variability in all of these estimates is simply reflective of our general lack of knowledge of the behavior of mercury in a variety of freshwater aquatic species. It is not possible to simply reduce these estimates of minimum and maximum values absent any new data or information on which to base such a reduction.* *(b) The maximum value (-0.22) is, as the text indicates, the highest invertebrate value. The text has been clarified to indicate that this highest value is for zooplankton, based on reference [25]. The minimum value (-3.00) was actually established during calibration; the text was changed to reflect this. The same is true for AQW and the text here has been revised as well. The literature-derived values were presented for comparison and as a point of departure.*
Comment 59. *Model development*	Given the overwhelming evidence that mercury in fish tissue is primarily in the methylated form, we do not understand why the model is constructed to account for divalent mercury in tissue. This adds the burden of estimating additional parameters and making the model more computationally intensive. Methyl mercury and divalent mercury accumulations in biota are never discussed separately, and there appear to be no data to support the comparison of modeled and observed data. There is evidence in the literature that lower trophic level organisms tend to have lower percentages of methyl mercury. If such data becomes available at some point, it may be useful to make comparisons to assess whether the model reproduces this behavior. However, at this time, we see no benefit of separately simulating inorganic and methyl mercury bioaccumulation (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Divalent mercury was included to make the model more comprehensive. It was separated from methylmercury to shed some light on the relative contributions of these two species. As the comment suggests, the model shows that the contribution made to biomagnification by Hg(II) is estimated at 4 orders of magnitude less than that made by methylmercury.*
Comment 60. *Use of sediment data*	The modeling analysis that DEQ has performed neglected to make use of any of the sediment data collected for the TMDL. These data could be very important in that they may provide a linkage between levels of mercury in sediments and uptake through the aquatic food web. The data could also be important to make

	decisions about whether sediment "hot spots" (as might exist due to mining operations) are a significant issue. At this time, DEQ models and analysis cannot address this issue. Sediment data can be a useful adjunct to the water and fish tissue data already collected by DEQ. Sediment data should be evaluated with respect to trends in mercury concentrations, sediment-water geochemical interactions, and sediment should be physically used for appropriate microcosm studies (55 (+35, 40, 46, 56, 63, 68, by reference)).
Response	*Any direct linkage between mercury in sediment and in fish has yet to be definitely established. The primary relationship appears to be between methylmercury in the water column and that in fish. In 1977, the USGS performed a comprehensive study of metal levels in sediment along the mainstem. Whereas they found evidence of anthropogenic loading in sediment for several metals, they did not do so for mercury. They also found no evidence of mercury "hotspots" in sediment in the mainstem of the Willamette.*
Mercury Mass Balance Estimates	
Comment 61. *General comments on mass balance estimates*	The mass balance estimates for mercury in the Willamette River are seriously in error and greatly underestimated (36). There are numerous assumptions in the mass balance estimate, many lacking any explanation or apparent basis, which combine to form a theory of mercury sources that could be erroneous and misleading (47). Source loadings must be validated for the Mercury Mass Load and Sources Model (66). DEQ should determine whether the mass balance model is actually necessary or whether a simpler discussion of sources and estimation of relative magnitude of sources is sufficient. The mass balance results aren't used in setting the percentage target load reduction and sector-specific loads aren't necessary in a phased TMDL (55 *(+35, 40, 46, 56, 63, 68, by reference)*). If DEQ demonstrates the utility of the mass balance model and continues to use it, the model should be corrected and refined (55 *(+35, 40, 46, 56, 63, 68, by reference)*). We appreciate the effort that DEQ has put into the MBM. However, as a mass balance model, this is not sufficiently robust enough to present an accurate mass balance (as detailed below). More importantly, all the effort in analysis does not now actually contribute to estimates of the target load reduction, or otherwise influence any calculation of a TMDL. The source discussion can be excerpted easily and brought forward into the TMDL for a useful evaluation. A simpler discussion of sources and estimation of relative magnitude of sources may be sufficient (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ agrees that the preliminary mass balance model may have underestimated loads from selected sources and may have not fully addressed important sources (such as global atmospheric) and fluxes (such as volatilization). A number of corrections and modifications have been made in the current version of the report in response to the comments we have received. ODEQ will further revise the mass balance model during Phase II to address these potential deficiencies.* *ODEQ agrees that further validation of loadings would be very useful. ODEQ looks forward to working with stakeholders during Phase II of this study to obtain data and information needed to make more accurate estimates of loads from various point and nonpoint sources.*

Comment 62. *Mass balance methodology: total vs methyl mercury*	It seems that the mass balance analysis should focus exclusively on total mercury, since this is the parameter that is tracked back to sources. Methylmercury concentrations could be compared and contrasted in the TMDL document to simplify the mass balance description. If it is to remain in the mass balance discussion, a statement should be added as to whether the regression equations for methylmercury and flow were employed in the estimation process given that there is little or no correlation (65).
Response	*ODEQ agrees with this comment and has revised the model to focus only on masses and fluxes (loadings) of total mercury.*
Comment 63. *Mass balance methodology: total vs methyl mercury*	DEQ should better document and refine the characterization of inputs and outputs by making use of more detailed watershed-specific information and the characterization of methyl mercury loads, fate and transport from these land use categories. DEQ has focused their estimated mass balance wholly on an accounting of inputs and outputs of total mercury rather than methyl mercury. While this is understandable because data for total mercury are more readily available, it does little to illuminate sources and sinks of methyl mercury, which is fundamentally the toxic bioaccumulative form of mercury. Specifically, DEQ should account for areas of wetlands, mining, reservoir pools, and other locations of anoxic waters that represent areas where the relative output of methyl mercury could be expected to be elevated. DEQ's data already appears to differentiate between the methyl mercury contributions from a mercury mining district (upstream of Cottage Grove Reservoir) vs. a gold mining district (upstream of Dorena Reservoir). In addition, DEQ should look more closely at trends from individual stations as their dataset expands beyond quarterly sampling over a single year (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The higher MeHg concentrations measured at one location in Cottage Grove Reservoir may be due to favorable methylation conditions in shallower portions of the reservoir as well as actual loadings of MeHg. ODEQ agrees with this comment in principle but recognizes the greater technical and financial challenges posed by low-level MeHg analyses. ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of MeHg loads from various point and nonpoint sources.*
Comment 64. *Load variability and model calibration*	DEQ has not provided any estimates of the variability of the loads and yields presented in the MBM or TMDL, although an inspection of the data suggests that there is both seasonal and spatial variation that could affect the results of the TMDL, as described above. *(a)* In addition, the "output" loads can be translated into estimated average water column concentrations directly by dividing the load by the long-term average streamflow volume. This produces average concentrations at the selected stations that are substantially larger than the 1.25 ng/L determined from measured mainstem Willamette River results. This suggests that the approach that DEQ has followed in calculating these outputs may need further calibration, and certainly needs more than a single year worth of sampling. *(b)* "Average annual" concentration is a misnomer until more sampling occurs (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*(a) ODEQ agrees with the need to include estimates of variability. Estimates of variability are presented for a few values (fluvial load, mine discharges) in the current report. As part of its Phase II activities, ODEQ plans to provide expanded estimates of seasonal and stochastic variability in other loads, masses, and fluxes.* *(b) ODEQ is unsure where "streamflow volume" data were obtained and why these, rather than flow, would be used to estimate concentration from load. The 1.25 ng L^{-1} value is the geometric mean across the entire mainstem; concentrations at selected stations can be either higher or lower than this central tendency estimate.*

Comment 65. *Uncertainty in mass balance estimates*	A stochastic approach to the mass balance model, similar to that used in the FWM, would be more robust than the estimates presented to date. At a minimum, DEQ should closely evaluate the number of significant figures in the components of the mass balance model (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(b)* DEQ should perform the type of rigorous uncertainty evaluation on this important component of the TMDL (at least commensurate with the analysis performed in the FWM (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* The uncertainty in the 'average annual' total mercury concentration for the Willamette River, as well as the uncertainty in the target level should be estimated and compared within the context of their joint uncertainty (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* DEQ has not performed the type of rigorous uncertainty evaluation on this important component of the TMDL commensurate with the analysis performed in the FWBM. A stochastic approach, similar to that used in the FWBM, would be more robust than the estimates presented to date. In addition, an evaluation of the effect of the joint uncertainties with the FWBM and MBM is needed. Such an analysis is vital to maintaining the overall credibility of DEQ's TMDL analysis (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*
Response	*(a) ODEQ agrees with the need to include estimates of variability. Such estimates are presented for a few values (fluvial load, mine discharges) in the current report. As part of its Phase II activities, ODEQ plans to develop expanded estimates of seasonal and stochastic variability in other loads, masses, and fluxes.* *(b) Results have been reported at 1 significant figure to minimize disparities in account balances due to rounding.*
Comment 66. *Mass balance methodology: relationship between flow and concentration*	Loads (outputs) for mercury species should not be calculated on the basis of insignificant regression relationships (55 *(+35, 40, 46, 56, 63, 68, by reference)*). Page 10, Tables 6 and 7: Load and yield estimates for methyl mercury should not be calculated on the basis of regression relationships between streamflow and concentration given the insignificance of the regression relationships. DEQ should revise these tables accordingly (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Because the focus is on total mercury loads, and because MeHg regression relationships with flow are not significant, MeHg was removed from the analysis.*
Comment 67. *Mass balance methodology: relationship between flow and concentration*	In the mass balance exercise, flow is regressed to river mile to make estimates at locations where the observational record is not complete. Did DEQ evaluate the accuracy of this method using the data that is available for the three locations of concern? If there is concern about accuracy, other methods might be considered such as developing a regression of flows at the long term station (say Station A) and shorter term station (Station B) for periods when both stations reported data and then synthesizing a long term record for Station B using the regression and the Station A data for the period of concern (65).
Response	*Both estimated and measured flows were compared by river mile to test the accuracy of this approach to estimation. The linear regression to river mile for measured flows is excellent (R^2 = 0.98) and all estimated flows are with the 90% prediction interval for measured flows. See Figure 1 in the revised document found in Appendix B.*
Comment 68. *Mass balance methodology:*	It should be noted that DEQ's estimated total and dissolved mercury loads at each station are based on a positive regression relationship between basin-wide observations of water column total and dissolved mercury concentrations and streamflow. This method is very similar to using rating curves to estimate sediment loads. There are three issues that DEQ should address in refining this

relationship between flow and concentration	estimate: • First, because at-a-station concentrations were not used for this analysis, any insight into the spatial patterns of input loads is lost *(a)* • Second, back-transforming these loads into point estimates of water column concentrations are subject to error: specifically, without some form of bias correction, the estimated concentrations may be underestimated. *(b)* • Third, flow explains a relatively small proportion of the variance in total mercury and dissolved mercury concentrations (25% and 11%, respectively). *(c)* DEQ's own modeling demonstrates that there is no correlation between flow and methyl mercury in the Willamette River mainstem. This pattern suggests that equilibrium geochemical reactions may be responsible for controlling water column concentrations of methyl mercury. If this is the case, the sediment reservoir in the mainstem may be sufficiently large that methyl mercury concentrations in the water column will be reduced only very slowly (i.e., the "capacitor" described above), and only by mercury reduction efforts aimed at reducing airborne mercury and remediation efforts that specifically inhibit methylation processes. For purposes of estimating a mass balance, however, the simplest estimate of load for these geochemical fractions could be calculated from the product of the mean concentration for the basin and the average runoff at any particular point. With more sampling, DEQ can better examine at-a-station variation in these parameters and potentially adjust loads or better understand mechanisms for delivering methyl mercury to the water column (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(d)*
Response	*(a) ODEQ attempted to do a segment-by-segment (spatial) analysis but concluded that data were, at present, insufficient to support this level of detailed analysis.* *(b) The concentration-flow relation has been bias-adjusted (see Figure 2 in the revised document).* *(c) ODEQ agrees with this statement but expects the degree of explanation to increase as additional truly synoptic flow and concentration data are collected.* *(d) Because the focus is on total mercury loads, and because MeHg regression relationships with flow are not significant, MeHg was removed from the analysis.*
Comment 69. *Use of rating curves*	The rating curve method to estimate load was shown to be negatively biased. More accurate and reliable load estimation procedures should be applied (36).
Response	*As noted previously, concentration data have now been bias-corrected.*
Comment 70. *Mass balance methodology: relationship between flow and concentration*	DEQ study utilizes ample flow data but scant mercury concentration data. Mercury samples were also not taken at locations comparable to the flow samples. The equations utilized by the DEQ suffer the defect of attempting to relate concentration to flows that occurred at different times and different locations on the river. The result of these calculations is an estimate of concentration that would have a tenuous relation to the actual concentration in the river. These errors are not reflected in the confidence intervals that DEQ calculated. Their confidence intervals only consider the error resulting from the fitting of a linear regression model; whereas, the actual error structure will be a product of errors plus covariances among errors. It would appear much more applicable to relate concentration to flow occurring at the time and location of sampling (36).
Response	*ODEQ agrees with this comment as it applies to the draft document. In the revised document, ODEQ has combined its mercury concentration data with that provided by others (primarily ACWA), so that there are now 218 concentration data points available for the mainstem (see Table 2 in the revised document). It was*

	possible to match each of these to the flow measured (by USGS) on the day and location of its collection. In addition, concentration data were bias-corrected.
Comment 71. *Table 1 and Equation 1*	DEQ needs to correct the information presented in Table 1. Sampling dates, USGS gauging station locations and data references are not correct (36). *(a)* The estimates for the parameters in equation 1 are not given. The statistical software packages used are not cited, no reference to statistical methods is given (36). *(b)*
Response	*(a) Although it is not clear what was wrong with the original Table 1, it has been updated and shortened (to include only mainstem locations and total mercury). The location, date, and source of each data point are now shown in Table 2 of the revised document.* *(b) For brevity, the 2500 values for the parameters in Equation 1 (about 125 pages) were not included. References (Cohn, Colman, etc.) that describe methods for regression analysis of water data have been added to the revised document.*
Comment 72. *Instantaneous annual mean discharge rate*	One mass balance endpoint is a calculation of a statistic termed the "instantaneous annual mean discharge rate (L)". This parameter of interest is actually a "mercury loading" (mass per time), not a "discharge" (a term usually referring to flowrate - volume per time) – (65). *(a)* There also appears to be a problem with Equation 3 in this section. We believe the right hand side of the equation should have a flow term (Q). At the same time, we could not discern the method used by DEQ to solve Equation 3. To check into a possible calculation error, EPA used an alternative method to estimate the mean loading, calculating a daily loading for each day of the six year record, summing these loads, and computing the mean loading. We obtained values roughly similar to the values calculated in the TMDL, suggesting that the Equation 3 problem is a typo and the method DEQ used was not in error (65). *(b)* We also have questions about the words "instantaneous" and "annual". "Instantaneous" has little meaning in this context, especially since the analysis is based on daily average flows. "Annual" statistics are not used here; rather, we are lumping six years of data into more of a long term average (65). *(c)*
Response	*(a) This terminology has been changed to "output from Basin as fluvial load" in units of kg per year.* *(b) This equation has been corrected.* *(c) The term "instantaneous" has been eliminated.*
Comment 73. *Average annual load*	Page 8: The use of the term "average annual load" (or concentration) is misleading. The estimates presented here are derived from one year of data and are not an average based on a number of years, as "average annual" implies (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ believes that it is acceptable to think of these as estimates of average annual loads (or fluxes) in units of kg per year. Several years worth of concentration data were obtained by adding concentration data collected by others to the ODEQ data set. This, combined with numerous years of flow data obtained from USGS, provide a reasonable estimate of average behavior on an annual basis.*

Comment 74. *Analysis of yields*	Page 7, 3rd paragraph: DEQ's analysis indicates that in the Willamette Basin, total mercury concentration increases with increase watershed area, contrary to the pattern identified by Grigal (2002) and cited by DEQ. This pattern results directly from DEQ's yield estimation algorithm based on a) a positive correlation between instantaneous streamflow and total mercury concentration and b) increased average instantaneous streamflow with increasing watershed size. In this paragraph, DEQ has inappropriately mixed discussions and calculations of yield—in units of mass export per year per unit area—and concentration—in units of mass per volume. *(a)* Grigal's regression model would estimate that the average concentration of mercury at the USGS Portland station would be 1.08 ng/L, rather than the 2.94 ng/L that the product of DEQ's concentration data and USGS streamflow suggest. The figure of 3.76 quoted in text, likely incorrectly, refers to the yield estimate of 3.76 µg/m^2 yr from Table 4. *(b)* In general, we question what the yield analysis really shows and how helpful it is to goal of determining the TMDL (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*
Response	*(a) Because the focus is on total mercury loads, the yield analysis was eliminated from the revised report.* *(b) Both sides of the Grigal equation are exponentiated, so that ln(1.08) = 2.94. The 3.76 value is thus a concentration and not a mis-attributed yield value.*
Comment 75. *Assorted comments on Figures 3-6*	Page 13-16, Figures 3 -6: Again, because of the insignificance of the regression relationships between methyl mercury species and streamflow, these graphics should be reconsidered. On Figures 3 and 4, confidence bands calculated from a normal distribution of the entire sample set would be more appropriate. On Figure 5, load estimates should clearly reflect the importance of total runoff as the determining factor in the apparent spatial patterns. This could be accomplished by showing total estimated annual water yield on a second axis. On Figure 6, methyl mercury yield should be shown as the constant value that DEQ's sampling and analysis to date suggests (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Because the focus is on total mercury loads, and because MeHg regression relationships with flow are not significant, MeHg was removed from the analysis.*
Comment 76. *Use of log transformed data*	DEQ uses log-transformed data, often when it is not advisable or necessary. They avoid the statistical problems of transforming back and forth from arithmetic space to log space by ignoring it. They also ignore the problems of the difference between the error structure of statistical models in arithmetic space and in log space. The resulting estimates of model parameters and mean values are biased negatively (36).
Response	*Log-transformation is a common and accepted technique for analyzing flow and concentration data and, as noted previously, concentration data have now been bias-corrected.*
Comment 77. *Statistical analysis*	In DEQ's estimation of parameters in equations 1-3, no thought was given to the error structure of the statistical models applied. Equation 2 involves an errors-in-variables statistical model. The parameters cannot be reliably estimated by ordinary least squares or ordinary maximum likelihood methods. It appears the method used by DEQ was ordinary least squares, these estimates would be negatively biased and would yield underestimates of results (36)
Response	*As noted previously, concentration data have now been bias-corrected.*
Comment 78. *Selecting and determining distributions*	It is questionable how the flow rate distributions given in Table 3 were determined or the distribution parameters estimated. The statistical power of the Kolmogorov-Smirnov goodness-of-fit test is so poor that the test has been discarded (see references). Even the results given in Table 3 do not show clear support for any of the probability distributions selected. In the case here, where obviously a string of probability distributions were tested, the level of significance of repeated

	hypothesis tests would quickly approach a very small value (approximately <0.0000003). Statistical goodness-of-fit procedures would be unreliable for selecting a probability distribution for flow. It would be just as well to select a distribution based on other criteria and use it at all locations (36).
Response	*The model has been simplified so that only one flow distribution, that for flow at RM 0, is now required. This distribution was obtained by first estimating flow at RM 0 (with Equation 1) then fitting these flow estimates to a distribution using CrystalBall® software. The resulting distribution was selected on the basis of three goodness-of-fit tests. Aside from the references mentioned in the comment, there is no indication that these techniques have "...been discarded." It is also not clear from the comment exactly why a distribution cannot be formed with flow data or, if it could, exactly what technique would be acceptable.*
Comment 79. *Calculation of load reduction requirements*	Calculation of load reduction requirement should be based on 'average annual cumulative output' (112.3 kg/yr) and not total inputs. Water column concentrations of total mercury are a reflection of the 'average annual cumulative output' and not the total input since the deposition of total Hg will not show up in the water column concentration. Thus a 26.4% reduction will result in a load capacity of 82.7 kg/yr (46).
Response	*It might be possible to set limits based on total output rather than total inputs. Total output, however, integrates the effect of numerous inputs so using it would not allow controls to be easily directed at any specific input. This alternative approach can be considered and discussed with our stakeholders during Phase II of this effort.*
Comment 80. *Need to validate estimates of source loadings*	Preliminary estimates of source inputs indicate that the most significant vectors were estimated from literature values, as acknowledged in the TMDL documents. Validation of source loadings is critical to developing a credible management plan that can be effective in reducing total mercury inputs to the river. The validation effort should focus primarily on those vectors estimated to be the most significant, namely soil erosion and runoff of atmospherically deposited mercury. The relatively small apparent input due to point sources argues for a minimal effort to characterize NPDES discharges. If the discharges from pulp and paper mills were eliminated, it would not have a measurable impact on mercury levels in the Willamette River (66).
Response	*ODEQ agrees that further validation of loadings would be very useful. ODEQ also agrees that, based on the preliminary model, that industrial and domestic (POTW) point sources are likely to make only minor contributions to mercury loads in the mainstem Willamette River. However, this estimate must be corroborated by gathering data from these sources which would show clearly whether or not the lower discharge concentrations assumed in the model are, in fact, actually present in the field. ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury loads from various point and nonpoint sources.*
Comment 81. *Schematic diagram*	The descriptions of the analysis components are very clear, but developing a mental picture of the assumed processes at work is not easy for the reviewer. We would recommend adding a diagram ("cartoon") or two that show the connections between sources and system components and receptors (65).
Response	*ODEQ believes that Figure 7 in the revised report provides an adequate overview of the relationships in this preliminary analysis. During Phase II, a figure ("Conceptual Model") will be developed which shows the key elements in the model (reservoirs, fluxes, sources) and their inter-relationships.*
Comment 82. *Degree of confidence and significant figures*	DEQ's analysis presents results with too many significant figures. This has the effect of making the analysis appear much more precise that it actually is and gives the reader a false sense of confidence in the results (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)*

	We believe that stating values such as on Graph 3.4 which reflects approximately 12.9% source load contributions from surface soil erosion from disturbed forest lands, may not be substantiated with data. Stating interim load allocation for erosion of soils at 52.2 kg/yr. may present a false sense of knowledge (62). *(b)*
Response	*(a) Results have been reported at 1 significant figure to minimize disparities in account balances due to rounding. In Phase II, ODEQ proposes to develop estimates for the variability in these various estimates.* *(b) ODEQ has dropped the category of "disturbed forest lands", has increased the fraction of land in the forest category to about 60%, and has recalculated the load for forest land using the lowest estimate of delivery ratio. The result still attributes about 12% of the erosion load to forest land. This is due, in part, to there being so much forest land in the Basin and possibly, in part, to too high an estimate of delivery from forested watersheds. ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury delivery ratios from various land use categories.*
Comment 83. *Estimate of atmospheric deposition*	In the section on atmospheric deposition, the text (on page 21) reads "Assuming that a concentration of 3.0 ng/L represents a global background level of Hg in air masses approaching Oregon from the west, and given an average rainfall over the basin of approximately 1.4 m/yr(~ 55 in/yr, range 30-80 in/yr, OCS, 2004) the global contribution to the basin would be ~3.3 ug/m2/yr...." We calculate this to be 4.2 ug/m^2/yr instead of 3.3 ug/m2/yr [(1.4 m/yr)*~~(2.97 * 10^{10} m^2 (basin area))*(1000 L/m^3)~~*(3 ng/L]/[~~(2.97 * 10^{10} m^2 (basin area)) * (1000 ng/ug)~~] = 4.2 ug/m^2/yr – (65) In the next sentence the correct total of anthropogenic and global inputs (assuming the 3.3 is correct) should be 15.7 ug/m^2/yr (65).
Response	*ODEQ agrees with this comment. ODEQ has revised its estimate of annual rainfall Basin-wide to 1.48 m yr^{-1}, and redone the calculations to give a wet deposition rate of 4.4 $\mu g\ m^{-2}\ yr^{-1}$. This, combined with a dry deposition estimate of 5.41 $\mu g\ m^{-2}\ yr^{-1}$, gives a total deposition rate due to global sources of 9.8 $\mu g\ m^{-2}\ yr^{-1}$.*
Comment 84. *Advection, litterfall, and throughfall*	Airborne mercury deposition is reduced by a factor of 40% across all land uses based on advection and 'litterfall and throughfall' in forested areas reducing the amount potentially available to be transported to streams. There is no explanation or justification for combining these two processes. The combined reduction is then applied equally to all land uses resulting in a reduction occurring on forestland being credited equally to urban and agricultural lands. This application of a forest-specific benefit to other land uses is not justified (47).
Response	*Advective loss and forest-enhanced deposition are two separate processes. Deposition was reduced by 40% (50% in the revised document) to allow for advection from the Basin. Advected mass is not deposited and therefore does not interact with forested areas.* *The model discussion has been revised to more clearly indicate that deposition of the mercury remaining after advection is greater in forested areas than in open areas due to litterfall and throughfall, typically by a factor of 4. This factor is not applied to land use categories other than Forestry.*
Comment 85. *Forest disturbance: spatial considerations*	The analysis assumes that 50% of private forest land and federal land is potentially disturbed by logging and other forestry practices. This assumption is made without basis or explanation in the document. We believe that this assumed disturbance is grossly exaggerated and more appropriate sources of direct information can be utilized (47). Any attempt to classify forestland by disturbance must be directly related to the likelihood of overland flow, the mechanism for input into streams. Reduced

	canopy cover does not correlate to disturbance caused transport of mercury through overland flow (47). The current estimate (of forest disturbance) is based on an estimation of canopy tree cover in a portion of the basin which omits the eastern and upper portions of the basin, the areas least likely to have reduced canopy cover (47). The most intensive forest management has stand replacement intervals ranging from 120-200 years and significant percentages of federal forestland set aside in permanent reserves. Newly disturbed forest would comprise less than 2% of the total forest in the basin on a yearly basis. Secondly, even in 'clear cut' harvest regimes, actual ground disturbance is limited. Current BMP enforcement guidance suggests enforcement action if disturbance exceeds 20% of the harvest area. Newly disturbed areas would not imply any overland flow constituting input of mercury to surface water, but would nonetheless comprise something on the order of 0.5%, far less than the assumed 50% (47).
Response	*ODEQ has removed the "disturbed forest land" category and now defines "Forest" land as simply that with ≥ 25% tree cover. In the revised document, land use has been re-apportioned as: Agricultural: 22.7%; Forest: 59.7%; Mixed: 10%; Urban: 6.3%; Open water: 1.3% (where 'mixed' would include all manner of uses not covered by other activities including alpine terrain, shrub & grasslands, and recently harvested forests both on federal and private lands).*
Comment 86. *Forest disturbance: temporal considerations*	The analysis does not address the temporal aspect of forest disturbance. Even accepting the assumption that there is a period of disturbance affecting mercury transport, there must also be a point after which the recognized processes of litterfall and throughfall have reestablished to function as a net sink for atmospheric mercury deposition (47).
Response	*The model discussion has been revised to more clearly indicate that deposition of mercury is greater in forested areas than in open areas due to litterfall and throughfall, typically by a factor of 4. This factor is not applied to land use categories other than Forestry. This increased deposition must be distinguished from any subsequent retention of mercury in forested land. The primary "sinks" in a forest are the trees themselves and soil organic matter which allows for sequestration. However, these sinks are not sufficient to absorb all deposited mercury and prevent some fraction of it from leaving forested land. Even though all forest land is considered to have a low delivery ratio, it's sheer extent within the Basin keeps it as a significance source to the mainstem.*
Comment 87. *Delivery ratio*	A delivery ratio of 5% was used for undisturbed forest land. This delivery ration is dependent on overland flow. This paper has previously acknowledged that overland flow 'has not been observed or described in undisturbed humid forest areas (Grigal 2002). There is no apparent justification for applying a delivery ratio of 5% to undisturbed forestland, particularly in light of the statements of no observed overland flow and 40% reduction in basin-wide yield partially due to litterfall and throughfall in forested areas (47).
Response	*First, values close to 5% have been observed by others in a number of temperate forest ecosystems. Second, absolutely no overland flow is unlikely; the cited document actually says "little or no flow", leaving open the possibility of such flow. Third, while forests are efficient scavengers of mercury from the atmosphere (4x greater than other land categories), they are also good at sequestering mercury in soil organic matter. In ODEQ's opinion, balancing increased deposition against increased sequestration justifies a value of only 5%.*
Comment 88. *Delivery ratio*	A value of 20% was selected for agricultural and disturbed forest lands. Assuming the same value for the two land uses is flawed. Agricultural lands are disturbed on an annual or periodic basis much more frequently than forested land, have observed overland flow, and disturbance covers most of the area. Forest land is disturbed on an infrequent basis and the actual area of disturbance is limited to a

	small portion of the area treated (47).
Response	*A delivery ratio of 20% was applied to all land use categories other than Forestry, in accordance with USEPA guidance. As noted above, a value of 5% was used for Forest land.*
Comment 89. *Estimates of soil erosion*	Erosion loss rates for disturbed forested land were assumed to be equal to those from Conservation Reserve Program lands. The universal soil loss equation has not been found to be a reliable method of estimating soil loss in forestland. The CRP applies to previously cropped land. This does not have any similarity to disturbed forest conditions where disturbance is limited to a small percentage of the land, and the organic or litter layer remains intact and undisturbed over the majority of the landscape (47). DEQ's estimates for forestry's current contributions of mercury to the river don't appear to have any basis in current thinking on erosion rates from forestlands. The estimates are based on simplistic and incorrect classifications of different types of forestland. We suggest that DEQ collaborate with the ODF and the College of Forestry at Oregon State University to further develop its understanding of erosion and forest soils (53).
Response	*More data is always welcome. However, it appears difficult to argue that erosion and runoff does not occur in forests. Published reports clearly indicate that disturbance enhances mercury runoff. So, for any erosion rate > 0, the sheer extent of Forest land (~ 60% of the Basin) is expected to keep it as a significance source to the mainstem.*
Comment 90. *Estimate of soil erosion*	Page 23, Section 2.3: DEQ presents no critical evaluation of the Natural Resources Conservation Service (NRCS) estimates for soil erosion or the estimated horizon-dependent mercury concentration estimates for soils. The NRCS erosion estimates are based on a sample of lands within the Willamette Valley rather than a deterministic analysis of soil erosion in the Willamette Valley. The soil erosion estimates in this study were developed for nationwide evaluation of the status of soil erosion, primarily from agricultural lands, and cannot be expected to have the accuracy of a Willamette Valley-specific investigation. At a minimum, the uncertainty of the soil erosion estimates should be understood. For instance, NRCS reports the "estimated margin of error" in the acreages of croplands and developed lands to be 6.7 and 9.2 percent, respectively. Added to this uncertainty would be any estimate of soil erosion from this land base (typically a far less exact exercise). In addition, DEQ has assumed that surface soil erosion is the dominant sediment delivery mechanism to the river network, neglecting bank erosion and mass wasting contributions. Bank erosion in urban areas may, in fact, be an important local sediment delivery mechanism. Recent works suggests that while the concentration of mercury in streambank materials may be lower than found in river bed sediments, methyl mercury released to the water column can be higher from resuspension of bank sediments than resuspension of streambed sediments (55 *(+35, 40, 46, 56, 63, 68, by reference)*). The documentation of the soil erosion estimate should be refined and improved. This would allow more meaningful participation in the mercury reduction efforts by the agricultural and forest resource stakeholders in the basin (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The broad NRCS estimates of erosion rates were deemed adequate for what is essentially a preliminary analysis of mercury sources and loads in the Basin. It is hoped that in Phase II it will be possible to refine our estimates of erosion rates with site-specific measurements and incorporate these empirical data into a GIS-based analysis framework. ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate*

	estimates of mercury loads from various point and non-point sources.
Comment 91. *Soil delivery ratio*	In the discussion of SD, the soil delivery ratio value, Equation 7 on page 23 shows the method for calculating SD. On page 24, in the first full paragraph, it is stated that the value of SD was calculated as 0.02. This apparently involves using the area in kilometers squared instead of meter squared, which have been used in the discussion up to this point. The correct units should be stated. Also we get 0.20 for SD not 0.02. – (65) *(a)* For Disturbed Forest Land we get an input of 19.5 kg/yr, instead of 18.4 kg/yr and this brings the basin total up to 72.5 kg/yr from 71.4 kg/yr (65). *(b)* The last sentence of the first full paragraph on page 24 refers to Equation 8. The correct reference is Equation 6 (65). *(c)*
Response	*(1) The estimate of SD has been corrected to 0.13.* *(2) The input from forest land has been revised to 15.1 kg yr^{-1}.* *(3) Comment noted.*
Comment 92. *Delivery ratio*	Page 22: We believe that the mercury delivery ratios used in this model and in other mercury TMDLs to date are too high. Ravichandran and Dean showed that mercury export ratios in a South Georgia watershed are likely on the order of 0.003% per year, based on measured mercury in watershed soils and sediments and based on analogies with atmospherically deposited radionuclides (i.e. ^{239,240}Pu, ^{137}Cs, and ^{10}Be) in the watershed (0.0002 to 0.002% per year). These figures are consistent with export rates for atmospherically deposited heavy metals measured by others researchers. The implication of using export rates for atmospherically deposited mercury that are too high is placing too much importance on the effect of controlling existing atmospheric sources and deemphasizing the role of older anthropogenic mercury already resident in watershed soils (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Additional data for the development of Basin-specific mercury delivery ratios would be welcome. In this analysis, a value of 5% was applied to the largest land use category in the Basin. This 5% value may be high but is nonetheless consistent with values reported by several others working in northern temperate areas and with values suggested by USEPA. The revised report shows an almost equal split between air deposition and erosion as sources of mercury, suggesting that neither has been overemphasized with respect to the other.*
Comment 93. *Load estimates presented in Table 9*	In Table 9, we get slightly different values for the Load in kg/yr, see below: (65)

	Land Use Area (m^2)	LU_k	DR_k	Load kg/yr	Table 9 Value
Urban Land	1,883,002,283	6.3%	1	18.8	18.7
Undisturbed Forest Land	10,409,121,689	34.8%	0.05	5.2	5.2
Disturbed Forest Land	10,409,121,689	34.8%	0.2	20.8	20.6
Agricultural Land	6,788,601,611	22.7%	0.2	13.6	13.5
Water	398,210,670	1.3%	1	4.0	3.9
Total	29,888,057,942			62.4	61.9

Response	*Changes in land use categories (and their associated areas) made in response to a previous comment caused this table (now Table 4 in the revised document) to be changed. The new total estimate is 61.3 kg yr^{-1}.*
Comment 94. *Potential for double counting of sources*	The double counting of sources and pathways needs to be eliminated (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* DEQ appears to be mixing sources and pathways in ways that could potentially

	lead to double-counting of mercury inputs. Specifically, estimated mercury input of runoff of air deposition from disturbed forestland (20.6 kg/yr) reaches the stream network via many pathways, including overland flow. Therefore, some of this load likely overlaps with the input load from soil erosion from the same land base (18.4 kg/yr). *(a)* The 20% delivery ratio of air deposited mercury on to croplands is close to the 30% sediment delivery ratio commonly used for agricultural lands. *(b)* Data from boreal forests is not a good basis for this number, and analyses from Savannah River TMDLs suggest that it is too high. *(c)* Again, air deposition likely accounts for a large portion of the estimated soil erosion load from agricultural lands (cultivated and non-cultivated crop lands and pastureland). Mercury delivery from soil erosion should track sediment delivery; the sediment delivery ratio is typically a function of watershed size. The load of mercury in the soil may be in part of atmospheric origin, however, it may not be of recent origin; that is, it may be from older anthropogenic sources. *(d)* If so, regulation of existing air sources may do little to affect it. Similarly, mercury in stormwater is dominantly related to air deposition. Air deposition is the source, and stormwater is the pathway. As DEQ moves forward to characterize stormwater, they need to account for air deposition vs. other sources of mercury in stormwater (55 *(+35, 40, 46, 56, 63, 68, by reference)*). The potential double-counting noted above appears to be sufficiently large to suggest that mercury is being exported from the Willamette Basin rather than being sequestered in the basin. Before finalizing the TMDL, this needs to be explicitly addressed and net inputs re-estimated (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(e)*
Response	*(a) ODEQ does not agree that it has "double counted" sources since these fluxes are estimated separately from one another using independent data sources. For example, the amount of air deposited material reaching water is estimated using a wet deposition rate estimated from the Hg concentration in rain while erosion is principally a function of the Hg concentration in soil; the two estimates share no Hg source terms in common.* *(b) These two delivery ratios describe different process and are arrived at in different ways, they are not necessarily synonymous.* *(c) Not all delivery ratio data are from boreal forests and, to the extent any are, a boreal forest is more similar to the temperate rain forests in the Northwest than is a warm hardwood forest in the southeast.* *(d) There is, at present, no evidence for older anthropogenic mercury sources in the Basin.* *(e) In Phase II, ODEQ will re-estimate masses and fluxes with a model that does not allow for double counting. The role of sequestration (which does occur in forest and other high organic matter soils) will be explicitly considered.*
Comment 95. *Point source contribution*	In Table 13 on page 29, it would be good to footnote which of the POTWs you are applying the 7 ng/L concentration to. We applied the 7 ng/L to over half the POTWs and were still getting a much higher value than 4.1. It would be desirable to explain the reasoning behind the selection of 7 ng/l as a "benefit of the doubt" value. Also would be helpful to explain what "TBD" means for the Silverton POTW (65).
Response	*The USEPA default value is 7 ng L^{-1}. ODEQ used a value of 10 ng L^{-1} for the 14 of 7 POTWs not reporting low-level results, which is the mean of values reported by those POTWs within the Basin that do report low-level results (see revised Table 8).*

	TBD means that no data were available for the Silverton POTW. *On re-calculation, ODEQ was unable to obtain a value higher than 4.1 kg yr^{-1}.*
Comment 96. *Point source contribution*	In the description of how equation 8 is applied, at the top of page 29, it would be helpful if the conversion factor from million gallons to gallons were added (65).
Response	*The additional conversion factor was added.*
Comment 97. *Point source contribution*	Pulp and paper should not be the only industry sector identified, considered and included in the sector identification and characterization for mercury. (66).
Response	*Pulp and paper was highlighted because it is one of two industry sectors (the other being chlor-alkali plants) identified by USEPA as known sources of mercury-containing effluents. There are no chlor-alkali plants in the Basin. ODEQ would welcome identification of other significant mercury-generating sectors within the Basin.*
Comment 98. *Point source contribution*	We request that the Department clearly identify that the pulp and paper industry's estimated contribution is 1.1% of the total estimated load of 142.2 kg/yr to the Basin and recognize that fact when setting BMP and monitoring requirements (see p. 3-24, Table 3.9) - (66).
Response	*Comment noted. The appropriate text has been added to the TMDL document.*
Comment 99. *Point source contribution*	Table 15 on page 35; The annual mean rate for industrial discharges should be 1.6 instead of 1.5. (65)
Response	*Value has been changed to 1.6.*
Comment 100. *Point source contribution*	P. 30. "Mercury is most often associated with discharges from chloralkali plants and pulp & paper mills." DEQ estimates this source to supply 13 ng/L of mercury, but does not support this estimate (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*This is a default estimate used by the USEPA. The derivation of this estimate will be found in the referenced USEPA document. This value can be revised as soon as data are available from sources within the Basin.*
Comment 101. *Abandoned mines*	Contribution from mine sites, including methylation potential, should be better documented and understood. If remediation of mine sites is to be considered a viable source reduction measure, their actual contribution to the mercury load should be much better documented (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ does not believe, based on the analyses performed with currently available data, that historical mining activity in the Basin makes a significant contribution to mercury loads in the mainstem. Evidence strongly suggests, however, that such historical activity did and continues to make significant contributions of mercury to reservoirs and water supplies in the Coast Fork, particularly Cottage Grove Reservoir. This is a problem that is probably best addressed by Land Quality Division's Site Cleanup Program.*
Comment 102. *Sediment deposition*	Sediment resuspension should be independently estimated rather than calculating it by difference (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a)* Sediment resuspension is not explicitly calculated by DEQ in this mass balance. Additional collection of suspended sediment data may enable DEQ to better understand the role, if any, that sediment flux plays in getting methyl mercury into the water column (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(b)* The estimated output of total mercury was compared against estimated inputs of total mercury to the river system (described below) to suggest that approximately 30 kg/year of total mercury is stored in depositional sites along the Willamette

	River mainstem (deposition minus sediment resuspension). Some portion of this mercury could be lost to volatilization, but this is not accounted for in the DEQ mass balance model (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(c)*
Response	*(a) ODEQ agrees with this comment but notes that resuspension and deposition processes in the mainstem Willamette are not well documented and available models are not particularly adept at estimating the movement of sediment (as opposed to the movement of water, which can be more readily modeled).* *(b) ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury deposition and resuspension throughout the Basin.* *(c) Volatilization will be included in a revised model to be prepared during Phase II. However, preliminary calculations suggest that losses due to direct volatilization from water would be small compared to losses via suspended load.*
Comment 103. *Methods for estimating sediment deposition*	DEQ has not used the calculated outputs for anything other than to suggest that approximately 30 kg/year are being sequestered within the river, particularly within the Newberg Pool. As described above, DEQ has either not appropriately or not sufficiently quantified either input or output parameters to allow net storage be estimated by difference in their mass balance model. Given the uncertainties in the estimates of "inputs" and "outputs", DEQ's hypothesis about storage should be tested directly by local monitoring net sediment deposition rates or otherwise independently estimated. *(a)* DEQ has also not addressed the fact that some portion of the sediment carrying mercury inputs made it out at the mouth in one season/year. The load exiting the watershed may be totally a function of what has been in the sediment moving through the system for many years. For this reason, it is inadvisable to perform mass balances involving sediment where all terms have not been independently estimated (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a + b)*
Response	*(a) ODEQ agrees and looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury deposition and resuspension throughout the Basin.* *(b) ODEQ does not agree with the assertion that the time constant of the active sediment layer is on the order of years. However, for more deeply buried sediment, movement may only occur in those years with higher than typical winter flows.*
Comment 104. *Estimation of fraction deposited*	The document states that the estimated inputs of mercury to the system exceed the mercury mass load at the mouth of the river suggesting deposition in sediment (see page 3-19 of TMDL). Was the export of mercury in fish tissue considered (46)? There is a remainder of total mercury from the water column mass balance that is ascribed to a loss to sediments. Are there any other chemical processes that might also remove mercury (e.g., volatilization)? - (65)
Response	*There are few, if any, data on the number and size of fish actually inhabiting the mainstem or on the number of fish that leave the system annually (either through migration or by being caught). But, for example, if each fish weighted 5 kg, and contained 0.3 mg kg^{-1} of mercury, each would carry 1.5×10^{-6} kg of mercury, so that 75 million such fish would be required to match the approximately 100 kg yr^{-1} leaving the Basin as fluvial load.* *Mercury can leave the water column through volatilization to the atmosphere, in the fluvial load, and through deposition to sediment. The amount given up through volatilization to air directly from water is typically a small fraction of that lost*

	through deposition and fluvial load.
Comment 105. *Sediment deposition*	If Hg is accumulating in the sediment, then the input may need to be reduced even further in the future, assuming the sediment mercury is available for methylation and subsequent fish uptake (46).
Response	*Mercury that is estimated to accumulate through burial in deeper sediment layers (below any biologically active layers) is not expected to be available for methylation.*
Comment 106. *Sediment deposition and resuspension*	In reference to Table 15 and Figures 12-13, even though sediment resuspension is a large factor during high flow, it is not considered in the annual budget. This seems to indicate that none of the resuspended material actually moves past the mouth. The overall net effect may be deposition but it might be useful to quantify the relative amount of resuspension and deposition. It most likely varies tremendously spatially and thus, may have a significant impact locally (46).
Response	*If additional data become available, the model will be revised to better estimate resuspension and deposition of sediment on a seasonal basis. It is also recognized that there may be segments of the mainstem (e.g., Newberg Pool, Portland Harbor) which consistently favor deposition over resuspension.*
Comment 107. *Particle size considerations*	When looking at soil erosion and sediment deposition both, particle size considerations are neglected. This is very important because mercury is more likely associated with silt and clay particles and particulate organic matter than sands and gravels. Typically, sediment delivery ratios only deal with total sediment. The enrichment factor is the ratio defining the increase in concentrations when large particles with lower mercury concentration are removed as a result of settling [and statements in the documents suggest that there is confusion about what this is] (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ does not disagree with this comment but notes that neither adequate data nor models are presently available with which to explore the effect of particle size on deposition or resuspension within the Basin. ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury deposition and resuspension throughout the Basin.*
Comment 108. *Stormwater discharges*	A more substantial value than zero should be used in the stormwater discharge section, perhaps a percent of the runoff for urban lands based on data from studies done in other areas (65). We encourage DEQ and municipalities to collect the information necessary to quantify the load of mercury attributable to stormwater discharges from the urban environment. It is important that mercury loads from urban stormwater discharges be characterized and separated from the erosion of native soils and air deposition categories. We believe that this data will show that estimated average inputs from municipal and industrial point sources will be greater than the 4% characterized in the current source load contributions. This information will also be useful when DEQ establishes reduction requirements in permits for both MS4 and non-MS4 communities (58).
Response	*Data are still not available with which to estimate loads at the level of detail requested in this comment. ODEQ agrees with the need to collect such data on a Basin-wide scale.*

Comment 109. *Sensitivity analysis*	With the combined USGS/DEQ dataset and additional sampling, revisit the mass balance model to ascertain sensitivity of model in general, and specific sensitivity to: • Streamflow estimates • Soil erosion estimates • Suspended sediment flux • Inclusion/exclusion of data from the upper watershed reservoirs (55 (+35, 40, 46, 56, 63, 68, by reference))
Response	*ODEQ looks forward to working with stakeholders during Phase II to obtain data and information needed to make more accurate estimates of mercury fluxes and loads from various point and nonpoint sources.*
Coast Fork Subbasin Analysis	
Comment 110. *Item clarification*	Please clarify if the load allocations for Cottage Grove and Dorena Reservoirs (pages 3-36 and 3-37) are for mercury coming into the reservoirs as opposed to mercury leaving them (33).
Response	*It is for mercury coming into the reservoirs.*
Comment 111. *Impact of legacy mining on downstream processes*	In Chapter 3, page 3-17 of the mercury TMDL, DEQ states that, "legacy mining sources appear to represent relatively minor sources of mercury to the mainstem Willamette River system..." We request this statement be modified. DEQ acknowledges that much of the mercury entering the Willamette River is bound to sediment from soil erosion. Therefore, it would be valid to conclude that the mercury bound to sediment that is eroded from mining sites would be trapped behind the reservoirs as bottom sediment. When trapped as bottom sediment behind the reservoirs, an active anaerobic methylation of mercury from legacy mine origin would most likely occur. Methyl mercury would then flow out of the reservoirs and downstream to the mainstem Willamette. We request that DEQ further investigate the impact that legacy mines may have on the bio-accumulation of methyl mercury in aquatic organisms downstream of the reservoirs (50).
Response	*Much of the mercury leaving major mining sites in the Coast Fork is trapped in the reservoirs. There are locations in shallow, warmer waters within the reservoirs where higher methylmercury levels (suggesting greater methylation activity) have been observed. However, much of the sediment-related mercury will be unavailable for methylation because it will be in places (deeper, colder waters) that are not favorable for the bacteria that actually perform the methylation. Measurements of methylmercury in waters downstream of the reservoirs do not show levels higher than generally observed in the mainstem. It should also be noted that methylmercury is somewhat volatile and also subject to photodegradation, making its long range transport from a single source unlikely.*
Comment 112. *Impact of legacy mining on downstream processes*	The sampling site immediately downstream of Dorena Reservoir (Sampling loc. 13) had total Mercury concentrations ranging from 0.52 to 2.66 ng/L, and dissolved methyl mercury concentration of 0.03 to 0.07 ng/L. These concentrations are comparable to the range of values observed in the mainstem of the Willamette River. On the other hand, the sampling location downstream of Cottage Grove Reservoir (sampling loc. 10) had total Mercury concentrations ranging from 0.97 to 4.48 ng/L, and dissolved methyl mercury concentrations ranging from 0.03 to 0.11 ng/L. In three of the four sampling events, total mercury and dissolved methyl mercury concentrations at this location was significantly higher than the locations in the mainstem of the Willamette River (which is also reflected in higher fish tissue concentrations at this location). This observation suggests that legacy mine sources in this reservoir may be impacting the Willamette River more directly than implied by DEQ. For this reason, the sediment sampling data need to be better incorporated into the MBM. This also supports an independent evaluation of the Coast Fork (55 *(+35, 40, 46, 56, 63, 68, by reference)*).

Response	*Any such comparisons must consider both flow and concentration. Daily mean flow below the dams is low, which translates into a low load despite the apparently elevated concentrations. All available evidence suggests that the mining activity in the Coast Fork cannot explain mercury levels throughout the remainder of the Basin. However, ODEQ looks forward to working with stakeholders during Phase II of this effort to obtain data and information needed to make more accurate estimates of mercury entering the mainstem from the Coast Fork Subbasin.*
Comment 113. *Characterization of impacts from legacy mining*	Page 28, Table 12: The input from the Coast Fork reservoirs is presented as exclusively related to mercury mining activities. This document should be reflected to show the clarification presented in DEQ's May 5, 2004 memo from Bruce Hope to Jared Rubin, noting that the inputs from Dorena Reservoir are atmospheric rather than mining-related. This assertion is not well supported, and this characterization is not reflected in the TMDL Chapter 3 proper. More importantly, investigation of these reservoirs should focus on understanding methyl mercury, rather than total mercury, cycling (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The loading analysis for the Cottage Grove and Dorena Reservoir watersheds can now be found in the text of the main Mass Balance document (see revised report in Appendix B). The text of this report clarifies the various inputs of mercury in these two sub-watersheds. ODEQ looks forward to working with stakeholders during Phase II of this study to obtain additional data and information to make more accurate estimates of mercury entering the mainstem from the Coast Fork Subbasin.* *The Coast Fork analysis raises significant mercury-related concerns that need to be addressed solely within its own context and disconnected from processes in the Basin. The cleanup of historical mining sites in the Coast Fork, for example, is the responsibility of ODEQ's Land Quality Division and the area's Designated Management Agencies.*

Need for Additional Mercury Sampling	
Comment 114. *Need for additional monitoring*	More sampling should occur to better understand the contribution of mercury from sediment resuspension (23 *(+ 40, by reference)*). Additional sampling of sediments is needed to better estimate historical discharges from past industrial activities (23 *(+ 40, by reference)*). DEQ should continue to develop data on the levels of methyl mercury in the river and the process/locations where methyl mercury forms (66). We support additional sampling and analysis for mercury and appropriate additional parameters on the Willamette to improve the scientific understanding of mercury water column concentrations and fish tissue results. Ambient mercury monitoring in water column, sediment and fish should be undertaken by the Department, not by permitted sources, as outlined in page 14-25 (55 *(+35, 40, 46, 56, 68, by reference)*, 63). We support additional sample collection and analysis for mercury and other parameters to improve the scientific understanding of mercury's transport, fate and bioaccumulation in the watershed (37, 40, 48, 57). We need to better understand how mercury gets into the soils so that 'we can assign numbers in the equation with a higher degree of confidence than is currently possible' (27, 32, 67). There are significant gaps in the data characterizing total mercury loadings to the Willamette River from essentially all sources. In addition, there are only limited data reflecting the spatial and/or temporal variability of methyl mercury concentrations in the river, which could be used to assess the potential for methylation "hot spots" in the river. These gaps preclude an accurate assessment of the significance of different sources with respect to both the total loadings and the potential for methylation of the mercury associated with a specific source. Although DEQ is planning to develop additional data on loadings associated with point sources, DEQ should also develop additional data characterizing loadings associated with what are acknowledged as the most significant sources of mercury to the Willamette; i.e., DEQ should be developing definitive data on loadings associated with non-point sources including atmospheric deposition and erosion. These activities should focus on total mercury. In addition, DEQ should continue to develop data on the levels of methyl mercury in the river. Goals of this ambient monitoring should be to determine 1) if methylation in the Willamette is localized to specific regions of the river, and 2) if there are seasonal effects on methylation (66). The future should be focused on understanding the methylation process to guide implementation (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ agrees that additional monitoring data would help clarify certain aspects of mercury loading and cycling in the Willamette Basin and would be extremely useful for calculating refined targets and for supporting sound management decisions. One of the highest priorities for Phase II of this study will be to better understand the multiple processes related to methylmercury formation in the Willamette Basin.* *ODEQ would like to work with the permitted and other sources to obtain the funding necessary to support the additional data collection efforts. Costs are associated with both taking and analyzing samples at lower detection limits and*

	with performing defensible QA/QC procedures. ODEQ will work with the stakeholders in the Basin to determine how best to fill the remaining data gaps pertaining to mercury in the Willamette given the resources available.
Comment 115. *Need for additional monitoring of point sources*	Additional sampling is required from industrial point sources (23 *(+ 40, by reference)*). *(a)* Ensure that all industrial dischargers are included in the study plan to characterize point sources regardless of flow or lack of historic information/data (66). *(b)* Why is mercury sampling of point sources only required on a quarterly basis? *(b)* What is the expected cost of taking a mercury sample? (29). *(c)*
Response	*See response 1 which describes the sampling requirements. Sampling costs vary depending on the sampling methods used, the parameter sampled for, quality assurance requirements, and reporting levels needed.*
Comment 116 *Need for additional monitoring of point sources*	The Plan (as outlined on page 14-25) allows a permittee with valid effluent monitoring data indicating that mercury is not present to end monitoring. The Plan, however, does not state the required detection limits for existing non-detect data to be considered valid for this purpose. We recommend that the data have low detection limits (i.e. 0.2 ng/L) in order to release a permittee from future effluent monitoring requirements (65).
Response	*ODEQ agrees with this comment. The text has been modified accordingly.*
Comment 117 *General*	The sampling locations and frequency of future monitoring should be better defined in Chapter 3 (24).
Response	*The sampling locations and frequency of future monitoring will be presented in detail in the Quality Assurance Project Plan (QAPP) for Phase II of this study. This Plan will be developed by ODEQ and will incorporate the recommendations generated by stakeholders during the Phase II scoping process. ODEQ's QAPP will be available on-line once it has been finalized.*
Comment 118 *Need to update QAPP*	DEQ should consider and adopt NCASI's technical comments on their Quality Assurance Project Plan for point source and ambient water monitoring for mercury to insure data generated from future DEQ studies will be technically sound (66). The Quality Assurance Project Plan should be revised for subsequent data collection (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The comments pertaining to ODEQ's QAPP have been forwarded to those responsible for its development, implementation and refinement. Many of the comments have already been incorporated into the revised version of the QAPP.*
Comment 119 *Commitment for future work*	We are concerned that DEQ and stakeholders will not collect the necessary data, as outlined during the next three years, due to lack of funds or priority changes. We would like to know what DEQ is doing to ensure that the mercury monitoring is conducted (58).
Response	*Select industrial and domestic point sources in the Willamette Basin will be required by ODEQ through a permit action to monitor their effluent for mercury and methyl mercury. This permit action is in accordance with general conditions attached to the NPDES permits stating that ODEQ may request additional information to determine compliance with the permit. The sampling will occur on a quarterly basis over the course of two years. This monitoring data will enable ODEQ to better quantify the contribution of point sources to the load of mercury in the Willamette Basin and to refine the wasteload allocations during the second phase of the mercury TMDL.*
Comment 120 *Need to collect*	We recommend that DEQ collect additional fish samples in the mainstem Willamette as well as in tributaries where higher methyl mercury production may occur. It is imperative that fish tissue samples are collected from all locations where water column samples are collected so that spatial variability in methylation

additional fish samples and to target areas with high rates of methylmercury production	can be related to fish tissue concentrations (50). We also recommend that DEQ collect additional fish samples in the mainstem of the Willamette River and tributaries at locations where higher methyl mercury production may occur. It would be highly desirable to collect fish from all locations where water column samples are collected so that spatial variability in methylation can be related to fish tissue concentrations. We also recommend that DEQ perform targeted sampling in locations and/or at times when methylation rates might be high. Future sampling efforts should include places (e.g., small tributaries, any wetland drainage areas, and impounded waters) and times (e.g., summer, fall) when methylation is likely to be highest (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ agrees that additional data would be extremely useful in support of sound management decision making. It is yet to be determined, however, whether or not additional fish sampling is planned for Phase II of this study. Whereas there is a relatively robust dataset for fish samples from the Willamette Basin, additional sampling might aid in the evaluation of trends over time. The design of the Phase II data collection effort will be shaped by the nature of the data gaps, the priorities for the mass balance modeling, and fiscal constraints. As stated above, one of the highest priorities for Phase II of this study will be to better understand the processes related to methylmercury formation in the Willamette Basin. ODEQ would like to work with permitted and other sources to obtain the funding necessary to support these additional data collection efforts. Costs are associated with both taking and analyzing samples at lower detection limits and with performing defensible QA/QC procedures.*
Comment 121 *Need for microcosm studies*	Future microcosm studies should be performed to address variability in elimination rates, bioconcentration factors and bioaccumulation (55 *(+35, 40, 46, 56, 63, 68, by reference)*). For future studies, we recommend that DEQ perform some controlled microcosm studies to better assess the variability in elimination rates and bioconcentration factors using biota and water specific to the Willamette Basin. In addition, DEQ should use Willamette Basin sediments in bioaccumulation studies to directly determine uptake by benthic organisms. DEQ should consider differences that may exist between reservoir and river environments. This information could ultimately be used to modify the FWM and enable it to address legacy sediment issues (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*ODEQ is open to conducting microcosm studies in the future if these studies are assigned high priorities during the Phase II scoping process. The design of the Phase II data collection effort will be shaped by the nature of the data gaps, priorities for additional modeling and resource constraints. At this point in time, we feel it is premature to commit to future microcosm studies.*
Comment 122 *Need to coordinate with the USGS*	DEQ has the opportunity to work with USGS to improve the understanding of the distribution of methyl mercury. The USGS's NAWQA program is evaluating mercury loading and bioaccumulation nationwide, and several sampling sites are located in the Willamette Valley. The USGS has recently provided preliminary data on fish tissue concentrations of methyl mercury and dissolved water-column concentrations of total and methyl mercury. With a single exception—from the Coast Fork Willamette station at low flow—the USGS data are well within the range of data collected by DEQ. Forthcoming analyses of sediment and water column particulates from 2002 samples and a full suite of samples from Johnson and Fanno Creeks (urban sites) and Lookout Creek (undisturbed forest site) should be useful supplements to DEQ's proposed data collection effort, along with the total mercury concentrations from hot springs and mining districts in the basin (55 *(+35, 40, 46, 56, 63, 68, by reference)*).

Response	*Comment noted. ODEQ will utilize the USGS mercury dataset once it has been finalized. The finalization of the USGS study results and dataset will most likely occur during Phase II of this effort.*
Data Analysis and Interpretation	
Comment 123 *Practical quantification levels and minimal reportable concentrations*	Much of the methyl mercury data reported by DEQ appear to be at or below the nominal practical quantification levels (PQLs) routinely achieved by laboratories applying EPA method 1630. Because analytical results less than the PQL are less accurate than those which exceed the PQL, the use of these kinds of data simply adds uncertainly to the overall analysis (e.g., in the determination of the ratio of dissolved methyl mercury to total mercury). The primary issue is that DEQ is assuming that all reported analytical values (the lab reports all values above the method detection limit) are of equal (acceptable) quality, when clearly they are not. DEQ should not use analytical results below the PQL in any of its modeling or decision making. If this is perceived as an impediment DEQ should perform the analytical work necessary to achieve lower PQLs (66). *(a + e)* DEQ should develop a more appropriate minimum reportable concentration of mercury in the existing dataset and all future datasets *(b)* and attend to issues raised in the USGS SRS Interlaboratory Comparison evaluation (see below) (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(c)* DEQ should develop a more appropriate minimum reportable concentration of mercury in the existing dataset and all future datasets. Method and QA samples do not support quantitation below 0.5 ng/L mercury (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a + e)* With any regulatory scheme such as a TMDL, accuracy of the underlying data must be the basis for any subsequent analysis. This is especially important in the development of mercury TMDLs for two reasons: the low concentrations of mercury considered to have a deleterious effect in the environment, and the corresponding high level of effort necessary for any analysis. DEQ properly makes use of EPA Methods 1630 and 1631 for mercury analysis in water, but inappropriately quantifies the results. In addition, some quality control results should lead to additional qualified data. The minimum level of quantitation (MLQ) for total dissolved mercury by EPA Method 1631 is 0.5 ng/L. In the Willamette River TMDL, however, values as low as 0.2 ng/L have been reported as method detection limits, which are also lower than the lowest calibration standard (0.5 ng/L). Similarly, the MLQ for methyl mercury by EPA Method 1630 is 0.06 ng/L, whereas the TMDL reports values as low as 0.0228 ng/L. The use of levels below the MLQ could bias the bioaccumulation factors (i.e., low methyl mercury values in water column would result in high BAF). Values that are less than the MLQ should be reported as censored values (i.e., <0.5 ng/L for mercury and <0.06 ng/L for methyl mercury). *(a + b + e)* At the “Willamette River at Greenway Bike Bridge” station in Eugene, a dissolved methyl mercury concentration was reported at 0.0618 ng/L in a field sample and 0.0316 ng/L in the field duplicate (relative percent difference [RPD] = 48.8%). Similarly, a sample for total methyl mercury at Wheatland Ferry was reported as 0.0738 ng/L in the primary sample, and 0.0322 ng/L in the duplicate sample, giving a RPD = 78% was reported. The high RPD in duplicate samples illustrates the problem of measuring these analytes at levels below EPA’s MLQ. In addition, it is not clear why DEQ arbitrarily chose to use Field Duplicate results for the Greenway Bridge location, but used Field Primary sample results for the Wheatland Ferry location. *(d)*

	In one of the equipment blanks (i.e., field blank), total methyl mercury was reported at 0.0332 ng/L, total mercury at 0.23 ng/L, and dissolved mercury at 0.270 ng/L. All of these results were above the Method Reporting Limit in this study. Similar problems were found with other equipment blanks as well. Methyl mercury was also detected in numerous laboratory blanks, but the results for the associated samples were not corrected. *(d)* Over the last year, DEQ has demonstrated progressively decreasing performance on the U.S. Geological Survey (USGS) Interlaboratory Comparison of Standard Reference Samples (SRS) for mercury —from "excellent" in Fall 2003, to "marginal" in Spring 2004, and to "unsatisfactory" in Fall 2004. This interlaboratory comparison evaluates whether analysis of a standard reference sample falls within an acceptable range when compared to other laboratories. While we recognize the rigor of this study, analysis of standard reference samples is a major component of laboratory quality control because it provides an independent assessment of the accuracy of the results. (c) These issues add elements of uncertainty to the analysis that have not been addressed in the TMDL, and that compromise the TMDL analysis. Due to problems associated with large differences between field duplicates, and the detection of various mercury species detected in equipment blanks as well as laboratory blanks (at levels above MLQ), we recommend that DEQ use only results that were above MLQs provided in EPA methods as described above (i.e., 0.5 ng/L for mercury, and 0.06 ng/L for methyl mercury). This would make DEQ more consistent with the USGS in their reporting of mercury analyses from the Willamette Basin in the course of the National Water Quality Assessment (NAWQA) study. Additional comments on the QAPP are addressed below (55 *(+35, 40, 46, 56, 63, 68, by reference)*). *(a + b + e)*
Response	*(a) Practical Quantitation Limits (PQLs) are the lowest concentration of an analyte that can be reliable measured within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs are essentially the same as minimum levels of quantification (MLQs). PQLs refer to general standards across a broad spectrum of laboratories as opposed to an individual laboratory. The methods for determining PQLs vary considerably and the numbers, in and of themselves, do not really have much significance. PQLs may be viewed as a target that the laboratory should be able to achieve. It is not uncommon for a laboratory to report values that are below the established PQL.* *(b) The Method Detection Limit (MDL) is defined in 40 CFR 136, Part B as "..the lowest concentration of an analyte that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions". The MDLs employed in this study for measuring mercury and methylmercury in water were found to be 0.057 ng/l and 0.00599 ng/l, respectively. These values were established and verified by the two laboratories conducting the analyses.* *Method Reporting Limits (MRLs) are laboratory defined values that represent the concentration of an analyte at which the laboratory is comfortable reporting data as unqualified (i.e. reporting data with a high level of confidence). MRLs are typically 3-10 times the MDL. The numbers that a laboratory is able to report to are not in the published method but rather are laboratory-specific and dependent on their individual facility, personnel and equipment. The MRLs for mercury and methylmercury for this study were 0.2 ng/l and 0.02 ng/l, respectively.* *If the value is between the MRL and the MDL it is typically 'flagged' and reported as an estimate. It should be noted, however, that ODEQ did not present any results that fell in this category (between the MRL and the MDL). Thus, none of these results were qualified as estimates.*

	(c) It should be noted that the samples were analyzed at two independent laboratories (and not at ODEQ's own laboratory). The total mercury samples were analyzed at the USEPA's Regional laboratory in Port Orchard, WA and the methylmercury samples were sent to Battelle's laboratory in Sequim, WA. Thus, comments pertaining to ODEQ's rating in the USGS Interlaboratory Comparison of Standard Reference Samples are not relevant here. *(d) Two cases of duplicate variability (48% and 78%) were presented as evidence of a problem. It should be noted that laboratory duplicates were also run and precision was maintained throughout the laboratory process. For laboratory duplicates, results must be plus or minus 20% or if the concentration was less than 5 times the MRL, then the duplicates need to be plus or minus the MRL. For these samples, the laboratory quality control was fine indicating that the 48% and 78% variation could be an indication of field variability and field precision.* *The Quality Assurance Project Plan (QAPP) for the study allowed for some detections in the blanks, provided they fell below a certain concentration. In general, if there had been a detection of an analyte in a blank, then the laboratory would have qualified the data. This is a practice that is commonly employed in laboratory quality assurance and quality control. For this study the data validation was successfully completed as described in the QAPP.* *(e) As mentioned before, ODEQ feels comfortable using results falling below the PQL, provided that the QA/QC guidelines specified in the QAPP have been met. There is also a strong precedent for using estimates in analyses. The USEPA, for example, often wants to see concentrations below the MRLs because they believe that these results still have value. Whereas concentrations below the MRL would have been flagged as estimates (had there been any in this study), concentrations below the PQL were not considered to be estimates for the reasons described above.*
Comment 124 *Use of the geometric mean*	Page 3-35 of the TMDL states that 'the geometric mean more closely approximates the median of log-normally distributed data and is less sensitive to the extreme values recorded during high flow events'. What if these 'extreme' values are of real significance and drive the fish uptake? That would not be captured by the geometric mean (46).
Response	*Because ODEQ's focus is on the long-term average performance of the entire Basin system, it is appropriate to use metrics that address central tendencies, as opposed to outliers. Although the Basin system is capable of generating "extreme" values (e.g., flood flows) it does so infrequently and for fairly short periods. The infrequency of these events and the real possibility that fish may have adapted to them over time, is expected to minimize their significance. In addition, extreme high flow events occur during the winter months, when lower water temperatures are likely to retard fish metabolism and thus uptake of contaminants.*
Mercury Implementation	
Comment 125 *Reliance on other state agency programs*	A heavy reliance on other state agency programs, private entities and, as yet, undeveloped reduction strategies are major weaknesses in the approach outlined by DEQ to reduce mercury fish tissue concentrations (see page 14-24) and temperature. We believe the proposed Water Quality Management Plan relies too heavily on out-of-date natural resource practices, voluntary efforts, too little actual enforcement, and protracted time frames to achieve the success envisioned for mercury and temperature reductions. The mercury TMDL implementation strategy, for example, emphasizes process, guidance values and long-term studies (60).

Response	*Comments noted. See response to Comment 1.*
Comment 126 *General*	Mercury will be difficult to control in 'natural decay and erosion areas' (8).
Response	*Comment noted.*
Comment 127 *Mines*	Adequate resources must be allocated for the closure and reclamation of abandoned and historic mines (37, 55 *(+35, 40, 46, 56, 68, by reference)*, 63).
Response	*ODEQ agrees that the closure and reclamation of abandoned and historic mines is of great importance in the Coast Fork Subbasin, specifically for mines upstream of the Dorena and Cottage Grove Reservoirs. However, there is no evidence of discernible discharges of mercury from other, less significant "mining" sites in the Basin.*
Comment 128 *Source reduction*	DEQ should focus on mercury source reduction rather than current load reduction targets and eventual load allocations. This approach should be included in the water quality management plan and the next TMDL (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Source reductions will ultimately form the basis of any effort to address mercury contamination in the Willamette, particularly for the municipal and industrial point sources. The development of load reduction targets and sector-wide allocations, however, are appropriate due to the requirements of State law (OAR 340-042-0025) and the Federal Clean Water Act.*
Comment 129 *Credits for proactive measures*	For the 'bubble concept' to work effectively, a mechanism for water quality credits that are associated with early actions to reduce mercury discharge into the Willamette must be established. Without a system to 'bank' mercury reduction credits, municipalities will be obligated to cease their early mercury reduction programs since it would inhibit their ability to capture those mercury reductions in the future (37, 50, 55 *(+35, 40, 46, 56, 68, by reference)*, 63). With the phased approach for implementing the mercury TMDL, point sources may be discouraged from taking proactive measures for mercury reductions under the sector-based strategy unless there is a way to "credit" their accomplishments when the next round of the mercury TMDL is undertaken and specific WLAs are developed (48, 56 *(+ 68, by reference)*). The across the board reduction requirements penalizes sources such as POTWs that have already implemented substantial Hg source reductions in the past. Reductions achieved by POTWs must be acknowledged in this TMDL and taken into account when establishing reduction requirements (46).
Response	*ODEQ commits to working with the stakeholders in the Basin to elaborate a mechanism for developing water quality credits that encourages the sources of mercury to take proactive steps in the short term to address their mercury contribution. The intent of this TMDL is not to penalize sources, such as POTWs, that have already implemented substantial mercury source reductions in the past. ODEQ will work with interested parties to develop a framework that encourages proactive measures for the reduction of mercury, where possible, without penalizing those who implement these types of activities prior to the elaboration of refined targets and more specific allocations during Phase II of this study.*
Comment 130 *Stormwater*	We support the phased approach toward implementing mercury allocations related to stormwater (40, 57). Stormwater is not a source of mercury rather it provides transport to move mercury from other sources into streams (57).

Response	*Comments noted.*
Comment 131 *Implementation of Phase I*	We do not support implementation of a Phase I TMDL for mercury. It appears that Salem BLM will be responsible for an "interim" sector specific allocation for mercury as part of the Phase 1 portion of the TMDL. From the component list in page 3-3 this TMDL covers all BLM lands that are tributary to the Willamette River. It is evident from your review and analysis of the pollutant that data on mercury is significantly lacking. Because of this lack of data you have not set an allocation for point sources. However, non-point sources that appear to be lacking as much or more data are responsible for an interim allocation (62). From what we have found in the document, the forestry sector will need to incorporate mercury concerns into the established mechanisms for TMDL implementation. To BLM, this means incorporation into standards and guidelines that can commit resource, workload and time. We agree as stated in the WQMP component of this TMDL that erosion control BMPs will be the dominate method of control on BLM (62).
Response	*The interim sector-wide allocations developed in this preliminary phase of this TMDL apply to both point sources and non-point sources of mercury. Best management practices to address runoff and erosion will most likely be the dominant methods of mercury control for the Federal and private land management agencies.*
Comment 132 *Erosion control measures*	A potential management strategy for mercury may be to extend erosion control requirements to all building permits. This strategy creates a whole level of administration, review, inspection and enforcement for which we currently do not have funding (43).
Response	*Comment noted. The intent of this management strategy is not to create a burdensome bureaucratic process particularly for the smaller municipalities and designated management agencies. ODEQ is in the process of developing guidance materials that will help municipalities and other designated management agencies develop their implementation plans and comply with the requirements of the TMDL.*
Comment 133 *Implementation of phased approach*	We recommend that the TMDL state that the Phase I estimates on loading reductions and waste load allocations have no enforcement effect and cannot be used to imply any effluent limit for a point source. We question the reasonableness of the requirement under a general permit or TMDL rule that mercury reduction plans be developed and implemented by point sources at this time given the documented uncertainties of the conclusions and targets proposed in this phase of the TMDL and the acknowledged major gaps in data and scientific knowledge. We agree that mercury monitoring should be conducted and can contribute to the knowledge base (61).
Response	*See response to Comment 1.*
Comment 134 *TMDL and MS4*	The Draft TMDL states (in Chapter 14, Part 2, page 14-25, paragraph 2, bullet 4) that 'a general permit or TMDL implementation rule will be developed for all municipal and industrial wastewater point sources." We would like it clarified that MS4 stormwater discharges would not be required to operate under this general permit or rule, as this would be redundant for TMDL discharges already covered by MS4 permits (64).
Response	*ODEQ plans to implement the mercury monitoring requirements through a permit action letter. The mercury monitoring requirements would extend to select domestic and industrial NPDES point sources including Phase 1 MS4 permitees. ODEQ is no longer pursuing the development of a general permit or a TMDL implementation rule.*

Comment 135 *Stakeholder input*	The Department should use stakeholder groups for policy and technical advice during the interim time period until 2009. Stakeholder groups can work on permit requirements, ambient water monitoring and air deposition analysis (66).
Response	*Comment noted. ODEQ plans to continue its work with the Basin's stakeholders during Phase II of this effort. Many have indicated their desire to assist with Phase II scoping, the development of monitoring requirements and other technical and policy issues related to mercury.*
Comment 136 *Bubble concept*	In Chapter 14, page 14-26, DEQ states that it is willing to explore the implementation of a 'permit bubble concept' that would allow a group of similar point sources to join together to determine the best way to reduce mercury effluent loadings. We support this concept as it will allow POTWs to collectively develop and implement mercury reduction options (50).
Response	*Comment noted.*
Comment 137 *Public process*	What type of public review process does DEQ envision for the development of the Permit Bubble Concept, Multi-media Bubble and pollution trading strategies for mercury (60)?
Response	*These concepts will be developed in more detail as part of the Phase II of the Mercury TMDL. There will certainly be an official public review and comment process incorporated into this next incremental phase of the study. In addition, there will be additional opportunities for the public to provide comment on how these concepts will be integrated into individual permits, as the permits themselves are developed.*
Comment 138 *Funding*	What mechanisms are in place to ensure funding will be available to support the proposed mercury reduction plan (60)?
Response	*Funding for the implementation of the Willamette TMDL was included in the Governor's approved budget for the 2005-7 biennium and was awarded to ODEQ by the State Legislature. This Implementation package includes staff resources to work on mercury implementation efforts. ODEQ will work with the permitted and other sources in the Basin to obtain the necessary funding to support additional data collection efforts. ODEQ will also be submitting a grant proposal which, if funded, will help cover the costs associated with the development of mercury minimization plans.*
Use of Best Management Practices	
Comment 139 *Advantages and appropriateness of BMPs*	Supports the proposal to allow municipal point sources to implement BMPs as a mercury minimization strategy for the control of mercury (16, 18, 19, 20, 21, 35, 40, 50, 56 *(+ 68, by reference)*, 57, 63) BMPs will allow point sources to effectively control mercury without installing costly end-of-pipe treatment (50). Should effluent limits need to be established in the future, they do not necessarily have to be numeric. According to 40 CFR 122.2 an 'effluent limitation' can be defined as 'any restriction imposed on quantities, discharge rates, and concentrations of pollutant discharged from point sources'. This definition includes non-numeric restrictions that are usually implemented through BMPs related to source control (50). We support efforts to reduce mercury concentrations by promoting the following: BMPs to collect and recycle dental amalgam; programs to reduce and eliminate mercury-containing products in schools; battery recycling programs; and mercury switch replacement programs (37, 48, 55 *(+35, 40, 46, 56, 68, by reference)*, 63).

	Stormwater BMPs related to erosion prevention will be important in areas that have naturally high levels of mercury (40, 57).
Response	*Comments noted. Best management practices and other source reduction efforts will form the basis of any effort to address mercury contamination in the Willamette. ODEQ will work with interested parties to develop a framework that encourages proactive measures for the reduction of mercury without penalizing those who implement these types of activities prior to the elaboration of refined targets and more specific allocations in Phase II of this study.*
Trading Between Sectors and Media	
Comment 140 *Cross-media trading*	DEQ should encourage cross media emission trading for mercury (23 *(+ 40, by reference)*). We support the concepts of trading among sources to achieve an overall practical and cost-effective means to achieve the goals of the TMDL (56 *(+ 68, by reference)*, 63). On page 14-26, 8th bullet, the document states that "Trading would be an option to meet future waste load allocations." We believe this is appropriate for the Temperature TMDL, but inappropriate for the Mercury TMDL. The individual point sources should be responsible for reducing their mercury effluent to acceptable levels (58).
Response	*Comments noted.*
Assorted Additions, Deletions, Clarifications and Changes	
Comment 141	In the 3rd paragraph on page 3-3, the last sentence should end with the addition of the following text 'or the tributaries in the Lower Willamette for which local data was used to set allocations' (40, 57).
Response	*ODEQ does not agree with this comment. The waterbodies of the Lower Willamette Sub-basin are covered by the TMDLs for temperature, bacteria and mercury. The temperature and bacteria TMDLs presented in this document do not presently address the 303(d) listed waterbodies in the Yamhill, Tualatin and Pudding Molalla Sub-basins. The mercury TMDL, however, is basin-wide and covers waterbodies in each of the twelve Willamette Sub-basins.*
Comment 142	The bullet "MS4 Phase 1 and 2" on page 14-26 should be revised to reflect any changes that are made in the MS4 permits related to 303(d) Listed Pollutants (40).
Response	*The proposed modifications currently under consideration for the Phase I MS4 permits are unrelated to the TMDL / 303(d) conditions for those permits. It is unlikely that any substantive changes will be made to those particular permit conditions.*
Comment 143	The first paragraph under 2009 TMDL Update, page 14-28 says "…One goal of the updated TMDL will be to set water quality based effluent limits for water point sources that discharge significant levels of mercury." The words "when appropriate" should be added to the sentence to accommodate existing policy

	related to stormwater permits (40, 57).
Response	*The suggested change has been made in the text.*
Comment 144	In the last sentence of the first paragraph on page 3-8, the reference to Appendix A should be changed to Appendix B (46). In the first paragraph on page 3-23, the reference to Appendices C should be changed to Appendix B (46, 65).
Response	*The suggested changes have been made in the text.*
Comment 145	Is the Willamette River Basin (WRB) data presented in Figure 3.2 an average of the four seasons shown in Figure 3.1? The WRB data is almost identical to the lakes and reservoirs data even though most data points were collected in streams and rivers. An explanation is needed to clarify the data (46).
Response	*The data presented in Figure 3.2 represents an average of the individual seasons presented in Figure 3.1. Several explanations for the convergence of translator values with those for lakes and reservoirs are possible: (1) coincidence, (2) data from reservoirs, tributaries, and the mainstem were combined to make this estimate, obscuring the effects of flowing water, or (3) the mainstem, because of its size and regulation, behaves more like a large, slow lake than a fast moving river. Text has been added to the TMDL to clarify this point.*
Comment 146	The text on page 3-19 states that 'there appears to be a moderate positive correlation between concentration and flow for total and dissolved mercury but no correlation for total and dissolved MeHg'. If that is the case, then the Omega value should not be fixed but increase with flow rate. This appears to contradict data in Figure 3.1, which shows a decrease in Omega with increasing flow (46).
Response	*Figure 3.1 shows that the translator is lowest in the Spring. We speculate that this phenomenon is due to a combination of factors: during the Spring time conditions may not favor bacterial action and higher flows most likely mobilize more total mercury as suspended load. The translator is highest in the summer because conditions now favor bacterial action (methylation) and lower flows fail to mobilize total mercury as suspended load.*
Comment 147	The text on page 3-23 states that 'it is estimated that the amount of mercury available for resuspension will decrease over time as cross sector measures to address mercury loading are implemented'. Does that mean that the amount of net deposition will also decrease over time? Instead of introducing re-suspension as a new concept, why not say that net deposition will decrease. In addition, as long as we have a net deposition anywhere in the basin, we potentially create local problem areas (46).
Response	*The model could be revised to explicitly identify the separate processes of deposition, resuspension, and burial (in deeper layers). Resuspension is a separate process from deposition and is the process which accounts for seasonal peaks in mercury water concentrations.*
Comment 148	The text on page 3-37 states that 'the interim load reductions apply on a year-round (as opposed to seasonal) basis'. That could be problematic for sources which do not have any contributions during part of the year and that contribute a disproportionate amount during some other part of the year (46).

Response	*The sentence on page 3-37 has been removed from the revised version of the TMDL.*
Comment 149	The text in Section D(a) on page 14-5 related to general permits and implementation rules is not very specific. Please clarify whether mercury will be implemented via a permit or an implementation plan (or both) (46).
Response	*ODEQ is planning to impose the mercury monitoring requirements through a permit action letter. ODEQ is no longer considering the development of a mercury-specific general permit or a TMDL implementation rule.*
Comment 150	Please clarify in the text of the document that MS4 permits are excluded from any effluent limits (46). Page 14-23, 1st paragraph under Mercury TMDL Implementation. The last sentence needs to explicitly state that there will be no numeric limits in MS4 permits. (63)
Response	*MS4 permits utilize performance measures and benchmarks, as opposed to numeric effluent limits. Text was added to Chapter 14 to clarify that MS4 permits will not contain numeric effluent limits.*
Comment 151	We agree with the conclusions reached under the Adaptive Management portion of page 3-40. We would like to highlight the statement “The lack of adequate information on mercury source contribution from various source categories mentioned above is a significant limitation of this TMDL” (62).
Response	*Comment noted.*
Comment 152	The Draft states (in Chapter 14, Part 2, page 14-25, bullet 4, sub bullet 3, sub sub bullets 2 and 3) that "effluent monitoring will not be required for sources that do not acknowledge mercury". It would be helpful if DEQ could further define what is meant by "acknowledge" and if data collection or documentation will be required to justify why mercury is not "acknowledged" (64).
Response	*ODEQ plans to implement the mercury monitoring requirements through a permit action letter. This will be in accordance with the general conditions attached to the NPDES permits stating that ODEQ may request additional information to determine compliance with the permit. ODEQ will require mercury monitoring of all major domestic and industrial sources in the Willamette through this mechanism. Select minor industrial sources will also be required to monitor but at a reduced frequency. The specific monitoring requirements, as well as the rationale for selecting the source categories affected, are described in detail in the documentation accompanying the permit action letters. All major NPDES POTWs and pulp and paper facilities would be expected to monitor for mercury and methylmercury as outlined in the permit action letter. The intent is not to require such labor and cost-intensive mercury monitoring of all NPDES permitees but rather require effluent monitoring of NPDES sources that, in ODEQ’s estimation, represent significant sources of mercury to the Willamette. .*
Comment 153	The values presented in the middle column of Table 3.9 do not match the values presented in Figure 3.4. The text leads you to believe that they should (65).

Response	*Table 3.9 and Figure 3.4 have been updated in the revised version of the TMDL.*
Comment 154	The third sentence of the second paragraph on page 3-36 states that no '...individual NPDES permit limits…' This should read 'individual numeric NPDES permit limits…' (65). This plan appears to waive the requirements for water quality based effluent limits for mercury in NPDES permits issued between 2005 and 2009. The TMDL cannot do this for all cases. If a reasonable potential analysis for mercury indicates that the facility exceeds the mercury criteria, a reissued permit must contain a mercury limit. The first sentence of 2) (on page 14-25) should read "Intent: Numeric permit limits…" (65)
Response	*The suggested changes have been made to the text.*
Comment 155	As described in Chapter 14, Table 14.1, page 14-9: The Yamhill Subbasin Designated Management Agencies column should include the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) (58).
Response	*The suggested changes have been made to the text.*
Comment 156	In Chapter 14, (L) on page 14-16, the Tribes are not mentioned. They will play an important role in the development and implementation of the Willamette Basin TMDL, Water Quality Management Plan (WQMP), and individual Implementation Plans (58).
Response	*We acknowledge the important role the Tribes play in the development and implementation of the Willamette Basin TMDLs. We would also like to acknowledge the significant input they provided as an active member of the Mainstem Willamette TMDLs Council. In response to the comment above, the Tribes have been added to the text of the paragraph in question in the WQMP.*
Comment 157	Please clarify (on page 3-19) how a water column concentration guidance for mercury relates to a fish tissue reduction when the water column mercury concentration already meets state water quality criteria (60).
Response	*The relationship between the water column guidance value and the fish tissue criterion for mercury is described in detail in the Section entitled 'Water Column Guidance Value' in the revised TMDL document. The applicable criterion, in terms of the water column guidance value, is the 0.3 mg/kg methylmercury fish tissue criterion which was adopted by the State in May of 2004. This criterion pertains to the human health concerns associated with the consumption of mercury-containing fish. As noted previously, the aquatic life criteria for mercury are not typically exceeded in the Willamette Basin.*
Comment 158	Please clarify (on page 3-17) the following statement. "The loading capacity for this analysis is defined as the load of total mercury (estimated in kg/yr) associated with the interim water column guidance value deemed to be protective of the beneficial use of fish consumption (60)."
Response	*Additional text has been added to clarify the relationship between the total load of mercury, the interim water column guidance value, and the restoration of the beneficial use of fish consumption.*

Comment 159	On page 3-15 the text states "As mentioned before, the methodology for establishing water column guidance values in units of total mercury, as opposed to methylmercury, is consistent with guidance from USEPA." Please provide the scientific rationale for why DEQ believes using total mercury is adequate (60).
Response	*Additional text has been added to the TMDL to better justify the policy decision to establish guidance values in units of total mercury, as opposed to methylmercury.*
Comment 160	Please clarify what DEQ intends by the following statement (on page 3-25): "Mercury loading attributable to the erosion of native soils from agricultural and forested land is, for example, based entirely on the concentration of mercury naturally present in native soils." Have applications such as fertilizers, pesticides, herbicides to agricultural and forested lands that might include mercury as well as atmospheric deposition been accounted for elsewhere in the model (60)?
Response	*There are no data which indicate any significant use of mercury-based agricultural products in the Basin nor are soil data currently adequate to detect any "hot spots" of mercury contamination (should they even exist). The mercury originating from atmospheric deposition has been accounted for elsewhere in the model.*
Comment 161	What does DEQ assume as a time frame for the statement (on page 3-35) "…will eventually fall below the threshold of 0.3 mg/kg?" (60)
Response	*Change would be expected to require several years, perhaps five or more, due to considerations pertaining to mercury cycling and food web dynamics. The presence of natural sources of mercury along with areas conducive to methylation (i.e., wetlands) could provide sufficient methylmercury to delay attainment for many years to come.*
Comment 162	Regarding page 3-36, Will these requirements be written into the permits? What will the requirements look like and over what time frame (60)?
Response	*ODEQ is no longer considering the development of a general permit specific for mercury or a TMDL implementation rule. ODEQ will impose the mercury monitoring requirements through a permit action letter consistent with the general conditions attached to the NPDES permits stating that ODEQ may request additional information to determine compliance with the permit. The specific monitoring requirements will be outlined in the documentation accompanying the permit action letters. Monitoring will occur for a period of at least two years on a quarterly basis.*
Comment 163	On page 14-25, the following two comments seem mutually exclusive (60). "Effluent monitoring will not be required for sources that do not acknowledge mercury on their application, report it in their TRI data, or have not been otherwise identified as a potential mercury source by ODEQ" "If valid effluent monitoring data indicates that mercury is not present or does not exceed *de minimus* levels, then future effluent monitoring will not be required."
Response	*The second sentence indicates that if monitoring of a point source were to take place for whatever reason and mercury was not found on a consistent basis, or was found at de minimus levels, then the point source in question could be relieved of future mercury monitoring obligations.*
Comment 164	Please provide a list of other potential point source discharges to which the following statement applies (page 14-25). "Intent: Permit limits will not be….A general permit or a TMDL……..such as

	municipal wastewater treatment plants and the pulp and paper industry." (60)
Response	*ODEQ is no longer considering the development of a general permit specific for mercury or a TMDL implementation rule. ODEQ will implement the mercury monitoring requirements through a permit action letter consistent with the general conditions attached to the NPDES permits stating that ODEQ may request additional information to determine compliance with the permit. The specific monitoring requirements will be outlined in the documentation accompanying the permit action letters. Monitoring will occur for a period of at least two years on a quarterly basis. The supporting documentation accompanying the permit action letters will provide a list of all the affected point sources.*
Comment 165	We suggest that DEQ clarify whether any fish tissue data was collected from the Willamette River at Greenway Footbridge (LASAR # 29044) location. Also, DEQ should clarify why fish data for two additional locations (Willamette River upstream of McKenzie and downstream of Beltline and Willamette River at Willamette Park - Portland) in the Appendix B, are not listed in Table 3-2, and whether any water column data were collected from these locations (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*Fish were collected at the 'Willamette River upstream of McKenzie River and below Beltline Drive' site in lieu of the 'Willamette River at Greenway Bridge' site due to the fact that ODEQ could not get the fish shocking boat to the Greenway Bridge site. Similarly, due to the depth and difficulty of collecting fish at the 'Willamette River at SP&S RR Bridge' site, additional fish were collected at the 'Willamette River at Willamette Park, Portland' site to complete our complement of fish from the lower Willamette reach. Corresponding water and sediment samples were not collected at these supplementary fish sites.*
Supplementary comments on DEQ's Quality Assurance Project Plan (QAPP)	
	DEQ published a Quality Assurance Project Plan (QAPP; ODEQ 2002) that supports its ambient environmental sampling program. Results of this program are presented in ODEQ (2004b). The focus of the mercury TMDL process is to understand the relationship between concentrations of mercury in the water column and concentrations of mercury in fish tissue through models and direct environmental sampling, using data whose quality is assessed in the QAPP. ODEQ's end purpose in developing the models has been to attempt to: 1) relate concentrations of inorganic mercury in the water column to fish tissue concentrations that are dominated by methyl mercury and 2) quantify sources and sinks of mercury in the Willamette Basin. Therefore, the quality of the data used as input to these documents is a critical factor in how reliable the assumptions made in the FWBM and mass balance calculations are, which in turn decides how applicable the TMDL will be to actual river basin conditions. The consequent regulation of permitted and non-permitted sources in the Willamette Basin will thus also depend heavily on the reliability of the baseline data. In light of the importance of data quality on additional sampling that will be performed by ODEQ and the future regulatory consequences of the mercury TMDL, the team has a number of comments on the QAPP. Note that these comments are in addition to those provided to ODEQ by the City of Corvallis in September, 2004, and acknowledged and responded to by Allen Hamel of ODEQ on September 13, 2004. **General Comments**

A. Our most substantial concern is the quantitation limits used by ODEQ. This concern, which is significant, has been addressed above (Issue #4).

B. A pilot study by the USGS has shown that there is a strong correlation of methyl mercury in water with methyl mercury in fish, but only a moderate correlation with methyl mercury in sediment and only a moderate correlation with total mercury in water. Also, the pilot study suggests that low concentrations of methyl mercury in water are more efficiently bio-transferred than are high concentrations. The addition of ancillary measures, i.e., percent wetlands and acid-volatile sulfides [AVS] by EPA Method 376.3 (sediments only) have proven to contribute significantly to the outcome of predicted models. These ancillary measures should be included in the analytical program.

C. In the QAPP summary, the first paragraph implies that the mercury concentrations in fish tissue are equivalent to their respective methyl mercury concentrations. This seems to imply that only fish tissue samples are analyzed for total mercury, which will allow estimation of the methyl mercury concentrations in fish tissue. This point, which is discussed in other sections of this document, needs to be more clearly emphasized in the QAPP.

Specific Comments

A. Summary, Paragraph 2, Sentence 1 – Include “methyl mercury”.
B. Summary, Paragraph 2, Item #1 – Replace “transport or transfer blacks” with “Field, equipment, and bottle blanks” in order to be consistent with EPA Method 1669 (or industry standard) terminology.
C. Summary, Paragraph 3, Items #1 and #2 – Statistically, mean blank values that are 1/3 to 1/5 of any corresponding field sample seem to be too close to the sample result. The team recommends using “1/5 to 1/10”.
D. Summary, Paragraph 3, Item #3 – The MS %R criteria should be 71 – 125% for total mercury and 65-135% for methyl mercury, per Methods 1631 and 1630, respectively.
E. Summary, Paragraph 3, Item #4 – The MS/MSD RPD criteria should be + or – 24% for total mercury and + or – 35% for methyl mercury, per Method 1631 and 1630, respectively.
F. Summary, Paragraph 3, Item #6 – The quality control spike criteria should be 77 – 123% for total mercury and 67 – 133% for methyl mercury, per Method 1631 and 1630, respectively.
G. Section 5, Page 7, Data Quality Objectives, Paragraphs 1 and 2 – Import changes referenced in Comments 1 through 6.
H. Section 5, Page 7, Precision, Paragraph 2, Sentence 4 – Revise to read “Matrix spike/matrix spike replicates are used to determine the effect of the matrix on the bias of the sample batch.”
I. Section 5, Page 8, Accuracy, Paragraph 1, last sentence – Should reference the method-specific criteria in Table 3 of QAPP, rather than using 60 to 140%.
J. Section 5, Page 8, Representiveness – Revise heading to read “Representativeness”.
K. Section 5, Page 8, Representativeness, Paragraph 1, Sentence 4 – Replace “transport, transfer blanks” with “field, equipment, bottle blanks” to be consistent with Method 1669 (or industry standard) terminology. It should be noted when collected filtered samples, the accompanying field blanks must be filtered as well.
L. Section 5, Page 8, Representativeness, Paragraph 3, Sentence 1 – Specify which tests will be used to describe the sample matrix (e.g.,

	"matrix spikes"). M. Section 5, Page 9, Comparability, Paragraph 2, last sentence – Please reference the method-specific criteria in Table 3 of the QAPP, rather than using 60 – 140%. N. Section 5, Page 9, Matrix Spike Analysis, Sentence 2 – Text should reference the method-specific criteria in Table 3 of the QAPP, rather than using 60 – 140%. O. Section 5, Page 9, Matrix Spike Analyses, Sentence 4 – Delete sentence. Method 1630 (methyl mercury) and 1631 (total mercury), do not require "Method of Standard Additions" (MSA) as a quality assurance/quality control (QA/QC) protocol. MSA is typically used for atomic absorption procedures performed by Contract Laboratory Program (CLP) methods (i.e., graphite furnace methods). P. Section 6, Page 10, Water Samples, Collection, Paragraph 3, Sentence 2 – Text should note that if the mercury samples are preserved at the lab, then it should be done within 48 hours of sample collection per Methods 1630 and 1631. Note: Method 1669 does indicates mercury samples should be laboratory preserved. Q. Section 6, Page 11, Sediment Samples, Processing, Paragraph 1, Sentence 3 – The sediment samples should be collected in fluoropolymer or borosilicate bottles with fluoropolymer-lined caps for methyl mercury analysis. R. Section 7, Page 13, Sample Tracking, Paragraph 1, Sentence 5 – The term "concatenated" should be replaced with a simpler term (e.g., linked). S. Section 7, Page 15, Corrections to Documentation, last sentence – The sentence-ending phrase should read: "..and initialing/dating the correction." T. Section 9, Page 15, Analytical Method Requirements – The second sentence should read: "The laboratory and field data quality control criteria are presented in Table 3." U. Section 10, Page 15, Paragraph 1, Sentence 4 – The team suggests that ACWA recommend to ODEQ to add dissolved oxygen and redox potential to the list of field parameters. V. Section 10, Page 16, Instrument Calibration, Paragraph 1, Sentence 2 – This sentence should read: "The degree of calibration depends upon the referenced methods and/or instrument manufacturer specifications." W. Section 10, Page 16, Instrument Calibration, Paragraph 2, Sentence 4 and 5 – Standards used to verify the calibration curves are referred to as "initial calibration verification" standards, not LCS's. LCS's are QC samples prepared along with each analytical batch and are used to measure the accuracy of sample preparation procedures, rather than calibration verification. Revise sentences 4 and 5 accordingly. X. Section 10, Page 16, Quality Control Standards – The first sentence should indicate that QCS's are not only used to assess accuracy of instrument calibration, but also to assess the extraction efficiency of the methods. Y. Section 12, Page 17 – Reference EPA CLP National Functional Guidelines for Inorganic Data Review, EPA 540-R01-008, July 2002. Z. Table 2 – Add a column heading entitled "methyl mercury (dissolved)" and related column information. AA.Table 3 – i.Parameter: Define or spell out TSS, DOC, TOC, T, DO, and Alk. ii.Method: Cite specific EPA (or applicable) method numbers for Grain Size (define EMAP), % Total Solids, DOC, TOC, T, pH, Redox, DO, Alk, Conductivity, and methyl mercury. Also cite references for each method (e.g.,

	EPA-821-R-02-019 for Method 1631, Rev. E, etc.). iii.The team suggests using EPA Method 160.2 per SM 2540D instead of USGS Method I3765. USGS Method I-3765 for TSS can lead to erroneous results because it eliminates the filter preparation procedure (i.e., drying to constant weight, which is common to other EPA and Standard Method procedures) and allows for a variety of filter types/sizes. EPA Method 160.2 does not eliminate the filter preparation procedures, and uses a binder-free glass fiber filter (nominal size of 1.5 microns), whereas USGS Method I-3765 uses any glass fiber filter (nominal size of 0.7 to 10 microns). iv.Reporting Limit: For TOC, the reporting limit (RL) < detection limit (DL). The RL should be > the DL. v.Bottle: The method-specific bottle types should be referenced (e.g., fluoropolymer or borosilicate bottles with fluoropolymer-lined caps for low-level Mercury, HDPE, amber glass, etc.). vi.Field Preservation: "Chill, 4 °C" should be added to total/dissolved mercury, hardness, DOC, and methyl mercury. For dissolved total and methyl mercury, indicate that samples are filtered using 0.45-micron filters. As a precaution, methyl mercury containers should also be stored in clean (new) polyethylene bags (double-bagged) until analysis. vii.Holding Time: The holding time of 89 days for total mercury on tissue samples analyzed using Method 245.6 seems unusual. Method 245.6 defaults to Method 200.3 for preservation and dissection of tissue samples, which requires that samples be frozen after dissection. Furthermore, there is no maximum holding time for tissue samples that are frozen (i.e., at less than –20 °C) per Method 200.3. In regards to the holding time for total Hg in fish, Appendix to Method 1631 (EPA-821-R-01-013, January 2001) states that samples that are homogenized and frozen at <-15oC, or freeze-dried, may be stored for a maximum of 1 year. Therefore, the team recommends using the 1 year holding time for total mercury in fish tissue. viii.Precision/Accuracy: The QC limits do not agree with the Summary or with Section 5 (note Comments above). The QC limits should be revised accordingly (55 *(+35, 40, 46, 56, 63, 68, by reference)*).
Response	*The comments pertaining to DEQ's QAPP have been forwarded to those responsible for its development, implementation and refinement. Many of the comments have already been incorporated into the revised version of the QAPP.*

Comments on October 2004 Chapter 4: Mainstem Temperature	
Comment 1.	Consider global warming as a factor in all TMDLs, NPDES permits, etc at least to the extent that it provides for adaptive management. (30, 10).
Response	*Global warming may affect precipitation patterns and river flows upon which temperature TMDLs are based. Warmer temperatures will threaten the viability of salmon and other cold water species in many Willamette basin streams. Ambient and other water monitoring programs will provide planners and decision makers with information with which to update this TMDL. Heat load allocations and NPDES permit limits will change to reflect changes in load capacity of the river because of global warming or other factors. Individual heat load limits specified in NPDES permits are established for a five year period. Receiving stream flow and temperature and thus load capacity are taken into consideration as permits are renewed.*
Comment 2. TMDL Overview	The TMDL fails to provide a clear plan for reducing heat inputs into the Willamette River and its tributaries. (29) The TMDL appears more focused on providing opportunities for dischargers the ability to justify high temperatures based on claims such temperatures are historically high despite lack of any requirement for actual historic data. (29) A TMDL is required to demonstrate that it will lead to attainment of standards. As DEQ knows, this includes full support of beneficial uses. The TMDL should establish the role of habitat and flow alterations in order to ascertain what is necessary to protect these uses, particularly where, as here, they are essential to understanding how the pollutant affects the species. Moreover, by failing to address these issues, the TMDL provides no assistance to those agencies that will continue to struggle with balancing flow rates (e.g., from dam discharges) with water quality problems in seeking to protect and restore threatened and endangered salmonids in the basin. Specifically, using the draft Biological Opinion flows alone does not help the National Marine Fisheries Service make determinations on flow that take temperature into account. This is a major failing of this TMDL. (52)
Response	*Identified in the TMDL are temperature reductions necessary to meet water quality standards. ODEQ has identified heat load reductions for nonpoint sources throughout the Willamette Basin. Nonpoint source activities that decrease effective shade are the primary cause of elevated stream temperatures throughout the basin during summer months. ODEQ identified reservoirs as contributors of substantial heat load during late summer and early fall in the large mainstem tributaries. Significant reductions in tail race temperatures will be necessary to meet load allocations for these reservoirs. Point source heat load reductions are identified for those sources as necessary to meet water quality criteria. Finally, limitations are also established for municipal and industrial point sources to ensure that their heat load contributions meet the overall allocation strategy of the TMDL.* *McKenzie (2003) summarized available temperature data available for the Willamette River. Of particular interest are data collected prior to the construction of the USACE Willamette Project Reservoirs because these reservoirs augment summer flows and have substantially altered the thermal environments of the river. McKenzie reported results of a sanitary survey conducted in 1929 (Rogers et al. 1930) that included maximum observed temperatures at Eugene, Salem and Sellwood of 21.2°, 23.6° and 21.9°C, respectively. These were not necessarily the warmest temperatures of the season as the samples were collected on a single day at each site. Samples were taken in mid-July from the Coast Fork Willamette River and the field team moved downstream visiting many sites on the river. Rogers and coworkers concluded their effort August 28, 1929 at Sellwood Bridge*

	in Portland. These data do not represent natural temperatures as the river was a highly modified, and in some areas a very polluted system by 1929. However, the data pre-date the USACE Willamette Project and much of the population growth in the valley. These data do indicate that water temperatures 75 years ago were similar to those observed today and that the Willamette River exceeded the biological criteria in Oregon's temperature standard throughout much of its length. The TMDL does not target these historical temperature targets, but also will not result in year round attainment of biological criteria. *The TMDLs do not explicitly assess habitat and flow alteration effects on temperature and beneficial uses. Heat load allocations are based on the channel and flow conditions observed during the data collection period. However, full beneficial use protection in the basin will require more than heat load limitations. Of concern is the loss of channel complexity and floodplain processes throughout the mainstem river and its largest tributaries. Protection and restoration efforts are necessary in targeted areas to increase channel complexity, floodplain forests, and natural flood plain functions. ODEQ relies in part on the riparian protection measures such as forest practices and agricultural management plans to reverse degradation of stream channels. Furthermore, ODEQ will exercise its responsibilities under section 401 to ensure that essential riparian area and floodplain processes are maintained. The restoration of riparian vegetation, especially the large trees, is essential to restoration of many of the important ecological processes of a healthy river system including the delivery of large wood to the mainstem channel, the creation of scour pools, bars and other affects on channel form and hydraulic processes (IMST 2002). ODEQ will also require a higher level of demonstrated need and mitigation measures before it will provide water quality certification for channel armoring and removal or fill activities in areas with high ecological potential. Protection of quality habitat in the mainstem river and side channels and the processes that influence these habitats is necessary to provide a diversity of thermal regimes. The Willamette River Basin Planning Atlas by Hulse and others (2002) provides a strategic framework for channel and floodplain restoration.* *ODEQ programs play a key role in the protection of river habitats through the 401 certification of fill and removal activities. Other agencies and stakeholders address channel and flow modification issues through species recovery efforts under the federal Endangered Species Act and other programs. For example, ODFW and the City of Portland recently released a draft report on behavior of juvenile salmonids and their habitat preferences in the Lower Willamette (Friesen 2005.) USACE are examining opportunities to combine floodplain restoration with flood control in the upper basin and the Governor has identified restoration of the Willamette as his top environmental priority.* *With respect to flow issues, USACE consults with NMFS, USFWS and ODFW representatives on a regular basis to manage reservoir operations and tributary flows for imperiled salmon, trout and chub populations. ODEQ believes TMDL implementation measures are complementary to ESA efforts and thus the flow regime negotiated between these fisheries agencies and USACE provides a reasonable basis to simulate river temperatures. Nevertheless to ensure attainment of water quality standards during low flow periods, ODEQ also calculated load capacity of the river at low flow conditions.*
Comment 3. WQS Designated uses	Water temperature may not be a limiting factor for salmonid populations in the Willamette River. A numeric standard may be exceeded but have no influence on the number of fish, the vigor individually or as populations (24).

Response	*The Independent Multidisciplinary Science Team or IMST (2004) addressed the issue of how salmonids may persist in waters where numeric criteria are exceeded. They identified several possibilities including physiological or genetic adaptations that allow some populations to survive exposures to high temperature; fish may be transient, not members of healthy population; performance could be impaired and effects of exposure not apparent until later life stages; temporal variation may allow fish to survive hot conditions; fish may utilize cold water refugia; and that temperatures that fish can tolerate may be wider than scientists realized when Oregon's temperature standards were written. However, the IMST went on to report that there is not evidence that fish thrive when temperatures exceed numeric criteria for prolonged periods of time.*
Comment 4. Designated uses	When the river is at its warmest do the fish that are detrimentally affected by that warm water continue to be present in those areas of the river or are they out of those areas and higher up in the river system so that can stay in the cooler waters? (24, 32 and 65)
Response	*ODFW evaluated fish habitat in the lower Willamette River and found juvenile salmonids in every month sampled from May 2000 to July 2003. (Friesen 2005) Although use of the lower river is greater in other months, salmon were found in July, which the warmest period of the year.*
Comment 5. WQS Designated uses- lower river	The water temperature standard for the lower 50 miles of the Willamette River should designate the reach as salmon and trout rearing and migration use with an 18°C numeric criterion rather than a migration corridor with 20°C criterion. Data show that ESA listed spring Chinook spend significant time in the lower river and under certain conditions ESA listed winter steelhead are likely to spend time in the lower Willamette before outmigration. (58)
Response	*Changes in beneficial uses (such as whether the lower river should be designated as migration and rearing rather than simply a migration corridor) and numeric and narrative criteria to protect these uses are made through the water quality standards review process. The Clean Water Act requires that water quality standards be reviewed and updated as new information becomes available. The Oregon Environmental Quality Commission adopted the current temperature standards in 2003. Oregon's applicable temperature standards were approved by USEPA in 2004.*
Comment 6. WQS Designated uses – upper watershed	Many streams not identified as bull trout streams are capable of supporting bull trout. These streams have an unclear numeric criterion or are assigned the next higher value (16°C). This provides much more than the temperature increase allowed by the HUA of 0.3°C. (60)
Response	*The cold water these streams provide to downstream waters will be protected as required under 340-41-0028(11).*
Comment 7. Triennial Review	DEQ should consider re-evaluating its water quality standard for temperature. Any TMDL will suffer in an attempt to meet an artificially rigid standard. A standard needs to allow a range of values to be considered for compliance purposes. It is difficult to support a TMDL that addresses a improperly constructed standard. (53).
Response	*ODEQ disagrees and believes the temperature standard is neither artificially rigid nor inflexible. ODEQ does not plan to review the temperature standard at this time. The triennial review process will be used to determine which standards will be revisited.*
Comment 8.	Standards include full protection of designated beneficial uses such as salmonids. Therefore, the development of a TMDL that provides for an unsafe level of temperature that is not protective of this designated use fails to meet water quality standards and must be rejected by EPA on its face (52)
Response	*Implementation of load allocations will meet the requirements of the Clean Water Act. Historical data and simulations indicate that temperatures above 20°C cannot be attributed solely to human sources. Moreover, the basin scale TMDL requires*

	the restoration of cooler temperatures in many Willamette River tributaries. Beneficial uses such as salmon, trout and other cold water dependent species will benefit most from these efforts.
Comment 9. WQS – Human Use Allowance	Page. 4-9, As these TMDLs rely heavily on the Human Use Allowance, paragraph 12(b) should be cited in this section (65,p4).
Response	*The narrative rule describing the human use allowance (OAR 340-041-0028(12)(b)(B)) has been added to Table 4.1. as recommended.*
Comment 10. Cold Water Refugia	DEQ's explanation of its temperature standard fails to conform to the EPA Regional Temperature guidance. In this TMDL, DEQ interprets its standard to mean that meeting a 20º C criterion without thermal refugia is protective and acceptable. It is not. (52)
Response	*Cold water refugia occur as spatially or temporally distributed areas of cooler water. ODEQ staff have reviewed historical data as well as recent data to identify where these refugia may occur in the 50 river miles designated as migration corridors. Diel temperature data collected before the construction of the USACE reservoirs suggests that daily fluctuations in summer temperature of 2°C occurred at few sites in the river below Newberg (McKenzie 2003). The confluence of the Clackamas, Tualatin provided temporal refuges. Numerous small tributaries throughout the Newberg Pool and lower river continue to provide small thermal refugia. For example, warmest seven day maximum temperatures in lower Tryon Creek are 20°C (DEQ 1995) DEQ: Details for Record 6035 whereas annual maximum temperatures in the mainstem river Willamette approach 24°C.* *The protection and restoration of streamside vegetation throughout the basin as called for in the TMDL will provide several benefits to cold water species. Shade on smaller streams will maintain or restore cool surface water inflows to the Willamette. Protection of large riparian trees will yield more downed wood and complexity along the margin of the river and restore some of the many contributions streamside vegetation offers along the Willamette (Seddell and Froggatt, 1984). Together cool water inflows and complex riparian environments will provide small lateral refugia currently missing in many areas of the mainstem river.*
Comment 11. WQS – Cool Water Use	Page 4-13,. Two waterbodies in the TMDL [the Long Tom River (Mainstem and Upper Willamette Subbasin TMDL) and Rickreall Creek (Middle Willamette Subbasin TMDL)] are noted as having a "Cool Water" fish use. In association with this designation, 'cool water' criteria have been applied. These criteria have not been approved by EPA under Section 303(C) of the Clean Water Act. As such, these criteria may not be applied in Clean Water Act actions such as the development of a TMDL. We recommend that DEQ either revise these two TMDLs such that they are written to Clean Water Act approved criteria, or delay action on these waterbodies until such time as the outstanding water quality standards issues are resolved (65).
Response	*ODEQ acknowledges that the cool water standard was not approved by USEPA and will not submit TMDLs for Rickreall Creek or the Long Tom River. ODEQ will continue to call for the protection of riparian vegetation along Rickreall Creek as it has for all other tributaries in the basin. Also, ODEQ will continue to target natural condition temperatures on the Long Tom River which is affected by USACE reservoir operations as well as other nonpoint sources of heat.*
Comment 12. Cold Water Refugia	Page 4-111- 112. The TMDL states that the "cold water refugia" requirement only applies to the lower Willamette (where the migration corridor is the designated use). Although its true that the specific cold water refugia narrative criteria only applies to where the migration corridor use is designated. EPA views cold refugia as an integral part of the "natural conditions criteria" and "natural thermal potential" definition. That is, the natural conditions criteria is not just one number, but a

	profile, that takes into account the cold water refugia provided by the natural "geomorphology" of the river. EPA believes it is especially important to evaluate current and potential cold water refugia whenever modeling indicates maximum temperatures reach or exceed 20C and the model does not account for all the natural features that create cold water refugia (e.g., hyporheic flow). Thus, consistent with the Region 10 Temperature Guidance, where the "natural conditions criterion" applies and the "natural thermal potential" is estimated to be 20C or greater, cold water refugia assessment, protection, and restoration also applies because cold water refugia is part of the natural condition. As such, the TMDL and WQMP should call for the DMAs to identify, protect and restore cold water refugia in the middle Willamette (up to Eugene) as well as the lower part of the river (65).
Response	*ODEQ agrees that cold water refugia are important elements that should be protected wherever they occur in the basin. However we disagree with the broader interpretation of narrative criteria that ODEQ must identify refugia whenever natural condition temperatures exceed 20°C. Protection of riparian vegetation, closer scrutiny of outfall placement, critical evaluation of bank armoring and fill and removal activities within the floodplain, and targeted restoration efforts will promote the restoration of these habitats and essential ecological processes.*
Comment 13. Cold Water Refugia	We do not believe DEQ has given the role of cold water refugia adequate consideration. Fish will find places in the stream where the water is cooler than the average stream temperature, and reside there until water flow increases and temperatures are better suited to migration and spawning. (4) Refugia must already exist because salmon already migrate through the lower river at temperatures greater than the criterion. (46).
Response	*ODEQ agrees that fish likely use refugia that are available to them. Also see response to comment 12.*
Comment 14. Cold Water Refugia	Requirements relating to cold water refugia further are inappropriate for inclusion in any storm water or wastewater NPDES permit. Neither the federal Clean Water Act nor the Oregon water pollution control laws impose any requirement on a discharger to protect, enhance or create cold water refugia. Although federal and state laws do provide protections against actions that may damage such refugia, there is no affirmative obligation to protect, enhance or create refugia. (35) Most permit holders lack authority necessary to take affirmative actions to protect, enhance or create cold water refugia. Further, the areas of potential refugia are generally located below the normal high water mark and permit holders generally lack authority to regulate activities below the normal high water line of the Willamette main stem. Any requirement regarding cold water refugia imposed through a NPDES or MS4 permit will be beyond the authority of the permit holder and such a requirement will be arbitrary, capricious and not in accordance with applicable law. (35) Identification and protection of cold water refugia is the State of Oregon's responsibility (37). If refugia are part of the TMDL then analysis is needed to assess impacts and benefits (46). Municipalities can evaluate cold water refugia within their mixing zones but creating refugia is not the responsibility of local government (50).
Response	*ODEQ agrees that outfall impacts on cold water refugia should be assessed. Furthermore, ODEQ will also require NPDES permit holders protect existing refugia and within the framework of permit programs, the ecological and fluvial processes that create refugia.*

Comment 15. Protection of Cold Water	Page 4-17, Provision (11) of the new temperature standard (OAR 340-041-0028) specifically addresses the protection of cold water. What is currently presented does not fully reflect what is needed for protection of Cold Water. We suggest that reference to this provision be included in this section and later discussions address how it is being incorporated into the development of wasteload allocations. (65)
Response	*The heading of this section in the draft TMDL is misleading. The discussion addressed natural conditions criteria (OAR 340-041-0028(8)) rather than the protection of cold water (OAR 340-041-0028 (11)). Changes to the text and Table 4.1 were made to reflect this.*
Comment 16. Protection of Cold Water	If a stream reach is assigned a temperature criterion, that criterion must be met at the downstream end of that reach. Colder water temperatures are required in headwaters of this location to meet this target. (60)
Response	*It is true that numeric criteria are applied throughout a reach and that colder upstream temperature are necessary to meet the criterion at the bottom of the reach.*
Comment 17. Use Attainability Analysis	Pg. VI, Temperature, Key Issues, second to last point. The Corps agrees with the statement "Inability for USACE to meet temperature criteria even with costly Cougar Dam style selective withdrawal modifications may drive process to future Use Attainability Analyses or Site Specific Criteria. (33)"
Response	*Federal water quality regulations include provisions for the development of site specific criteria or the removal of designated, but not existing beneficial uses. However, analysis is required to demonstrate that all feasible measures have been taken to meet existing water quality standards before such standards modification occur. ODEQ does not anticipate development of use attainability analyses in the near future. UAA are not viewed as an appropriate remedy to the inability to meet water quality standards. Approval of UAA will require concurrence of a number of federal agencies and ODEQ believes this process needs to be established by these agencies before ODEQ undertakes this responsibility.*
Comment 18. Waterbodies Listed for Temperature	Page 4-17, Tables in Appendix 4.1, 4.2 and each subbasin chapter should specify the chapter in which the segment is addressed so that allocations can be easily correlated with individual listed segments (some of the subbasin chapters include the mainstem listings (addressed in Chapter 4) and some do not). One way to do this may be to subdivide tables into "segments addressed in chapter 4" and "segments addressed in subbasin TMDL(65)."
Response	*Noted and included in Appendix 4.1*
Comment 19. Waterbodies Listed for Temperature-McKenzie	The TMDL exemplifies the McKenzie River as a large, cold-water tributary to the Willamette River, yet the data used in the temperature models for the Upper Willamette indicate that the McKenzie River is a positive heat contributor to the Willamette (i.e. the McKenzie River is warmer than the Willamette at the confluence of the two rivers). This is contradictory and suggests a discrepancy in the thermal assessment of the McKenzie River. The data set should be evaluated for its accuracy and representation of normal conditions. (48,50, 55)
Response	*For much of its length the McKenzie River is a very cold river as any one that has waded or rafted the river can attest. The river is also designated as a core cold water habitat with the numeric criterion of 16°C. However, the data are accurate and at times the Willamette is simply cooler than the McKenzie River at their confluence. This is due in part to the cold water releases from the USACE Reservoirs on the Middle Fork Willamette. The lower McKenzie River was listed for maximum weekly temperatures at RM 7.1 of nearly 19°C (66°F). DEQ: Details for Record 5905 http://www.deq.state.or.us/wq/WQLData/RecordID02.asp?recordidreq=5905*
Comment 20. Waterbodies Listed	The Clackamas River between River Mill Dam and the Willamette River serves as a migration corridor for wild and hatchery adult salmonids, although spawning and

for Temperature-Clackamas	rearing, also beneficial uses, take place in the reach as well. Returns of salmonids above River Mill and at the North Fork fish trap indicate that use as a migration corridor is not impaired by existing temperature conditions. Temperatures in this reach are, and have been, suitable for this purpose under existing conditions, and will continue to be in the future. Temperature exceedances at the Eagle Creek site (RM 15.7) occur primarily from July through early October, a period that is not coincident with much of the wild salmonid migration (39)
Response	*The Clackamas River is designated as a core cold water habitat reach from River Mill Dam downstream to Clear Creek at RM 8.15. Eagle Creek shares this beneficial use designation. The biological based numeric criterion for this reach is 16°C. Spawning in these reaches is designated from September 1 through June 15. The numeric criterion for spawning is 13°C. Downstream of Clear Creek the designated use is salmon and steelhead trout rearing and migration with a numeric criterion of 18°C. Spawning in this lower reach is designated October 15 to May 15. Revisions to these use designations require a change in the water quality standard.*
Comment 21. Waterbodies Listed for Temperature-Willamette	Map 1.5 designates the Willamette River from river mile 50 to the mouth as a salmon and steelhead migration corridor with applicable numeric criterion of 20°C. Appendix 1A 303d listing designates the use as rearing waters with criteria of 17.8°C. (31)
Response	*The Willamette River from RM 50 to the Columbia River is now designated as a migration corridor use with a biologically-based numeric criterion of 20°C. This segment of the river was designated as rearing habitat with a numeric target of 20°C (68°F) prior to revision of the temperature standard in 2004. The rearing criterion displayed in the 2002 303(d) list and included in Table 1A and appendix 4.1 is incorrect. The applicable criterion was and remains 20°C. Seven day maximum temperatures exceed this criterion regularly in the summer and the analysis used in the TMDL is unaffected by the error.*
Comment 22. Waterbodies Listed for Temperature-Willamette	Page 4-4 states that "the Willamette River and its major tributaries exceed the temperature criteria for a number of months in the summer and early fall". This is an overly – broad statement that does not reveal whether or not this has any meaning for listed salmonids in the system. Where are the fish during this period? (24)
Response	*Water quality standards for temperature include antidegradation provisions, beneficial use designations such as salmon and trout spawning, and numeric criteria intended to protect uses. These use designations and criteria were developed during a triennial review process that included public input from a wide range of stakeholders. Use designations and criteria will be modified as new information is available however it is apparent from recent ODFW work reports that juvenile Chinook salmon may be found moving through the lower river during the warmest periods of the year (Friessen 2005). ODEQ believes the designated use as a migration corridor is appropriate. More information on the development of water quality standards will be found on the DEQ: Water Temperature Criteria Page or http://www.deq.state.or.us/wq/standards/WQStdsTemp.htm*
Comment 23.	It is an impossibility to reduce year-round stream temperatures to below 64 degrees (9).
Response	*ODEQ agrees that the Willamette River will not meet 64°F at all times during the summer. It is ODEQ's policy to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. At some times summer temperatures in the river may very well exceed biological based numeric criteria, but mainstem uses will be protected through the restoration of natural stream temperatures in small tributaries and large tributaries, the restoration and maintenance of mainstem vegetation that promotes habitat complexity along river margins, and greater appreciation and protection of processes that form channel complexity and cold water refugia.*

Comment 24. Waterbodies Listed for Temperature-Upper Watersheds	Page 4-18, Map 4.4, The Corps notes with interest that several relatively "pristine" water bodies are included on the 303d list for temperature as displayed on Map 4-4, including Waldo Lake, the North fork of the Middle Fork of the Willamette, and the upper reaches of the McKenzie River. The Corps realizes that these reaches are not addressed in the Willamette Mainstem TMDL. However, the Corps does not understand why water bodies such as these, with virtually no activities that cause an anthropogenic change in water temperature, are included on the 303d list. The Corps assumes that these listings are driven by the very cold biologically based numeric temperature criteria for bull trout spawning and juvenile rearing. Given the apparent inconsistencies between the historic use of these habitats and "natural thermal potential" of the streams, the Corps questions the accuracy of the numeric temperature standards. (33).
Response	*Listings in the north fork of the Middle Fork Willamette River were based on salmonid spawning criteria. Lower in the system near West Fir maximum weekly temperatures exceeded 20°C in 1997. Some listings in the McKenzie were based on bull trout as well as salmon and trout rearing and spawning criteria. A number of the listings were based on maximum seven day average temperatures that were slightly above numeric criteria. Individual assessments determine the merit of each 303(d) listing.*
Comment 25. Waterbodies Listed for Temperature-Willamette	With respect to USACE effects the combination of altered hydraulics and temperature caused the fishes to change their behaviors. That fish are still using these reaches and successfully migrating downriver and into the Columbia River testifies to the high degree of adaptability exhibited by anadromous salmonids. (24)
Response	*Salmon and steelhead populations do exhibit a number of traits that have allowed them to adapt to changes in their environments. This is evident in their ability to re-establish themselves in watersheds after large scale, but episodic disturbances. That Lower Columbia coho, Willamette spring Chinook, bull trout and winter steelhead populations are federally listed as threatened or endangered suggests that their high degree of adaptability has been insufficient to overcome the many anthropogenic disturbances (including habitat and water quality degradation, water diversion and harvest) they experience in addition to natural disturbances.*
Comment 26. System Potential Scenarios – BiOpFlows	Page 4-7, Setting Allocations: It states the flows are consistent with the flows found in the draft Biological Opinion for the operation of the Corps Willamette Project. However water from no natural source had to be added to the model runs of 2001 so that results could be produced. In 2002 flows were much closer to Biological Opinion flows. (33).
Response	*According to the USACE, the Biological Opinion flow rate estimates provided by USACE did not represent reasonable estimates of how USACE reservoirs would actually be managed in water years similar to 2001 and 2002. Therefore, for the final TMDL natural thermal potential temperatures were calculated using actual 2001 and 2002 flow rates, rather than the Biological Opinion flow rate estimates.*
Comment 27. System Potential Scenarios – Flows	Page 1-18, Dam and Reservoir Operations, paragraph 4. This section references the reservoir flow regimes recommended by NOAA-F and USFWS through the Corps ongoing ESA Section 7 process addressing continued operation of the Corps reservoirs. The Corps wants to stress that these flows are recommendations not statutory requirements. The flows do reflect the Corps most current approach with the state and federal fish management agencies regarding reservoir operations to provide the greatest benefit for aquatic species while providing for authorized project purposes. However, the Corps does not expect to meet those flow targets at all times and all locations in the basin due to natural hydrologic conditions. The flow targets are subject to change based on annual hydrologic variations and adaptive management approaches. This is a critical issue since these "BiOp Flows" were used as the basis for modeling approaches used to develop natural thermal potential of the river under "System Potential 1 and

	2." The BiOp flows represent an optimum flow regime from the reservoirs under sufficient water conditions. However, in less than average water years the "BiOp Flows" will not be implementable. On that basis, the Corps does not believe that the "BiOp Flows" are representative of actual operations that the Corps can provide. (33) Pg. 4-41, Biological Opinion (BiOp) Flows, last paragraph. Reference the statement, "due to low precipitation in 2001…" 2001 was a critical water year. However, based on modeling, the Corps estimates that the "BiOp flows" will not be achievable approximately 5 years out of 10. Again, the "BiOp flows" are target flows that the Corps will strive to achieve when hydrologic conditions permit but they do not accurately represent actual operation of the system and are not a reasonable basis for establishing TMDL load allocations. (33). We believe that the TMDL's reliance on BiOP flow rates for Army COE dams, instead of the "worst case" flow rates that occurred in 2001 and are likely to occur again this year provides an overly optimistic view of actual in river flows and is not justified in light of regional climate trends and global warming. (29)
Response	*As discussed above, the Biological Opinion flow rate estimates did not represent reasonable estimates of how USACE reservoirs would actually be managed in water years similar to 2001 and 2002. Therefore, for the final TMDL natural thermal potential temperatures were calculated using actual 2001 and 2002 flow rates, rather than the Biological Opinion flow rate estimates. Furthermore, ODEQ targets compliance with water quality standards at low flows such as 7Q10 and uses the calibrated model to assess heat load effects at higher flows.*
Comment 28. System Potential Scenarios- FACA	Page 4-6, System Potential 1 and 2. As a general matter, the Corps recommends and supports "natural temperature" modeling efforts that are consistent with the recommendations contained in the "Report of the Federal Advisory Committee on the TMDL Program, July 1998." The 1998 Report recommends that water quality conditions associated with the existence of large existing dams (those conditions that cannot be altered through feasible modifications in operation, maintenance, and structure) should be given a "background allocation" during the TMDL development process. The Corps notes this TMDL Advisory Committee included Lydia Taylor of ODEQ, who was a signatory to the Final Report. (33).
Response	*ODEQ acknowledges the multiple congressional mandates USACE must address in the Willamette Basin. The federal Flood Control Act, Clean Water Act and Endangered Species Act among others are not complementary in all programs and purposes. ODEQ expects that USACE will develop a temperature implementation plan that will:* *1) assist with data collection and analysis to support revision of load allocations for each dam and reservoir;* *2) demonstrate compliance with the Biological Opinion for the Willamette Basin Projects;* *3) develop a temperature management plan that will show improvements needed to achieve load allocations;* *4) participate in an interagency management process for temperature related improvements in the basin; and* *ODEQ does not anticipate development of UAAs in the near future. This implementation strategy is included on page 14-35 of the water quality management plan.*
Comment 29. System Potential Scenarios	Page 4-39, In the explanation of the different scenarios, it is unclear whether 1) 'SP vegetation' refers to only the mainstem and major tributaries or the entire watershed. Similarly, it is unclear what 'non-modeled tributaries' in 6) refers to. Are these all the tributaries in the watershed that were subjected to reference

	conditions, or only those tributaries above the dams? It would be helpful to better explain this in the outline and in the text as to what waterbodies were included in each scenario. (65, p.6)
Response	*System potential vegetation was applied to the major tributaries included in the mainstem model downstream of boundary condition reservoirs. These are tributaries as shown in Figure 4.8 are the Long Tom, Coast Fork Willamette and Row River, Middle Fork Willamette and Fall Creek, McKenzie River and South Fork and Blue River, Santiam River and the North and South Santiam Rivers, and the Clackamas River. Un-modeled tributaries inflows were also included in the model at current conditions (observed temperatures). These include the Marys River, Calapooia River, Luckiamute River, Yamhill River, Molalla River and Tualatin River. Table 4.7 was revised to clarify this point.*
Comment 30. System Potential Scenarios	System Potential 2 assumes that the dams are in place and uses augmented flows but applies a different and much more conservative standard to the federal dams by using historic above-dam temperatures as a proxy for "without-dam natural thermal potential" which becomes the basis for the temperature load allocations applied to the dams. The Corps also has concerns about the very limited data and overly conservative assumptions used by ODEQ to establish System Potential 2 estimates of "natural thermal potential" below the dams. (33)
Response	*ODEQ agrees that individual load allocations for the USACE reservoirs were developed based on a conservative treatment of data collected above each reservoir. These system potential 2 data sets were used to identify "'background" temperature targets for each project but were not coupled with background flow rates to assess impacts downstream on the mainstem Willamette River. Throughout the temperature TMDL and in the water quality management plan ODEQ acknowledged the limitations to this approach; namely that the allocations are based on water temperature data collected at locations well above the tail water of each reservoir and do not account for natural warming that would likely occur.* *It is apparent at this time that USACE reservoirs increase the heat load capacity of the mainstem river in the summer through augmentation of summer flows with water colder than natural. It is also apparent that these same reservoirs consume all the load capacity in much of the river at other times of the year because of flow augmentation with waters warmer than natural. Less apparent are reservoir contributions to downstream exceedances of criteria when tail water temperatures meet biological based criteria but provide no capacity for additional warming from natural or other anthropogenic sources downstream.* *USACE reservoirs also dampen the daily fluctuations of temperature observed in free flowing rivers. Water released from reservoir may meet biological based criteria at the tailrace but contribute to warming downstream. Analysis of the PGE Clackamas project demonstrated that maximum daily temperatures are cooler than natural at the tail race but that warmer minimum and average daily temperatures eventually translated into warmer daily maximum temperatures some distance downstream (4-60 of Draft TMDL). The USACE projects are much larger than the PGE reservoir at Estacada and it is anticipated that future analysis will demonstrate that the effects of warmer daily average temperature will often exceed the human use allowance of 0.3°C.* *ODEQ is committed to working with USACE to better understand the beneficial as well as detrimental effects of the Willamette Project on river temperatures and beneficial uses. However, until individual and cumulative effects of USACE reservoir operations are known load allocations will target daily average natural temperatures.*

Comment 31. System Potential 2 Scenarios	Page 4-39, The Corps believes that System Potential 2 is an overly conservative approach that is not supported by ODEQ guidance for preparing TMDLs. (33) The 2nd paragraph in this "System Potential" section states that System Potential 2 was developed in response to a USEPA request to develop specific load allocations for the dams. The basis for this request is apparently based on a requirement in the new water quality standards to address and quantify the effects of dams on stream temperatures. The statutory and policy basis for that determination is not adequately described in this document. In order to accurately address and quantify the effects of the dams on downstream temperatures, the Corps believes that ODEQ must model the entire system under a "without dam" scenario, and then compare the results against System Potential 1. The Corps believes that the difference (delta) between the two scenarios would give a much more accurate and compelling characterization of the temperature effects of the operation and existence of the dams. The scenarios would identify both positive and negative effects at different times of the year, at different locations in the system and under different annual hydrologic conditions. (33).
Response	*OAR 340-04200025(2) declares it the policy of the Environmental Quality Commission to have ODEQ to establish TMDLS including waste load and load allocations and have responsible sources meet these allocations through compliance with discharge permits or other strategies developed in sector or source specific implementation plans. The Federal Water Pollution Control Act Section 303(d) (33 USC Section 1313(d)) and Oregon Statutes ORS 468B.020 and ORS 468B.110 establish rules for developing issuing and implementing TMDLs. Section 313a (33 USC 1323) describes federal facilities requirements to comply with all federal, State, interstate and local water pollution control and abatement measures.* *The relationship between water quality standards and total maximum daily loads is described in Chapter 1 of the Willamette TMDL. The addition of natural conditions criteria, the 0.3°C human use allowance and other changes to Oregon temperature standard necessitated fundamental changes to the TMDL approach. The conservative nature of the load allocations for the reservoirs was based on the assumption that load allocations will be refined as USACE reservoir model outcomes become available. As discussed on page 1-4 the TMDL is iterative allowing for new information to be incorporated into the plan as it becomes available. ODEQ believes it is appropriate to implement load and waste load allocations at this time for the benefit of beneficial uses while also beginning a process to gather and process additional data and refine USACE reservoir load allocations as necessary.*
Comment 32. System Potential 2 Scenarios	System Potential 2 represents an artificial, inconsistent and inaccurate scenario of the system's "natural thermal potential." ODEQ and USEPA were arbitrary in applying the System Potential 2 alternative standard to the federal dams. This TMDL should be revised to assign temperature load allocations to the dams based on System Potential 1. If ODEQ chooses to retain temperature load allocations for the dams, then this TMDL document must make a much stronger case for taking that approach by describing the statutory and policy basis. (33).
Response	*ODEQ applied the natural conditions criterion to the PGE Clackamas project in a similar manner to the USACE projects. The PGE Clackamas project was also a boundary location project affecting boundary conditions used in system potential one. The fundamental difference between the applications of system potential 2 was the availability of a calibrated model to simulate the Clackamas River without the project. PGE supported this analysis as part of their 401 certification and FERC re-licensing application. PGE Clackamas load allocations were based on comparisons of current and natural thermal potential temperatures based on SP2 simulations. Load allocations for PGE Clackamas project were driven not by*

	7DADM temperatures at River Mill Dam but by temperature changes identified in model simulations at locations well downstream of the tailrace. *Because EWEB and PGE Willamette Falls projects were included within the mainstem model development of load allocations for these projects was also greatly facilitated by the availability many model simulations. . In contrast, USACE reservoirs were not included within the original scope of work and were excluded from the mainstem modeling effort. Consequently calibrated models were not available to evaluate far field effects and develop USACE load allocations. Flow-weighted tributary temperatures were used to approximate natural condition temperatures.*
Comment 33. BiOp v 7Q10	It is more appropriate to set waste load allocations for frequently anticipated low flows rather than desired BiOp flows. Salmon must be able to survive conditions presented by nature every 10 or 20 years as well as the additional anthropogenic stresses. (60). DEQ should support USACE flows that support salmon throughout their lifecycle rather than simply supporting decisions made by NOAA. (60)
Response	*ODEQ agrees that BiOp flows alone may not adequately meet water quality standards. Thus individual waste loads were screened first at weekly low flows with a 10 year return period (7Q10). Cumulative effects were assessed using BiOp flows as well as these lower 7Q10 flows.* *ODEQ recognizes that USACE has federal mandates to maintain flows in the mainstem river for navigation and other purposes. Furthermore, while acknowledging the importance of flood flows to channel complexity and fish habitat quality ODEQ believes the flow targets developed with input from ODFW, NMFS and USFWS to protect threatened and endangered fish are reasonable for the TMDL.*
Comment 34. System Potential 2-model needs	Failure to model tributary inflows to USACE reservoirs is apt to cause significant underestimation of water temperatures flowing into the reservoirs. (60 p11). If heating of non-fish bearing streams yields 1°C warmer reservoir influent temperatures and this heat input is conveyed into the Willamette River at river mile 175 there would be a significant impact in terms of standards violations from RM 175 to RM 85. Impacts are likely to be observed even further downstream because the 0.25°C increase at RM85 is a median warming value. (60) p) A schedule to develop to tributary inflow models and USACE reservoir models is needed. (60).
Response	*Although not verified through modeling, it appears likely that summer and fall reservoir tailrace water temperatures are largely independent of reservoir tributary temperatures. This is because warming occurs from the surface of the strongly stratified reservoirs. ODEQ and USACE will develop a time schedule for further reservoir and tributary assessments as part of the implementation plan. The water quality management included in Chapter 14 provides 18 months from the time the TMDL is issued by ODEQ for designated management agencies such as USACE to develop these plans.*
Comment 35.	System potential 2 would result in substantially cooler flows and spawning criteria would be met at RM 161. (60).
Response	*System potential 2 simulations suggest that river temperatures would be cooler lower in the river system if USACE reservoirs could be managed to provide the water temperatures and flows included in that scenario. As is evident in their 39 pages of written comment, USACE believes that is not feasible.*

Comment 36. Modeling limitations	Major deficiencies of complex numerical models is producing outputs relating to salmonid fish distribution and behavior and applying model results in a regulatory environment (24). Modeling for the TMDL was done on a scale that fails to take into account the influences of smaller water withdrawals, tributary inputs, and point sources on localized water quality conditions. This scale is critical to salmonids particularly in a river system that forces them into a main channel which is heated to unsafe levels. So, not only does the TMDL fail to identify the thermal refugia salmonids need but it also ignores the extra hot zones created by nonpoint and point sources, zones that have an impact on the species which require the protection. (52)
Response	*ODEQ agrees that physical process models such as CE Qual W2 have limited usefulness for assessing fish distribution and behavior. That was not the intent of this effort.* *The mainstem model is closely calibrated for flow and accurately reflects changes in flows because of changes in boundary conditions, diversions or other inputs. ODEQ and the model coordination team did not develop the Willamette River model to assess localized effects of small tributaries on mainstem temperatures. The mainstem model is not sensitive to lateral differences in water temperature and therefore is not particularly well suited for identifying small, thermal refugia on the stream margin. Tributary temperature data and local information are more useful for such characterizations. Likewise the model was not used to characterize mixing of heated waste water at the point of discharge. Simple mass balance calculations were used to ensure that unacceptable increases in river temperatures did not occur at the point of discharge but such calculations were based on the entire receiving stream. Temperature thermal plume limitations more restrictive than waste load allocations may be included in NPDES permits to protect aquatic life from elevated temperatures at the point of discharge as detailed in OAR 340-41-0053. Detailed and site specific information is necessary to calculate actual thermal plume temperatures.* *The mainstem model is useful for identifying diel changes in water temperature that provide temporal refugia from high daily temperatures.*
Comment 37. Mainstem Model	Wetted Surface Areas – Wetted surface areas were apparently "calculated through interpolation of aerial photography, modeling, and by field measurements." Do the data sets correspond to a specific year, season, or date? If not, identify the measures taken to correct for temporal differences. (48, 55)
Response	*Data used for model calibration are detailed in section 1.2 (page 4) of the Draft Willamette River Mainstem Model Calibration report in Appendix C. USGS staff collected detailed longitudinal and cross sectional field data along the river to supplement existing information. Width data were collected at 129 sites on mainstem model tributaries in April, June and August 2002. All cross sectional and longitudinal data were referenced to vertical datum using GPS and surveying techniques. For more see the USGS discussion of this effort at http://or.water.usgs.gov/projs_dir/will_tmdl/main_stem_bth.html*
Comment 38. Mainstem Model	Page 4-35, The statement "The model was used to analyze reservoir operations…" is inaccurate. The model employed historic temperature from gage stations below the dams as boundary conditions and used reservoir flow targets. Beyond that, no attempt was made to evaluate or analyze operational alternatives. In particular, no attempt was made to evaluate a true "no-dam" scenario. (33)
Response	*Simulations were performed to evaluate the sensitivity of river temperatures to boundary flow and temperature, including their potential impacts (see Appendix 4.6) No objective scientific analysis or data was available to estimate the impact of a "no dam" scenario on the natural thermal potential.. The department has a plan to deal with these data deficiencies in the water quality management plan and incorporate them into the TMDL as they become available*

Comment 39. Mainstem Model	c) Page 4-35, Model calibration, last paragraph. The Corps does not concur that accuracy in calibration of the model guarantees good predictive capability. In addition, the TMDL document does not present (nor does the Corps recall seeing during the involvement in the MCT) any comparisons of modeled NTP to historical pre-dam temperature data. (33)
Response	*USACE is correct that model accuracy does not guarantee good predictive capability. Predictive capability is dependent upon model calibration error and subsequent input parameters among other issues. ODEQ believes that the Willamette temperature model has the accuracy and sensitivity necessary to develop waste load and load allocations with the accuracy required for this TMDL. USACE is aware there are no comparisons of pre- Willamette Project and post project temperature regimes.*
Comment 40. Mainstem Model	The model should be reviewed and updated periodically. (61)
Response	*ODEQ agrees.*
Comment 41. Mainstem Model Heat Source	OFIC assumes that because Heat Source was used for inputs to the mainstem model across a very large area the basic data inputs were incorrect (53).
Response	*Heat Source was used to predict stream temperatures on a number of small tributaries in the Willamette Basin. However as shown in Table 4.7 page 4-40 of the draft TMDL, current conditions were used to characterize these tributary loads in simulations used to establish total maximum daily load capacity. A number of comments indicate apparent confusion over ODEQ's discussion on how tributary temperatures were used in the model. Changes have been made in the discussion to clarify this point.*
Comment 42. Cougar Reservoir	Figure 4.6 does not appear very useful because of major construction activities at Cougar Reservoir in 2002. It appears 2001 temperature curve is more representative of a typical year. (46 p5).
Response	*Figure 4.6 illustrates very well the general change in thermal regimes caused by USACE reservoirs. The figure also shows that high temperatures below Cougar Reservoir in 2002 are attributed to water flowing through the dewatered reservoir during construction of the selective withdrawal structure.*
Comment 43. Model Sensitivity Analysis Influence of Flow	Page 4-50 to 4-52, The information in this section, when presented to the TMDL Council, was shown to be misleading due to the 7DADM producing a truncated sinusoidal wave characteristic. Until the effects of the truncated sinusoidal wave characteristic can be evaluated correctly for changes in travel time, it is recommended that this analysis be omitted. (33). Page 4-67, Conclusions, paragraph 1, The Corps does not believe the way the model runs were set up and analyzed are correct for determining the effect of boundary temperatures and flow. The boundary temperature sensitivity was not performed in a consistent manner for each of the subbasins and requires a more in-depth analysis of the results before any specific conclusions can be drawn. The model runs made to evaluate the influence of flow need to address the travel time issue as it relates to the measure of 7DADM. (33).
Response	*As indicated on page 4-49, a more detailed discussion of model sensitivity analysis for flow and other parameters was presented in appendix 4.6. Change in stream flow affects heat transfer process but as reported on page 4-162 also affects where maximum seven day average temperatures will be expressed in a given river reach. Natural and anthropogenic sources of heat will have less effect on the temperature of greater volume of water at high flow than will be apparent on temperature of a smaller volume of water at low flow. Higher velocities at high flow will also result in the expression of that heat load as maximum daily temperatures*

	farther downstream. Figures 4.81 and 4.82 illustrate the separation of maximum temperatures when flows vary; higher flows yield cooler maximum temperatures farther downstream. Figures 4.14 and 4.15 (also 4.83 and 4.84) show the differences in 7 day maximum temperatures at each model segment throughout the analysis period. Generally flow reductions yield warmer temperatures as reflected in median values in these figures. *Figure 4.16 of the draft TMDL also illustrates how 10% reductions in boundary flows result in warming throughout the river reach. In the figure temperature change for each model segment in the upper, middle and lower river was averaged for each day. Thus, a 10% reduction in boundary condition flow yields a temperature increase of 0.2°C in early August when averaged throughout the Upper Willamette River. The effect of boundary condition flow is less apparent downstream, farther from boundary locations used in the model.* *The effects of flow change are reversed in September when temperatures of water released from the reservoirs are warmer than natural. Slower travel times associated with low autumn flows allow for greater heat loss and thus river cooling. This cooling is reflected as negative values in Figure 4.14 and 4.15. What comments on this point do make clear is that determining how point sources and reservoir operations affect river temperatures requires not only knowledge of temperature data, but how changes in flow affect the magnitude, duration and even the location of temperature changes.*
Comment 44.	Page 4-67, Conclusions, paragraph 2, The language used seems to imply that Corps reservoirs release different water temperatures at different times of the day. The Corps projects are not designed to do this. (33).
Response	*ODEQ agrees that USACE reservoirs are not designed to discharge water of different temperatures on a daily basis. Changes were made to clarify findings of the sensitivity analysis.*
Comment 45. Model Sensitivity Uncertainty Analysis	A number of parameters and variables are defined for System Potential conditions utilizing various techniques and algorithms. Unfortunately in many instances uncertainty analysis is not documented and there appear to be inconsistencies (48, 55)
Response	*The TMDL represents an understanding of the relationship of the hydrodynamic and heat transfer process of the Willamette River. Sensitivity analysis was used to identify the importance of several key processes in the Willamette model. Where appropriate ODEQ used conservative parameters such as 7Q10 river flows, biological-based temperature criteria and effluent characteristics to ensure that at critical design conditions waste load allocations comply with water quality standards attainment. Greater uncertainty exists in the assessment of nonpoint source loads, and so an implicit margin of safety is applied to load allocations. As stated in Guidance for Water Quality-based Decisions: the TMDL process (EPA 440/4-91-001) http://www.epa.gov/owow/tmdl/decisions/dec1.html a margin of safety is a required component of the TMDL that accounts for the uncertainty about the relationship between the pollutant loads and the quality of the receiving waterbody. (CWA section 303(d)(1)(C)) The MOS is normally incorporated into the conservative assumptions used to develop TMDLs (generally within the calculations or models) and approved by USEPA either individually or in State/USEPA agreements. If the MOS needs to be larger than that which is allowed through the conservative assumptions, additional MOS can be added as a separate component of the TMDL (in this case, quantitatively, a TMDL = LC = WLA + LA + MOS).*
Comment 46. Model Sensitivity Analysis - Small	Analysis of small tributary effects on Willamette River temperatures assumes these streams are only 0.3°C over NTP and ignores nonpoint source impacts. (60).

Tributaries	Table 4-11 (page 4-66) shows increases of a few thousandths of a degree in the Mainstem River if a tributary temperature has a 0.3°C rise in temperature. These data are meaningless; they contain no usable information that leads to knowledge or understanding (24). Page 4-66, text and Table 4.11: The discussion of the relative influence of some of the tributaries on the temperature of the Willamette River is interesting and reasonable, but it is stated in way that suggests the temperature of the tributaries is not important. From a modeling point of view this is accurate, but from an ecological standpoint it is not. Besides providing some cold water refugia (assuming lower water temperatures in the tributaries) the quality of the tribs' water is equally as important as that in the Willamette. These tributaries should not be written off in this section of the document, because this implies that management to reduce temperature is not necessary (6).
Response	*Sensitivity analysis assessed effects of full allocation of the human use allowance (0.3°C) on mainstem temperatures. Contrary to the second comment we find the results in table 4-11 useful for the purposes of development of allocation strategies in these smaller tributaries. Specifically waste load allocations that meet the human use allowance in small tributaries will have very little impact on mainstem temperatures. Consequently full modeling of the mainstem river below each tributary is unnecessary before each NPDES permit is renewed or issued.* *However, ODEQ agrees with the general sentiment that nonpoint source impacts in these small streams often exceeds the human use allowance. ODEQ also agrees that protection of these small streams is important.*
Comment 47. Model Sensitivity Analysis- Shade	Shade sensitivity results should include 5th percentile and 95th percentile results as well as median results. (60).
Response	*The plots have been modified to include 5th percentile, median, and 95th percentile results*
Comment 48. Model Sensitivity Analysis- Boundary Temperature	Pg. 4-67, Conclusions, paragraph 3. The test for boundary temperature sensitivity did not change the outflow temperatures from the Cougar and Blue reservoirs. It did change the temperature on the mainstem McKenzie River that the Corps has no control over. Therefore the boundary temperature sensitivity test did not accurately represent the effects of the Corps projects. (33).
Response	*Simulations presented in the final TMDL show sensitivity of river temperature to adjusting temperature at the Blue River and Cougar Reservoir tailraces. For these simulations the temperature of the McKenzie R, upstream of its confluence with the South Fork McKenzie River, is unchanged. Only Blue River and Cougar Reservoir tailrace temperatures are adjusted.*
Comment 49. Natural Thermal Potential	There is to be close concordance between biological criteria and natural thermal potential. NTP is to be estimated by multiple lines of evidence that may include modeling, historic data, inference from pristine streams and biological distribution of species. (60). DEQ uses its new temperature standard to supersede the numeric biological criteria with "natural thermal potential." The idea that what DEQ is modeling is "natural" is absurd. The TMDL states, correctly, that among other omissions, DEQ did not examine the effects of channel modification on temperature and did not examine the effects of water diversion or withdrawal on temperature. While we agree that there are major complexities – scientific and regulatory – with regard to addressing these issues, we do not agree that DEQ can prepare a TMDL that fails to include them particularly, as here, the natural condition is an inherent baseline in the standard. (52)

Comment 50. Natural Thermal Potential	*In an ideal situation, alignment of these four criteria might occur in a system as large as the Willamette Basin. Ambient data, historical information and model simulations all yield temperature values several degrees warmer than biological-based criterion. Furthermore, as discussed in the system potential comments, the mainstem model was well calibrated to flows and temperature. Augmentation of flow by USACE reservoirs largely determines actual flows seen in the large tributaries and mainstem river. ODEQ also believes that while there is uncertainty as to how natural thermal potential temperatures are affected by channel modification and flow augmentation, the conservative approaches used in waste load allocations and load allocations adequately address that issue:* • *Waste load allocations are based on biological criteria at 7Q10 flows.* • *Load allocations for land use activities affecting stream side vegetation target system potential vegetation.* • *Allocations for hydroprojects and dams target NTP or a small increase above NTP* *Finally as previously discussed, ODEQ will exercise its 401 certification authority to protect existing channel complexity and to promote the protection and restoration of channel complexity and spatial and temporal heterogeneity in thermal regimes throughout the basin as is necessary to fully implement the temperature standard and protect the temperature dependent beneficial uses.*
Comment 51. Natural Thermal Potential	Using NTP to set load allocations when it is warmer than biological criteria and using biological criteria when warmer than NTP allows the least restrictive, least protective criteria to guide land management activities (60). Natural thermal potential is limited to that amount of shade that produces something equal to or more than the temperatures contained in the numeric biological criteria. (52) The intent is to aim for a temperature increase that may be 0.3°C above the biological criterion, which could be several degrees in excess of NTP. Reverse calculation from this approach yields an estimate of natural vegetation needed so as not to exceed this target. (60).
Response	*Natural thermal potential temperatures were based on system potential vegetation and effective shade characteristics. Background heat loads were then derived and simulations used to identify natural thermal potential stream temperatures and where appropriate the natural condition criterion. Load capacity and nonpoint source load allocations were based largely on this criterion and generally target very little reduction (loss) of system potential vegetation.* *Total heat load allocations were developed to ensure that anthropogenic heat contributes to no more than 0.3°C warming of stream temperatures when temperatures meet or exceed the biological-based criteria. Water quality standards and allocations do not permit sources to heat the river to 0.3°C above the biological based criterion when NTP temperatures are substantially cooler than that criterion.*
Comment 52. Natural Thermal Potential	DEQ's treatment of natural potential and its biological criteria guarantees that water temperatures such as those included in this TMDL will remain too high. Natural thermal potential only applies where waters will exceed the biological criteria including those waters upstream of the criteria boundaries that – according to EPA – must be colder in order to meet the criteria downstream. So, Oregon's standards only allow for hotter criteria, but never colder than the numeric criteria. (52)
Response	*ODEQ disagrees with this characterization. Simulations were conducted to ensure that the human use allowance was not exceeded. Exceedances of the 0.3°C allowance anywhere within the analysis area would trigger additional load reductions as was necessary on the Upper Mainstem Willamette, McKenzie and Coast Fork Willamette Rivers.*

Comment 53. Natural Thermal Potential	While admitting that the System Potential 1 results do not represent natural potential, DEQ uses them anyway and then adds on a 0.3º C additional allowable heating load from human activities as if System Potential 1 didn't already incorporate more anthropogenic loading than the standard allows. We understand the rationale for using the BiOp flow rates but the temperature standard does not make reference to BiOp flow rates, it refers to natural conditions. Moreover, since in this TMDL DEQ has failed to fully understand the effects of dams and the maximum possible improvements that can be made to them, the TMDL is relatively meaningless. (52)
Response	*The revised TMDL no longer uses BiOp flow rates for determination of the natural thermal potential. Current flow rates are used instead. Current flow rates are more realistic flow rates that occur in a low flow year and may better represent flow rates that could occur under natural conditions. Natural condition flow rates are likely less than those of the BiOp flow rates.* *Natural Thermal Potential (NTP) means the determination of the thermal profile of a water body using the best available methods of analysis and the best available information. The department has used the best available information to determine NTP but could not fully determine the effects of dams on because of data limitations. The TMDL has a plan described in the water quality management plan to deal with these data limitations. As these data gaps are filled the TMDL will be revised and updated.*
Comment 54.	We question the scientific basis for projections of natural temperature conditions. Speculative and largely untested modeling results should not be relied upon in place of strong data supporting the temperature needs of salmonids (29).
Response	*ODEQ disagrees. The Willamette mainstem model was calibrated adequately to determine the necessary TMDL requirements. Calibration error statistics generally met or exceeded performance goals (Page 14 model calibration report Appendix C of Draft TMDL).*
Comment 55. Limitations in DEQ Approach	System potential one does not represent the best estimate of natural thermal potential that could have been produced although it may have been the only estimate available after the system potential 2 condition was determined to be unacceptable for TMDL development (17a p.8) c) So long as a large proportion of anthropogenic temperature altering processes (irrigation, reservoir management and land management activities) are excluded from modeling exercises, the natural thermal potential will not be achieved. (60) As acknowledged by DEQ (11-11) there are situations where the water temperature cannot meet the criteria even in the absence of anthropogenic influences. We commend DEQ for recognizing this and for providing a mechanism to accept the natural condition as the criteria. We encourage DEQ to streamline the procedure for establishing the natural condition as the measurement criteria.(4)
Response	*System potential 1 represents a solid foundation of known data upon which load allocations and waste load allocations are based. Through TMDL implementation and effectiveness monitoring ODEQ and stakeholders will continue to gather and process information to improve our understanding of processes affecting temperature in the basin. This information will be used to revise the TMDL and reflected in future load and waste load allocations.* *Efforts to stream line establishment of natural condition were used in this TMDL. Specifically, system potential vegetation and effective shade targets were developed to smaller watersheds in the subbasin TMDLs. This is appropriate where temperatures are minimally affected by point source inputs and flow modification.*

Comment 56. NTP Pre-dam information	a) Page 4-39, System Potential Scenarios, paragraph 5, As discussed in this paragraph, the Corps is committed to working with ODEQ and other stakeholders to develop better estimates of "natural system thermal potential." The Corps has undertaken an initial effort to develop more scientifically supportable estimates for the South Fork of the McKenzie River (below Cougar Dam) and other locations. **The Corps revised estimates are presented in the section titled, "Discussion on Natural Thermal Potential above USACE Reservoirs",** at the end of the comments on specific statements in the TMDL. The Corps recommends that these revised estimates be incorporated into the final TMDL. (33) b) Page 4-41, Biological Opinion (BiOp) Flows, paragraph 3, Reference the 2nd sentence, stating "…natural conditions flow rates are not well-documented and would have to be estimated." The Corps disagrees. The Corps has extensive flow data in the basin, including both pre- and post-reservoir. It is relatively simple to estimate unregulated flow conditions on the Willamette Mainstem and major tributaries across a variety of hydrologic conditions. The Corps is willing to work with ODEQ to develop and model an unregulated flow scenario. (33). c) Page 4-70, Natural Thermal Potential Temperatures, paragraph 2, Flow augmentation does modify the temperature regime of the river, however the Corps has not seen a convincing study that flow augmentation alone greatly modifies the river temperature. Additional studies and modeling should be performed before such a statement can be stated with certainty. Some of the statements made in this paragraph refer to findings during the summer but are not quantified by stating "in the summer". Different temperature regimes (spring, summer, fall, winter) will create different behaviors of river temperatures and heat accumulation and dissipation. (33).
Response	*a) ODEQ has revisited load allocations for the USACE project. The TMDL now specifies that the load allocation for each Willamette Project reservoir is no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded. Monthly stream temperature targets were recalculated using median rather than 25th percentile monthly upstream values. These are not the load allocations, but are ODEQ estimates of median seven day average values to meet the load allocations.* *Additional monitoring and modeling is needed to develop the estimates of natural thermal potential. A plan to address this is discussed in the water quality management plan.* *b) ODEQ agrees that flow information for the basin pre-dates the Willamette Project by decades and has changed the text.* *c) The adjective "greatly" was removed from the text. ODEQ agrees that effects vary over time.*
Comment 57. Natural Thermal Potential	It is appropriate to use system potential (scenario one) to develop the TMDL as the USACE reservoirs serve many purposes. (61). DEQ chose to base its TMDL on target flows from the dams which is unrealistic. DEQ did not develop any base flow scenarios. Flow augmentation creates a base scenario that was unattainable prior to construction of the dams and should not be used for analyses. (53). DEQ should collect data to develop natural thermal potential temperatures that reflect a no-dam scenario. (58). Develop natural thermal potential temperatures that reflect a no-dam scenario (scenario 2) but only for heat load reductions not dam removal.

Response	*TMDL heat load capacity of the river was developed based on flow augmentation and boundary condition temperatures reflective of current conditions.* *The water quality management plan calls for ODEQ and USACE to refine load allocation targets for each USACE reservoir and identify temperature reduction strategies. The TMDL does not call for dam removal.*
Comment 58. Natural Thermal Potential- Channel Complexity	a) The historic hydrograph and the historic braided channel configuration play a significant role in water quality and must be restored as much as possible. While efforts are made to reduce uncertainty we urge DEQ to encourage efforts to restore channel complexity. More attention should be given to the whole floodplain. In fact, OSU researchers are identifying significant floodplain restoration opportunities (30).
Response	*ODEQ agrees that channel complexity can be important component to water quality and will use its 401 authority to protect remaining channel and floodplain processes necessary for the protection of beneficial uses. ODEQ will also promote restoration of channel complexity through various mechanisms including mitigation banks, nonpoint source pollution control (319 grants) and other targeted actions.*
Comment 59. NTP- Channel Complexity	Why is channel complexity included in the draft TMDL? Room, budget and social will to restore sufficient channel complexity to the river system is essentially non-existent. Why bother modeling the variable and spending the time and effort to write it up with illustrations? (24).
Response	*Scientists and decision makers familiar with the needs of Pacific salmon call for the thoughtful protection and restoration of habitat necessary to support all phases of their freshwater existence. Restoration framework has been developed and is a key element in the Governor Ted Kulongoski The Willamette River: Oregon's Legacy plan. Accessed at http://governor.oregon.gov/Gov/willamette.shtml (also see the WRI Conservation Focus Areas Map at http://www.oregonwri.org/id19.html)*
Comment 60. System Potential Shade	a) P 4-127. It is not realistic to expect system potential shade in urban settings. Structures in the urban environment should be treated as changes to the natural system along with flood control reservoir structures (46). b) Load and waste load allocations should be based on applicable biological-based numeric criteria because DEQ did not fully develop a natural thermal potential scenario. (58, 60) c) No schedule is provided to address data and analysis limitations with respect to NTP and TMDL development.
Response	*a) ODEQ expects that local governments will protect existing streamside vegetation through local ordinances and setbacks as allowed by existing state statue.. ODEQ expects that these governments will incorporate salmon friendly design into re-development projects including bio-engineering methods that are commonly seen in the basin. Finally ODEQ acknowledges that there are some developments that will not provide system potential shade, but these areas are small as percentage of total stream miles in the basin. A portion of the human use allowance may be allocated to these sources after the implementation plans are submitted.* *b) Waste load allocations are established with biologically-based criteria.* *c) ODEQ will develop a schedule for addressing data and analysis limitations.*
Comment 61. System Potential Vegetation	Apparently 15 classes of land cover, excluding water, were developed from some technique or algorithm as described on page 41 in Appendix C. It is not clear what technique or algorithm was used to define visually alike land cover features as

	indicated in Steps 1 and 2 on page 40. Were land cover classes field-verified? Errors associated with the technique or algorithm should be described and quantified. (48,55) • Valley Bottom Prairie Potential Landscape – On page 4-79 the Department states that valley bottom prairies were included as an element of the system potential landscape however, in Chapter 10-43 the Department states that the nearest geomorphic cover was substituted for valley bottom prairies because they no longer exist. It is not clear why differing techniques were employed for the Mainstem Willamette and the Upper Willamette Subbasin. The magnitude of error associated with this substitution is unknown. (48, 55)
Response	*Cover types and attributes such as height, width and effective shade were field verified at 30 streams. The observed shade characteristics for each vegetation cover type were then incorporated into effective shade targets for each geomorphic unit.* *Substitution of the geomorphic surface Qg2 with another and the application of effective shade curves as specified in Chapter 10 occurred because vegetative characteristics of that surface have been extremely modified and do not represent a system potential condition. This substitution was not necessary throughout the entire basin and the prairie vegetation effective shade characteristics were applied. There were less than 500 acres of Qg2 surface type in the basin.*
Comment 62. Natural Disturbance	a) Model Natural Disturbance – Provide more explanation of how natural disturbance was included in the NPS allocation. (62) Was natural disturbance applied to major tributaries in the mainstem TMDL? (62). b) Shading in the system potential models incorporates natural disturbance such as fires and infestations; however, no definitions or explanations are provided for this model variable, hence it is difficult to assess whether the model outcome is reasonable. (48,55) The description of TMDL modeling does not appear to include modeling include natural disturbance in any meaningful way (47). By not creating a true dynamic shade component the static shade condition across the landscape misrepresents and over simplifies the situation. (53) c) We appreciate the attempt to incorporate natural disturbance regimes into your model. However, the inability due to time and resources to adequately apply the Monte Carlo system (11-23) leaves the measurement criteria lacking. While it is impossible to accurately predict natural disturbances, it is a certainty that they occur. Missing in the disturbances considered are debris torrents. These do occur where there have been no anthropogenic influences. (4)
Response	*For the mainstem river and its entire modeled tributaries, background load allocations for most of the valley bottom were based on a distribution of vegetation within each geomorphic unit. These distributions were based on expected vegetation structure for each unit as shown in Table 1, Potential Near Stream Land Cover, Appendix C of Draft TMDL. The assignment of each cover type such as forest, savanna and prairie was randomly assigned based on frequency of occurrence in 1850s land surveys and as described on page 14 of Appendix C Upland forest load allocations were set at background levels and based on USFS plant association information as described on page 21 Appendix C. Disturbance in this landscape was set at 25% and was reflected in substantially less effective shade.* *Where surficial geologic and plant community information was not available ecoregion information was used to identify effective shade targets. This included*

	portions of the Lower Willamette Subbasins where with local stakeholder input ODEQ developed potential land cover and effective shade targets that incorporated structure diversity in the near stream areas (See table 3.8 and 3.18). *b) ODEQ agrees that natural disturbance was not included in the stream temperature modeling as a dynamic process. Whereas river flow and climatic variables in the mainstem model were dynamic, attributes such as system potential vegetation were fixed for the 2001 and 2002 simulation periods. As discussed on page 4-76 and in Appendix C, potential near stream vegetation characteristics were intended to reflect effects of natural disturbance and successional pathways on effective shade.* *c) ODEQ will continue to improve the modeling of watershed processes as tools and resources become available. What is abundantly clear is that it is unnecessary to quantify the effects of all disturbance processes before requiring protection of riparian and floodplain processes.*
Comment 63. System Potential Shade	a) The basis for the load allocations for temperature is intended to produce the maximum possible shade everywhere and all the time. The stated preference for maximum shade is a value statement and an equal or more compelling argument is that maximum shade is not compatible with beneficial uses and is likely to have negative impacts on beneficial uses (47). Another indication of the complexity of these systems is the conflict between attaining SPV and the contribution of sunlit openings that attract invertebrates that are a food source for the fish. It is likely that maintenance of system potential vegetation could limit fish health and production by creating suboptimum conditions for the production of food for fish. Further, while cold water may be desirable, the assumption that system potential vegetation is universally beneficial is not scientifically supportable. (4) b) The findings of the DEQ/ODF sufficiency analysis that we have more shade no than ever before because of fire exclusion indicates that the request for additional shade is unsupportable (53)
Response	*a) ODEQ does not state that maximum shade is the basis for the load allocations or is necessary to protect cold water aquatic life. In fact, the benefits of disturbance and sunlight to stream productivity were briefly described on page 4-27 of the draft document. As stated on page 4-34 the restoration of vegetation appropriate to a site is necessary to provide tree heights, canopy density and thus effective shade levels that will contribute to attainment of natural temperatures. Protection of such vegetation from disturbances such as logging or urban development is necessary where it already exists. ODEQ assumes that natural disturbance processes will continue to occur in the basin although these processes are constrained by management objectives beyond the riparian area. The TMDL explicitly includes vegetation and effective shade targets that will not yield maximum shade. For example, ODEQ includes disturbance targets on 25% of upland forest sites. Characteristics of these sites include smaller trees and lower canopy density (page 4-75) than undisturbed sites. In low elevation areas, prairie and savannas are included in development of effective shade and temperature targets. These plant communities are maintained by periodic disturbance events such as fire and produce substantially lower effective shade values.* *b) ODEQ agrees that the sufficiency analysis document reported that there has been a change in age class distributions of trees on state and private forestlands in the Coast Range. Forestation and fire suppression have resulted in fewer forest stands in the zero to three year age class and far more in the three to 50 year age class than historical levels. Forests in the later half of the three to 50 year age*

	group generally provide adequate shade to meet or exceed shade targets along the many small and medium sized tributaries in the Willamette. The sufficiency analysis also indicated that there has been a dramatic reduction in forests older than 50 years. These are the forests which provided the largest trees necessary to effectively shade larger streams. These older stands also provided key pieces of large wood characteristic of productive fish habitats in lower gradient streams. *The sufficiency analysis documented the effectiveness of reforestation requirements of the Oregon Forest Practices Act. Assuming that forest stand conditions in riparian areas are similar to upland forests, there may be more stream side shade along Coast Range streams. However, the report also cited work by ODF staff (Dent and Walsh, 1997), that indicated that after logging shade reductions of 10% or greater occurred along 25% of medium fish bearing streams and 44% of small fish bearing streams. The report further stated that the consequences of these reductions in shade at the watershed scale were unknown. ODEQ acknowledges the riparian area protection measures in the Forest Practices Rules but will continue to call for protection of cold water dependent beneficial uses throughout the basin. ODEQ also emphasizes the need for restoration and protection of floodplains and streamside vegetation along middle and lower elevation streams. It is in these agricultural, rural and urban settings where differences between current and potential vegetation targets are greatest.* *Note: Seddell and Froggatt (1984) reported that average extent of the riparian woodland along the Willamette River prior to Euro-American settlement was 1.5 to 3.5 kilometers on either side of the river.*
Comment 64. System Potential Shade	DEQ acknowledges that system potential vegetation is not intended to be an estimate of pre-settlement conditions This raises the question of what the baseline for measuring temperature variances should be. The variance in temperature from a specified target will vary dramatically depending on the point in time and space it is measured (4)
Response	*Water quality standards for temperature are specific as to the time and place numeric criteria apply. Biologically-based numeric criteria serve as the baseline from which variations are assessed. The nature of the seven day criteria also recognizes the diel variability of stream temperatures.*
Comment 65. System Potential Shade	The assumption made by DEQ is that system potential condition minus current condition is due to anthropogenic influences. At any given time, current condition may provide more or less shade than system potential condition with or without anthropogenic influences. DEQ also acknowledges that channel morphology and hydrology are other factors influencing stream temperature dynamics. The nature of these ecosystems is very dynamic and basing criteria on only one of the factors system potential vegetation and such a variable one at that, is arbitrary at best.(4)
Response	*ODEQ disagrees that our approach has been arbitrary. An approach for the TMDL was shared with stakeholders early in the process detailing information needed to support the decision making process. Many of these stakeholders assisted with the data collection and analysis.* *ODEQ agrees that current conditions may yield greater shade than system potential. Fire suppression and the federal flood control project reservoirs have a significant effect on natural disturbance processes and this in turn influences characteristics of streamside vegetation. There are segments in the mainstem simulation where current shade levels provided by existing vegetation exceeded that provided by system potential vegetation.*

Comment 66. System Potential Shade	We are concerned that the "effective shade" methodology used in the TMDL may not fully account for the effect on water temperature of vegetation manipulation further from the stream. The TMDL should recognize that trees beyond the immediate streamside area may not provide direct shade but are still valuable for maintaining cooler air temperature, reduced wind speed, and higher humidity in the stand, so these trees also affect stream temperature and may need protection. (30)
Response	*ODEQ acknowledges this as a limitation of stream temperature modeling, especially on smaller streams.*
Comment 67. System Potential Shade	ODF suggests we work together with Oregon State University College of Forestry to Develop a landscape shade modeling perspective and examine riparian shade conditions over time (47).
Response	*ODEQ strives to improve TMDL development through a better understanding of landscape processes that affect water quality. This is evident in the evolution of how streamside vegetation and effective shade targets are included in temperature TMDLs. For the Willamette TMDLs, scientists and staff from OSU, U of O, industry as well as state and federal agencies assisted or reviewed the development of landscape vegetation targets (Appendix C page 20).*
Comment 68. System Potential Shade	Calculated Temperature Change under System Potential Vegetation – There have been some problems identified with the way system thermal potential is addressed in the temperature and shade models. For example, in considering the influence of shade the system potential model appears to be based upon a curve generated for August 1st which was then extrapolated to adjacent months; the Department claims this approach is "reliable for mid-July through mid-September" (see page 57 in Appendix C), yet system potential shade is somehow extrapolated to include April to mid-July and mid-September through October. The Department also affirms that "solar radiation loads are much lower in October because the sun is lower in the October sky and vegetation blocks more direct beam solar radiation" (see Vegetation Assessment and Development of System Potential Shade, page 4-77). In addition, differences between August and October solar loading are compared on page 4-78, however no data are presented. Given this information, or lack thereof, one must conclude that the system potential shade model contains inherent errors for extrapolated months and that non-point source heat load contributions computed during these months are suspect. (48) (55)
Response	*The shade curves that are presented are not the inputs to models, but rather are the results of shade modeling. Model calculated impacts of vegetation on solar radiation was dynamically calculated by the Willamette Mainstem CE-QUAL-W2 model. A detailed assessment of vegetation characteristics and topography was performed to derive characteristic vegetation heights and densities and topographic heights for each model segment. These values were input to the models and the models then calculated the amount that solar radiation would be reduced for each model time step. Therefore, the impact of vegetation on solar radiation varied throughout the day and the seasons.*
Comment 69. System Potential Shade	Page 4-17. It is large assumption to conclude that targeting system potential shade will meet biological criteria in all reaches. (62).
Response	*ODEQ does not make this assumption. System potential shade will yield water temperatures in some reaches that exceed the biologically-based numeric criteria. Under the natural conditions provision, OAR 340-041-0028(8,) water temperatures that naturally exceed the biologically based numeric criteria become the applicable temperature criteria.*
Comment 70. System Potential Shade	Establishing trees in riparian areas is a laudable goal that we support. However, this effort must be focused on areas that were historically covered with trees (30).

Response	*ODEQ agrees. See 4-73 and rules for developing potential near-stream land cover for modeling stream temperature on page 14 Appendix C-potential Near Stream Land Cover.*
Comment 71. System Potential Shade	It appears that system potential vegetation is not a required BMP in salmon-bearing streams given that riparian vegetation may be thinned and trees harvested. (60)
Response	*ODEQ established system potential shade targets which are implemented by designated management agencies. These targets are not prescriptive but are results oriented. Implementation and effectiveness monitoring are necessary to determine successful implementation of the TMDL.*
Comment 72. System Potential Shade	In another bizarre twist, Appendix C states that improving land cover on near-stream lands is, by definition, what is required to meet the temperature standard. Both the standard and this TMDL implementing the standard have almost nothing to do with protecting aquatic life. (52)
Response	*Attainment of effective shade targets reduces solar radiation inputs and facilitates recovery of channel form and acts to control stream temperature.*
Comment 73. System Potential Shade	The process of back-calculating necessary shade levels once NTP is identified is not given, nor is the confidence level in the performing this translation. (60).
Response	*System potential vegetation and effective shade targets are determined independently of natural thermal potential. Rather, natural thermal potential is derived by applying system potential vegetation and effective shade levels to current conditions.*
Comment 74. HeatSource	A bug in the DEQ Heat Source and Shade program used to calculate vegetative shading caused the amount of shade to be over estimated. The bias varies as a function of stream width and vegetation characteristics and may be as high as 12%. This error in shading calculations will not change any of the general conclusions in the temperature TMDL since most streams will still require additional shading to reduce nonpoint source heat loading (17a).
Response	*The Heat Source program was used to model several small streams tributary to the mainstem model (see Table 4.28 in Draft Temperature TMDL document). The concern raised in the comment is regarding the method used to calculate partial stream shade. Heat Source assumes that the wetted stream channel runs down the center of the active channel and vegetation positions are determined based upon the active channel edges. In reality, streams migrate across the active channel and may run along one bank in some reaches. This is one of several factors that add uncertainty to partial shade calculations. This is especially true on larger streams where shadows may not reach across the entire active channel.* *ODEQ calibrated each Heat Source model to ground level measurements of temperature, flow and effective shade. That said, ODEQ is always working to improve our assessment and simulation abilities and improvements have been made in recent versions of Heat Source. Finally, outputs from these simulations were not used in the mainstem model or waste load allocations*
Comment 75. Effective Shade Surrogate	Percent effective shade is used as a surrogate measure for non-point thermal loading. The temperature model extrapolates a very limited data set of shade effects on temperature across a wider seasonal range, and it is unknown what the magnitude of error is that is associated with this extrapolation. Effective shade conditions and targets should be evaluated and established on a watershed-specific basis. (35, 48) With the limitations of the model, in the final TMDL the Department should avoid making any blanket effective requirements for all water bodies based upon a water body such as Johnson Creek or the Columbia Slough. (55) Shade-curves developed to determine the load limit for a site should reflect the uncertainty associated with the unique physical and biological constraints of

	each site. In other words, the shade target for a site should be stated as a range rather than single value to reflect the uncertainty associated with this value resulting from data limitations. (23)
Response	*ODEQ disagrees that very limited data sets were used as the basis of effective shade targets. ODEQ made substantial effort to collect and assess remote sensed information and to verify this information with field observation and develop shade characteristics. The methodology for deriving current vegetation and effective shade is detailed in Appendix C (page 40 Willamette Subbasin Stream Temperature Analysis). ODEQ believes the approaches taken to develop shade targets along the mainstem river and its subbasins are adequate for developing shade curves. However, we do agree that effective shade targets are best developed using local watershed scale information including local surficial geology and disturbance processes. Finally, it is acknowledged that shade curves (Appendix C, page 51 of the Potential Near Stream Land Cover) are relatively coarse targets.*
Comment 76. Shade Table 4.13	The connection between map 4.9 and table 4.13 is unclear. Also the ecoregion classes in table do not match the classes used to establish system potential in Johnson Creek and Columbia Slough (46).
Response	*ODEQ agrees that the narrative on 4-73 does not well describe the relationship between the ecoregions, geomorphic units, and upland forests in Map 4.9 and vegetation characteristics in Table 4.13. Specific vegetation allocations for each geomorphic unit are included in pages 52 through 57 of the Potential Near Stream Land Cover document in Appendix C. Allocations for upland forests and ecoregions of the Lower Willamette are found on pages 57 and 58. Actual height, density and overhang for each vegetation type and geomorphic unit are displayed on pages 50 and 51 of the Potential Near Stream Land Cover document in Appendix C.* *The map of ecoregions and temperature TMDL watersheds in the Lower Willamette Subbasin (page 5-117) agrees with map 4.9.*
Comment 77. table 4.15	*How were values in table 4.15 derived? (17a p8)*
Response	*Values in Table 4.15 were derived by simulating the amount of solar radiation reaching the stream surface with current vegetation and with system potential vegetation. The difference represents the portion from anthropogenic sources. You will find more information about the development of system potential vegetation and the heat source model in the temperature appendix C.*
Comment 78. Shade target implementation	DEQ should provide clear, practical guidance on restoring system potential vegetation when attempting to meet the shade target. The information for determining a load allocation using a step-by-step example is relatively clear. However, determining the regulatory boundary for a shade target is less clear. In other words, for example, how does one determine the width of system potential vegetation that will be needed to ensure the maintenance of the shade target? Will some form of riparian area delineation be required similar to the approach utilized in state and federal wetland delineations? (23)
Response	*Implementation of shade targets will vary for each designated management agency. ODEQ will provide assistance with development of implementation guidelines but will not include prescriptive management measures including riparian area delineation in the TMDL.*

Comment 79. Shade target implementation	Is DEQ requiring that the shade targets be met by re-establishing system potential vegetation or can other species compositions for a particular site be used to satisfy shade targets in a manner similar to early seral stages of plant community succession? (23)
Response	*ODEQ recommends restoration of native plant communities appropriate to a giver site to realize effective shade targets but acknowledges that established, introduced species may meet shade goals in some intensively managed landscapes. These species however may not provide the broader ecological benefits of native plant communities.*
Comment 80. Shade target implementation	In the past, county roads were often located and constructed in riparian areas displacing the riparian vegetation and the stream shading that this vegetation provided. However, after reviewing the TMDL, OACES is not sure if historical impacts such as these must be reversed if the road can not be relocated during major reconstruction in the future. If these historical impacts must be mitigated, DEQ must articulate county options and timelines for mitigating these historical impacts? (23)
Response	*Roads and other infrastructure are often located within historical floodplains and restoration of system potential vegetation at all locations is unlikely. Nevertheless, ODEQ will expect DMAs to identify management measures to minimize future losses of riparian features and restore, to the extent possible, streamside plant communities. These strategies will be included in implementation plans submitted to ODEQ by each DMA.*
Comment 81. Current Conditions	Current Conditions and Current Conditions Calibration – Reference is made to these terms in multiple locations throughout the document, however it does not seem to be clearly defined or is contradictory when used. For example, on page 4-72 point source contributions to changes in receiving stream temperature are based on observed stream temperatures and 7Q10 flows. The critical period for each point source is then defined as the month with the greatest calculated stream temperature increase at the point of discharge; this is peculiarly reported as "current conditions". The title of Table 4.12 seemingly does not correlate with the description of data used to generate the table, which supposedly consists of the "seven day average of daily maximum temperatures based on 2001 and 2002 ambient conditions and effluent data." Ambient conditions and 7Q10 flows are not necessarily the same. (48, 55)
Response	*Current conditions include reported effluent flows and temperatures, observed river temperatures and flows, and recorded or derived ambient information such as channel bathymetry, meteorological and effective shade values used to develop and calibrate the mainstem temperature model. (Appendix C summarizes and provides links to USGS and PSU web pages). Language on page 4-72 has been revised to indicate that point source impacts in table 4.12 are based on current effluent characteristics (rather than design flows) and current river temperatures but also 7Q10 flows. And while ambient conditions and 7Q10 flows are not necessarily the same, these low flow statistics were realized at various locations in the basin in 2001, 2002.*
Comment 82. Waste Load Allocations	Upstream of the Santiam River the TMDL would allow for 35% increase in discharges for municipalities and 15 % increase in heat discharges for industries while not requiring any heat discharge reductions from point sources downstream of the Santiam River. This is entirely counter the requirements of a TMDL and Oregon's water quality rules that require increased technological and other controls to accommodate increased production. It fails to meet the purposes and requirements of the CWA and Oregon law and would only ensure that water quality in regards to temperature continue to worsen. (29).
Response	*The waste load allocations for dischargers have been revised in the final TMDL.*
Comment 83.	Page 4-7, 4th full paragraph. Page 4-103 states that domestic sources

Waste Load Allocations	downstream of the Santiam will be allocated a heat load based on 1.5 times their dry weather design flow. This appears to be inconsistent with the last two sentences of this paragraph which indicate that no sources receive allocations greater than their current design flows. If some sources are receiving an allocation greater than their current permit limits, this should be specifically stated and a justification provided for increasing heat loading to an impaired river. (65)
Response	*Dry weather design flows are a 30 day average. For NPDES permit calculations maximum seven day flows are calculated as 150% of this 30 day average. The proposed waste load allocations were based on these maximum flows and are within current permitted limits. The final TMDL has revised the waste load allocations.*
Comment 84. Waste Load Allocations	It is the intent of the Department to use the NPDES program as the control mechanism to implement the requirements of the TMDL. We request that the TMDL documents not include specific wasteload allocations for NPDES point sources, but rather outline the WLA calculation methodology and procedures, with the specific WLAs to be defined when the existing NPDES permits are renewed. This would allow the assessment to take place within the context of permit renewal, will provide the Department with better information upon which to base the WLAs, and facilitate a more comprehensive review of the conditions and requirements for meeting water quality-based needs. (55) NPDES permits should allow the use of daily flow parameters. The objective of the TMDL is to limit the temperature increase of the river. Limiting the temperature increase calculation to 7Q10 flows introduces an unnecessary level of conservatism that may force a permittee to expend large amounts of capital for conditions that rarely occur and may eliminate the ability to use of other short term options that would be adequate. A permitee should be allowed to use the available capacity at the higher flows as long as the underlying objective (i.e. limiting river temperature increase) is met. (66)
Response	*Waste load allocations in the final TMDL are specifically identified for critical conditions. Monthly waste load allocations included in the draft TMDL have been replaced by waste load allocations for each beneficial use period such as salmon and trout rearing and migration, and salmon and steelhead spawning. These seasonal allocations are based on seasonal 7Q10 flows and biologically-based numeric criteria. Separate seasonal 7Q10 flows were calculated for the each beneficial use period (e.g. rearing and spawning). A single 7Q10 flow was calculated for each source that discharges into the lower 50 miles of the river designated as migration corridor. Waste load allocations are based on 7Q10 flows and allow for increased heat loads as river flows and therefore heat load capacity increases. Benchmarks are included to guide permit writers in their development of flow-based permits to ensure that the human use allowance of 0.3°C anthropogenic change in river temperature is not exceeded.*
Comment 85. Waste Load Allocations	The equation to calculate heat waste load allocations needs to be corrected so that dischargers are not asked for the net heat figure to be adjusted with each permitted plant effluent discharge flow increase (37 p2) We do understand the department's definition of heat. Draft WLA are based on an increase on temperature using 0°C as a benchmark rather than a change in temperature. This is inappropriate (37 p3).
Response	*ODEQ has revised the waste load allocations.*
Comment 86. Waste Load Allocations	Temperature waste load in the TMDL should NOT be based on monthly values but rather the TMDL must focus on the attainment of beneficial uses, which would require avoiding daily (or even hourly) critical values that would be harmful to aquatic life. (30)

Response	*ODEQ has revised the waste load allocations to focus on the fish use designation period. Attainment of the waste load allocations protects the beneficial use from excessive daily maximum temperatures from anthropogenic point source heat.*
Comment 87. Waste Load Allocations	The City of Sweet Home believes effluent temperatures used to formulate waste load allocations for the waste water treatment facility are not representative of normal summertime temperatures and therefore the waste load allocation is too low and will result in NPDES permit violations (3). WES is requesting larger WLA in April, May and June because Willamette River flows are higher and cooler and sewage treatment plant flows can be higher than during summer months. WES is also requesting larger WLA July through October because effluent temperatures can be higher than those used by the Department to calculate WLA. (37). After review of files SP Newsprint requests that effluent design flow be increased from 17.0 million gallons per day to 17.9 MGD. SP Newsprint requests that waste load allocations for April and May be based on neighboring month effluent maximum temperatures or estimated values 25.5°C and 26.8°C for April and May, respectively (31). Corvallis requests that April waste load allocations for temperature be based on wet weather conditions. As proposed the TMDL does not provide the city with 35% growth factor as proposed (50).
Response	*Wasteload allocations were calculated by ODEQ using best available data. Starting in 2000, ODEQ on numerous occasions communicated to the Oregon Association of Clean Water Agencies, the Northwest Pulp & Paper Association, and individual dischargers the need for all dischargers to collect and submit to ODEQ accurate information on effluent flow and temperature characteristics. ODEQ used the data submitted to calculate the initial set of wasteload allocations presented in the October 2004 Draft Temperature TMDL. Following receipt of public comments on the October 2004 TMDL, ODEQ provided an additional four week period for discharges to submit effluent data. All data submitted was then used to calculate the final set of WLAs presented in the March 2006 Draft Temperature TMDL which the department opened for public comment.. In addition to using all data received, ODEQ, at the request of dischargers, developed a better method to accurately characterize maximum daily heat loads, conducted additional model runs to better define the load capacity of the river during critical conditions, developed flow based waste load allocations to better utilize the load capacity of the river, and met with many dischargers to walk through their waste load allocation procedures. ODEQ encourages sources to look at all scenarios, including pollutant trading, as possible options. ODEQ also encourages dischargers to collect additional data, including continuous effluent and receiving water temperature data, which will be useful when recalculating wasteload allocations in the future.*
Comment 88. Waste Load Allocations	The Tri-City waste water treatment plant is likely to grow by nearly 2.9 times current flow by 2030 and using the Department's methodology required effluent temperature will be approximately 6.8°C, which would be cooling the river in any season. For new dischargers and increased dischargers the Department should only regulate the portion of heat in the effluent which is undesirable. Clearly the goal of OAR 340-41-0028(12)(a) is that anthropogenic sources match the natural temperatures not to cool waters Diversion of new sources could deprive the river of beneficial flow. We believe the heat load from anthropogenic sources should be measured at the temperature difference above (or below) the desired temperature. (37).

Response	*The waste load allocations have been revised and ensure that upon implementation individual and cumulative heat loads will not exceed the human use allowance at critical conditions, ODEQ's allocation methodology is not requiring sources to cool river waters below the applicable criteria.*
Comment 89. Waste Load Allocations	Tualatin WLA were based on no increase in river temperature approach. Why has the Department changed its approach in this TMDL to an absolute energy limit?(37)
Response	*The Tualatin Temperature TMDL, approved by USEPA on 08/07/2001, was based on water quality standards that have been superceded by new standards approved by USEPA in March 2004, while the Willamette Mainstem Temperature TMDL is based on the new standards . Nonetheless, the approach used for the Tualatin is similar to the approach used for the Willamette. Heat load limits for the Willamette are tiered to temperature criteria and river flows. The objective of the Willamette TMDLs is to limit changes in river temperatures to no more than 0.3°C above the applicable criteria as specified in the new standard.*
Comment 90. Waste Load Allocations	Is it appropriate to not consider some of the Clackamas River flow when evaluating the Tri City treatment plant heat load given the tidally influenced nature of the river at this location? (37)
Response	*No, but tidal influences are considered in the model and therefore were considered when looking at cumulative heating impacts.*
Comment 91.	The text on page 102 should be rephrased to say that point source WLAs that were quantified were those that at one time were thought to have the potential to individually warm the river by more than 0.01°C. Detailed analysis has since shown that some of these dischargers do not meet this potential, some have been shown to have no warming effect at all, and at least one discharger actually cools the river. (37)
Response	*Revisions to wasteload allocations and text were made.*
Comment 92. Waste Load Allocations	Page 4-102, Mainstem Willamette Waste Load Allocations, first paragraph: The 4th sentence notes that some sources are not significant contributors and thus are not given allocations. Since all discharges contain some heat load, it should be clarified that the lack of an allocation should not be interpreted as an allocation of 0 kcal/day but rather that these facilities may continue to discharge at their current heat load without impacting the temperature profile of the river. (65)
Response	*ODEQ agrees and changes were made to the text.*
Comment 93. New Waste Load Allocations	Page 4-102,: It is important that this section also specify how new sources should be addressed. While it is implied that they should be addressed through the narrative process outlined for small point sources, unless this is specified it could be argued that no heat loading is allowed under the TMDL. The TMDL should also address how future large sources are to be addressed. (65)
Response	*Clarifications were made for small and future large sources.*
Comment 94. WLA- Period of Concern	Page 4-102, Mainstem Willamette Waste Load Allocations, 2nd paragraph: This paragraph should also state why no allocations were developed for most winter months and how the permits should address temperature concerns during the months for which numeric allocations have not been developed. Please also address how the spawning criteria and Provision (11)(b) of the temperature standards has been, or will be, considered in these allocations. (65)
Response	*During the winter months water quality standards are being met and available data does not indicate a likelihood that point sources will violate the coldwater provisions of Section 340-041-0028 (11) (b). Regardless, permits will require additional effluent and river data to be collected. If this data suggests that violations of water quality standards could occur outside of the seasons for which*

	WLAs have been provided, than revised permit limits or wasteload allocations may be specified for additional seasonal periods in the future.
Comment 95. Thermal Plume Limits	Page 4-102, Mainstem Willamette Waste Load Allocations – NPDES permits for point sources need not only meet the TMDL wasteload allocations, but must also meet the temperature thermal plume limitations [340-041-00532(d)(A-D)]. These limitations are to be established to prevent or minimize the adverse effects to salmonids inside the mixing zone, such as impairment to an active salmonid spawning area, acute impairment or instantaneous lethality, thermal shock, and migration blockage. This rule provision should be cited and discussed in this section and the rule language should be included in the appendix. EPA also recommends that ODEQ conduct near-field modeling for one or two of the largest point sources to see if temperature limits associated with the WLA would need to be reduced to meet the thermal plume requirements. EPA believes it is important for the regulated community to understand this provision, and the possibility for limits more stringent than the WLA. (65)
Response	*Thermal plume limitations are discussed on page 4-103 however changes to the text will be made to emphasize these requirements. Also OAR 340-041-0053(2)(d)(A-D) will be added to the rule language in Appendix C. ODEQ has not included near field mixing models in TMDL, but has discussed this issue in the TMDL. ODEQ has also communicated this requirement to stakeholders in public meetings. ODEQ believes stakeholders know that permit specific thermal limitations more stringent than TMDL waste load allocations may be included in an individual NPDES permit based on site specific information such as discharge pipe configuration, channel bathymetry, and beneficial uses.*
Comment 96. Load Capacity	Combinations of statistics used such as 7Q10 river flows, median water temperatures and 90th percentile flows may conspire to conceal single day impacts. (60)
Response	*The metric of compliance is the seven day average of daily maximum temperatures. Attainment of numeric criteria is expected at low flows and maximum allowable anthropogenic heat loads. Higher streamflows or smaller actual point source discharges will result in smaller anthropogenic effects on stream temperature. Single day events are also regulated for point sources through thermal plume limitations.*
Comment 97. Point of Maximum Impact	Page 4-103 1st paragraph, 2nd sentence: Please provide a reference to which sections are being cited. (65)
Response	*The concept of the point of maximum impact is discussed throughout the document but is specifically identified in the Mainstem Willamette Excess Load section on page 4-101 of the draft.*
Comment 98. Load Capacity	For TMDL and NPDES purposes, dynamic temperature increases in the river are a more meaningful compliance measurement than static heat loads. Please ensure that the final TMDL contains the narrative language to allow for actual river flows and temperatures to be implemented in NPDES permits. (59) Critical conditions used to develop waste load allocations in Appendix 4.5 include monthly 7Q10 flows and biological criterion or monthly natural thermal potential temperatures derived from the model. If simulated stream flow was much greater than 7Q10, monthly NTP temperatures may be cooler than those generated at 7Q10 flow. Higher flows likely correspond to cooler water temperatures. How does this affect waste load allocation temperatures? (17a p9).
Response	*ODEQ agrees and has made provisions for this within the waste load allocation framework. Individual NPDES permits may incorporate flexibility in accordance with the framework of the TMDL.*

	Flows substantially greater than 7Q10 do tend to correspond to cooler river temperatures. Typically as river flow increases and temperature goes down the net impact for waste load allocations is that there is more assimilative capacity.
Comment 99. Large Point Sources	Page 4-103, Large Point Sources, 2nd paragraph: It is our understanding from the summary (p. 4-7) and previous discussions that the facilities above the Santiam River were provided allocations based on an increase to 2002 effluent flows but that these were limited to current permitted flows. Thus, if a domestic facility's 2002 flow was near its permitted limit, it may not receive an allocation based upon the full 135% increase over 2002 flows. If this is true, it should be clearly stated in the first part of this paragraph. If not, a justification should be provided which explains why an increase in heat loading over current permit limits is being allowed. (65)
Response	*Waste load allocations were not intended to exceed currently permitted effluent flows and Appendix 4.5 was revised to reflect this.*
Comment 100. Model Anomaly	Figure 4.60 on page 4-105 needs to be revised to reflect an anomaly in results that occurs during high streamflow in mid April to early May. (17a p.4) There are anomalies and data instabilities associated with the model predictions for temperature effects of point sources. For example, anomalies and data instabilities are associated with the model predictions for temperature effects of point sources such as those observed in Figure 4.60 at river miles 193, 160, 153, and 100. The Department explains that these thermal anomalies are an artifact of using the 95th percentile hence the normal temperature fluctuation is exaggerated. A valid question arises; do the anomalies directly affect the maximum observed temperatures at each profile increment on the chart? The model should be re-run after correcting for these anomalies, and the output should also be evaluated on a monthly, rather than seasonal, basis for the reasons described in the comment above about the point of maximum impact. (48) The apparent increases in temperature at river mile 193 and river mile 100 are caused by travel time effects not an artifact of plotting 95th percentiles of seven day average of daily maximum temperatures. (17a p9).
Response	*Revisions were made to the models to minimize any such anomalies.*
Comment 101. WLA Flexibility	NPDES permits should allow the use of temperature or heat parameters to implement temperature wasteload allocations issued in the final TMDL. The permit writer and the permitee should have the flexibility to select a heat load or a temperature increase limit that best fits each situation. This selection would be based on the availability of necessary information, specific site circumstances, and other applicable factors. Setting TMDL allocations and NPDES limits in the context of river temperature increases offers several advantages to DEQ, the public and the regulated community. These include: • River temperatures are used to define and interpret water quality criteria. • The impact of sources is very intuitive when cast in terms of river temperatures. River temperature increases are easier to communicate to the general public than heat loads. • A heat load expressed as an increased river temperature can be directly computed under varying temperature and flow regimes. As long as the increased river temperature is set based on critical conditions, all other flow and temperature regimes will result in lower river temperatures and be conservative from a water quality perspective. With the generation and evaluation of a few more TMDL model scenarios, DEQ should be able to

	demonstrate and document this conservatism. • Waste Load Allocations were based on conditions that are highly unlikely to occur. For example, in most cases elevated effluent flows occur during elevated, not low river flows due to precipitation. A screening approach that uses a fictitious worst-case scenario to determine if a problem might occur is not appropriate for determining compliance in all cases (66, 59).
Response	*Generally ODEQ agrees with these comments and has revised the TMDL to provide more flexibility to NPDES sources. But ODEQ takes some exception to the notion that screening of individual sources is based on fictitious worst case scenarios. Especially for industrial sources thermal loads appear to be driven at times by production rates rather than precipitation events. And as we have seen in the winter and early spring of 2005 river flows at or below 7Q10 levels can occur while temperatures are also quite cool.*
Comment 102. Combined WLA	What impact would be expected if two or more waste water treatment plants combined into a larger facility? (37)
Response	*Assessment would be necessary to ensure that near field and far field effects do not produce exceedances of thermal plume limitations (340-041-00532(d)(A-D) and the human use allowance.*
Comment 103. McKenzie Heat Load	How could the McKenzie River contribute point source heat loads to the Willamette River as shown in figure 4.60? (37)
Response	*Conveyance of substantial heat load from the Weyerhaeuser Springfield paper mill warms the Willamette River.*
Comment 104. WLA and LA	Apply waste load allocations and reservoir load allocations in a similar manner with respect to flow conditions. (37)
Response	*Point source waste load allocations and reservoir load allocations reflect fundamental differences in how these sources contribute heat to the Willamette River. Point sources add heat but have only a small effect on river flow. These sources also tend to have little effect on diel temperature fluctuations in receiving waters. Characteristics of reservoir releases vary for each project and can have substantial influence on thermal and flow regimes of downstream waters. In particular it is often necessary to address reservoir effects on diel temperature patterns to restore natural thermal regimes downstream. Thus reservoir load allocations may target average daily temperatures rather than simply daily maximum temperatures. Nevertheless, both waste load and reservoir load allocations target compliance with the seven day average daily maximum temperature metric.*
Comment 105. WLA	Page 4-53. If point source influences on temperature are so small why place stringent limits on them? page 4-67. Please explain the statement that future loads from point sources could be significant (46).
Response	*Point sources represent a small contribution of the overall anthropogenic temperature increases compared to nonpoint sources, Currently most point sources are discharging well below currently permitted levels. If sources started discharging effluent at currently permitted levels there would be an exceedance to the water quality standards. As sources expand in the future discharges will likely increase and may exceed water quality standards The department has developed waste load allocations that will result in permit limits that do not violate water quality standards.*
Comment 106. WLA and Near Field	This TMDL should define the issue of mixing zones as part of the analysis of whether standards are met and beneficial uses protected particularly since there is little if any evidence that DEQ's TMDL will lead to any overall cooling of the river. (52)
Response	*ODEQ disagrees that this TMDL will not lead to overall cooling of the river.* *Near field considerations and mixing zone limitations to ensure uses are protected near the discharge are not addressed in the TMDL. Point source waste load*

	allocations address the cumulative effects of natural and anthropogenic heat loads at a large basinwide scale. Thermal plume limitations also apply to each permitted source as specified in standards (340-041-00532(d)(A-D), but mixing zone analysis is best conducted at a much finer spatial scale than at the scale of the TMDL.
Comment 107.	Page 4-7, second full paragraph, second sentence. It would be helpful to name the two sources that do not meet the assumed condition. (65)
Response	*Waste load allocations for Weyerhaeuser Springfield and Cottage Grove are more stringent than current conditions. This information was added to the text.*
Comment 108. Waste Load Allocations	It appears that, as a result of the proposed TMDL, permits for municipal wastewater treatment plants will be modified to require monthly thermal limits from April through October. We have concerns about the rationale for applying thermal limits in April, May, and June when river temperatures are colder and river and POTW flows are generally greater than summer. We do not agree that monthly limits are needed for these three months. (50) Why are heat loads allocated on a monthly basis when the point of maximum impact was not? The largest cumulative heating occurred in August and October, but point sources have a smaller heating effect in the months April through July indicating the river's capacity to assimilate point source heat loads in those months is greater (17a, 50) Use of the average dry weather design flow with regard to the month of April is inappropriate, and the Department should have calculated the waste load allocation for that month using the WWTP average wet weather design flow. (35) Waste load allocations need to be based on model runs for each month using the maximum weekly flow for each month and based on actual conditions due to possible antidegradation implications (37-p5). Point source WLA could be increased in April, May and June to currently permitted design flows and not exceed their share of the human use allowance of 0.23°C. (17a p5.) (49)
Response	*ODEQ has revised the waste load allocations. Allocations are now based on the beneficial use period and increase of decrease based on river flow to reflect greater load capacity in time periods with high flows. This will allow greater waste load allocations when the river is able to assimilate them.*
Comment 109.	The model should be run using multiple years of data to reflect variability and waste load allocations should be developed on a monthly basis to reflect that variability (50).
Response	*ODEQ believes that simulations based on the 2001 and 2002 provide adequate variability in flows and meteorological conditions to assess the effects of allocations.*
Comment 110.	Table 4.5 and Appendix C are subject to revision and should be moved to a guidance document (50, 55)
Response	*Table 4.5 and Appendix C provide important explanatory information and have been retained in the TMDL.*
Comment 111.	The TMDL was developed using BiOp flows and yet waste load allocations based on observed stream temperature and 7Q10 flows. This appears contradictory. (31)
Response	*Due to concerns regarding BiOp flows (see Comment 26), final modeling of natural thermal potential temperatures and cumulative wasteload allocation impacts was performed using actual 2001 and 2002 flow rates.*
Comment 112.	The Department's proposal to apply monthly thermal limits from April through October based on slightly adjusted existing permit limits is inconsistent with the fact that many facilities are under Department order to dramatically expand their plants (to comply with the 1-in-5 year, 24-hour design storm event to reduce overflows).

	These expanded plants, which are being designed to capture flows that are already entering the Willamette system but are not accounted for in existing permit limits, will not be able to meet the proposed limits. The Department needs to align their policies to ensure that communities that are investing hundreds of millions of dollars do not end up with plants that are out of compliance with permits the minute they begin operation. (55, 63, 68)
Response	*The final flow based allocations should address this concern while also ensuring that the human use allowance is not exceeded, since allowable heat loads increase as river flow rates increase. However, if in the future point source heat loads exceed heat load allocations, other options, such as heat load trading, can be pursued.*
Comment 113.	The flow of the Yamhill River should be added to the river flow at Salem to calculate 7Q10flows for the point sources at Newburg (31)
Response	*Yamhill River does provide flow to the Willamette that could be considered when calculating wasteload allocations for the City of Newberg. However, the 7Q10 flow of the Yamhill is quite low relative to the Willamette River. In addition, Yamhill River flow rates were considered when modeling cumulative wasteload impacts. Therefore, the impact of not adding Yamhill flow when calculating 7Q10 Willamette River flow rates is quite small.*
Comment 114.	The temperature model should be run for each month individually with representative statistically-based discharge flows to ensure proper calculation of thermal loads and the differing points of maximum impact. We believe that the assimilative capacity of the river varies widely with the season and that the point of maximum impact likely also changes significantly by month and season. (48, 55, 63) Monthly limits are also appropriate and should be based on actual conditions because of anti-degradation implications under the Clean Water Act regulations (48, 55) July WLAs could be increased to some level between the current TMDL allocation and permitted design flows (17a p.5).
Response	*ODEQ has revised its approach to developing waste load allocations away from monthly limits to limits based on beneficial use period. This approach also is flow based and allows for greater allocations when load capacity of the river increases.*
Comment 115. Wah Chang WLA	The proposed diffuser from Wah Chang has not been considered in the draft TMDL.(49)
Response	*Wah Chang is currently permitted to discharge to a small Willamette River tributary near Albany and was not included in the original analysis. ODEQ included Wah Chang loads in recent and final TMDL simulations.*
Comment 116. WeyCo WLA	DEQ should maximize the waste load allocation available to Weyerhaeuser Springfield and Albany subject to anti-degradation and point of maximum considerations. (59) The point source temperature waste load allocation for Weyerhaeuser's Albany mill should represent a combined allocation for Outfalls 001 and 002. The current heat load allocated to Weyerhaeuser Albany's Outfall 001 is not representative of the mill's allowable discharge conditions. (59)
Response	*The TMDL includes the maximum allocation available to each of these facilities based on cumulative impacts on the Willamette River.* *ODEQ has not provided a wasteload allocation for the Weyerhaeuser outfall 002 in*

	the TMDL. Rather, we will work with Weyerhaeuser during the next permit renewal to determine if the outfall has an impact on river temperature, and may allocate reserve capacity if appropriate, and if there are no reasonable alternatives.
Comment 117. WeyCo WLA	The temperature waste load allocations for Weyerhaeuser's Springfield mill should be based on the river flow at the mill, not at Vida. (59) During the cooler months of the year, McKenzie River temperatures are well below the water quality criteria. During these periods (subject to certain conditions), Weyerhaeuser believes Oregon's water quality criterion allows for a 0.5°C increase from point sources. We urge DEQ to make this clarification in the TMDL. (59)
Response	*Waste load allocations are established based on flow records at well established records such as the data from the USGS gage at Vida. ODEQ acknowledges that this likely underestimates flow at the mill.* *Waste load allocations are based on periods when river temperatures are at or above the biological criterion. A temperature increase greater than the human use allowance may be allowed during periods when ambient river temperatures are less than the criterion provided cold water protection criteria (340-04100028(11)) and thermal plume limitations (340-041-0053(2)(d)) are met.*
Comment 118. WeyCo WLA	The point source temperature allocation for Weyerhaeuser's Springfield mill should include an allocation for Outfall 003 to the Willamette. (59)
Response	*Outfall 3 does not warrant a specific waste load allocation for the Willamette River because it does not discharge directly to the Willamette River. It will require a waste load allocation that reflects load capacity of Q Street Canal and follows the protocol described on page 10-29 of the Upper Willamette Subbasin TMDL.*
Comment 119. Clackamas WLA	Are Rainbow Ranch Fish Hatchery and Boring waste water treatment plant so small they do not receive a portion of the human use allowance for the Clackamas River *(included in the Willamette TMDL)*? (37)
Response	*Yes.*
Comment 120.	The Oregon Temperature Water Quality Standard does not call for facilities to modify their activities to reach in-stream, temperatures below the modeled natural condition criteria to protect cold water. Protection of cold water requirements are narrative requirements that imply investigation and mapping of spatial areas rather than requiring facilities to be held responsible (and possibly making reductions) for heat additions when the modeled natural condition is below the biologically-based criteria during a specific time period. (66)
Response	*ODEQ agrees that the protection of cold water (340-41-028(11)) applies to those waters that are always cooler than biological criteria among other factors. The purpose of the summer cold water protection criterion is to limit human warming of streams that currently stay cold all summer and contain salmon, steelhead or bull trout and to prevent them from being warmed up to the numeric criteria.*
Comment 121. Waste Load Allocations	The Oregon Temperature Water Quality Standard mandates that industrial facilities only have the duty to control the thermal effects of their own discharges. NWPPA disagrees with the Department's interpretation of the Oregon Temperature Water Quality Standard on this matter as implemented in the Willamette TMDL. In particular NWPPA's *strong* opposition to DEQ's requirement that point sources are assigned waste load allocations as if the mill's intake water temperature is at the applicable biologically based criteria or the natural condition criteria – even if the ambient temperature if the mill's intake water exceeds the applicable standard by

	several degrees Celsius. The final waste load allocations for point source should not require facilities to reduce heating of the mainstem Willamette below the natural condition temperature criteria established in the TMDL at any time period. The Oregon Temperature water quality standard clearly states that the duty of anthropogenic sources to control temperature is limited to controlling the thermal effects of their own discharges (66).
Response	*ODEQ disagrees with NWPPA's interpretation of the temperature standard and how the department should manage wasteload allocations. The waste load allocations do not require mills to reduce heating of the mainstem Willamette below the natural conditions or the numeric temperature criteria.*
Comment 122. Mainstem Load Allocations	There appears to be four different ways in which the nonpoint source load allocation is addressed: 1) none of the HUA is allocated to nonpoint sources, 2) 0.05°C is reserved for future distribution (but still allocated), 3) 0.05°C which would be allocated to nonpoint sources is reserved for nonpoint sources as part of the reserve capacity, and 4) 0.05°C is not allocated but rather becomes part of the margin of safety. While it is acceptable for different subbasins to employ different allocation methods, it is important that this is consistent within each subbasin TMDL and that this is accurately reflected in the subbasin summary in Chapter 4 (page 4-125). Please make the appropriate changes so that this consistency is present. Pages which should be checked include 4-125, 4-126, and 4-129. (65)
Response	*The mainstem and subbasins TMDLs (Chapter 5-13) allocated some portion of the human use allowance to nonpoint sources. Specific allocations In the mainstem TMDL were provided to PGE hydroelectric operations but no specific allocations were made to other nonpoint sources. In the subbasin TMDLs 0.05°C of the human use allowance was earmarked for nonpoint sources however this allocation was not targeted to individual sources at this time. Corrections to each subbasin chapter and Chapter 4 were made to clarify this.*
Comment 123. Mainstem Load Allocations	Page 4-125. Why is there no human use allocation for nonpoint sources? Some actions may reduce the shade in short term but provide long term benefits. BLM is prepared to address this with monitoring. (62)
Response	*There are nonpoint source allocations in the subbasins as well as along the mainstem river. With the exception of PGE reservoir allocations, these nonpoint source allocations have not been assigned to individual sources. Also, it should be pointed out that Oregon water quality standards have provisions for riparian restoration activities (OAR 340-41-0004(5)(a)), but measures must be taken to minimize short term effects.*
Comment 124. USACE Reservoirs Load Allocations	If the TMDL were done properly, two likely outcomes would be: 1) an analysis of the need to modify the Corps' withdrawal structures, and 2) operational modifications. The outcome of the data gathering on the subbasins that feed into the reservoirs would be: 1) an understanding of to what degree subbasin temperatures affect reservoir water quality and dam outputs, and 2) what actions are needed to restore upstream temperature regimes to more conditions suitable for cold-water species. To a large extent this TMDL is about dams. This is because the dams' effects on flow and the temperature of discharge water may have the single largest overall effect on downstream conditions in the mainstem, after the major alteration of the physical layout of the river and its side channels. Notwithstanding that fact, this TMDL went forward in the absence of a clear understanding of their effect. (52).
Response	*ODEQ agrees more information about the impact of dams is needed. The department was unable to determine the impact of dams due to a lack of data. The department has a plan outlined in the water quality management plan to deal with these data deficiencies and eventually incorporate them in the TMDL.* *This lack of data does not mean the department needs to delay implantation of the TMDL. There is adequate information to justify the restoration of stream*

	temperature regimes throughout the Willamette River Basin. Implementation of waste load and load allocations to mainstem and tributary sources will begin soon after the TMDL is completed.
Comment 125. USACE Reservoirs Load Allocations	Dams on reservoirs regulate flow and help mitigate temperature problems. (8) At the open house at Clackamas Community College there appeared to be a lack of awareness about the water subsidy provided to the Willamette River by the USACE in late summer (10) Page 4-5, Modeling, paragraph 6, While the Corps understands that ODEQ did not model an unregulated "natural river" scenario because of time and cost limitations, the Corps believes that the TMDL document would be strengthened by a more complete discussion of the reservoir operations and their implications for water quality conditions throughout the Willamette mainstem. (33).
Response	*ODEQ and many stakeholders are aware of the water quality benefits of flow augmentation as well as some of the detrimental effects of the Willamette Project on water temperatures and beneficial uses.* *ODEQ was unable to model an unregulated river because of data limitations. The Water Quality Management plan outlines how these data limitations will be addressed. The TMDL will be updated as this data becomes available.*
Comment 126. USACE Reservoirs Load Allocations	Some reservoir releases occur closer to the middle of the reservoir pool than the bottom, but they are sufficiently deep to access cold water in mid-summer. (17a, 10)
Response	*The document has been revised to reflect this.*
Comment 127. USACE Reservoirs Load Allocations	Page 4-30, The Corps Willamette Project Reservoirs, paragraph 3, ODEQ states that fisheries biologists believe that summer water temperatures below some Willamette Project reservoirs such as those in the McKenzie River are too cold for salmon to efficiently utilize available habitat, yet the load allocation set for the Corps dams is below the fisheries biologists recommended values. Page 4-113, THE CORPS Willamette Project Reservoir Allocations, paragraph 1, Reference the 1st sentence, "Protection of cold waters in theses mainstem tributary streams…is necessary to protect threatened salmonid species that rear in these streams." The Corps believes that this is an oversimplification of a very complex ecological condition. More cold water is not necessarily better and, in fact, can create conditions that negatively affect the biological productivity of streams. The selective withdrawal tower at Cougar Dam was designed and constructed as much to warm the river at certain times of the year as to minimize warm water releases at other times. Note that the estimated NTP below the dams developed under System Potential 2 in many cases is not only colder, but significantly colder, than the numeric biological criteria. (33).
Response	*Load allocations target NTP temperatures with the goal of restoring thermal regimes throughout the basin. Such a strategy will benefit native fish in the summer rearing period as well as fall spawning season.* *ODEQ agrees that the TMDL will be strengthened when USACE modeling is complete and natural thermal potential temperatures (with and without flow augmentation) can be derived and compared with current conditions in each tributary as well as downstream in the mainstem river.*
Comment 128. USACE Reservoirs Load Allocations	Page 4-47. If USACE reservoirs have the greatest effect on temperature isn't this where the focus of the tmdl should be? (46)

Response	*Quantifying reservoir effects and developing plans to address detrimental stream temperature effects will be the focus of ODEQ's and the USACE's' TMDL implementation strategy. Simultaneously, addressing nonpoint source and point source loads on smaller systems such as Crabtree Creek, Mosby Creek, Coyote Creek and many others unaffected by the USACE projects will also have substantial benefits to designated uses. Finally, waste load allocations ensure that point source heat loads will not impair uses in the future.*
Comment 129. USACE Reservoirs Load Allocations 25th Percentile	Page 4-45, System Potential 2 Upstream Boundary Temperatures, paragraph 1, Reference the statement in the 1st sentence, "System Potential 2 simulations use tailrace temperature targets that are designed to mimic average natural thermal potential temperatures…" The Corps does not believe this is an accurate statement. As noted later in this section, ODEQ chose to use the 25th percentile of monthly data to estimate NTP. This is a highly conservative assumption that reflects water temperatures much cooler that "average". (33). Page 4-46, System Potential 2 Upstream Boundary Temperatures, The Corps is the only entity that was required to hold to the 7dAvg instead of the use of the 7DADM, and not just the 7dAvg but also the 25th percentile of that. This seems arbitrary. The policy, guidance, and technical analysis that led to the determination that an added margin of safety was needed in this case needs to be described in much more detail. Please explain the basis for this decision. (33). Page 4-45, System Potential 2 Upstream Boundary Temperatures, paragraph 1, Reference the statement in the 1st sentence, "System Potential 2 simulations use tailrace temperature targets that are designed to mimic average natural thermal potential temperatures…" The Corps does not believe this is an accurate statement. As noted later in this section, ODEQ chose to use the 25th percentile of monthly data to estimate NTP. This is a highly conservative assumption that reflects water temperatures much cooler that "average". (33) Given the unknowns of how the selection of the data sets for tributary inflow and temperature affect system potential two calculations it is unclear t whether the 25th percentile is really conservative at all. (60)
Response	*ODEQ agrees that it is more appropriate to use the seven day moving average of daily mean temperatures. The rationale for selecting the 25th percentile was to ensure that temperatures during cool periods were also protected but it is recognized that this doesn't reflect the actual thermal patterns of upstream tributaries. An allocation based on seven day daily average of flow-weighted upstream tributary temperatures will be the assigned to each reservoir. The allocation will apply for the entire period that downstream waters exceed biologically-based criteria.*
Comment 130. USACE Reservoirs LA v. Hydroproject LA	Page 4-9, Table 4.1, TMDL Loading Capacity and Allocations, Load Allocations (Reservoir Operations). Load allocations for the Corps dams are based on no increase but PGE projects are granted a human use allowance. Please explain the discrepancy in application of load allocations to different dams. (33). Page 4-113, USACE Willamette Project Reservoir Allocations, paragraph 2, Reference the statement, "The Corps Willamette Project Dams are allocated 0.0° C of the human use allowance." What is the basis in law or policy guidance for the decision that the Corps dams are the only sector of heat load contributors to be given a heat load allocation of zero? (33). Page 4-46, System Potential 2 Upstream Boundary Temperatures, The Corps is the only entity that was required to hold to the 7dAvg instead of the use of the 7DADM, and not just the 7dAvg but also the 25th percentile of that. This seems

	arbitrary. The policy, guidance, and technical analysis that led to the determination that an added margin of safety was needed in this case needs to be described in much more detail. Please explain the basis for this decision. (33)
Response	*A portion of the human use allowance was allocated to the PGE project because effects on natural thermal potential temperatures were quantifiable. USACE projects may receive a portion of the nonpoint source allocation or reserve capacity when it is possible to better define current and future project heat loads. Such definition would include characterization of the seasonal timing and magnitude of the allocation. Currently, the entire human use allowance if allocated to USACE reservoirs would result in little benefit to USACE or beneficial uses and would be very detrimental to existing downstream sources.*
Comment 131. USACE Reservoirs LA -System Potential Scenarios	Page 4-40, Reference the statement "Based on the above findings, the System Potential 2 conditions were used to evaluate the impact of reducing the upstream temperatures that better reflect "natural thermal potentials" at the base of the dams and to develop load allocations for each dam." The Corps finds that the statements contained in the previous paragraphs of this section describing the limitations of the data used to develop "natural thermal potential" below the dams directly contradict this conclusion. The Corps does not understand how the TMDL document can state that "ODEQ does not believe that the System Potential 2 scenario is sufficiently accurate to use as a basis for setting waste load allocations…" but in the following paragraph conclude that the System Potential 2 scenario is sufficiently accurate to use as the basis of load allocations for the dams. (33) Page 4-47, System Potential 2 Upstream Boundary Temperatures, paragraph 2, Reference the statement in the 3rd sentence, "… they do provide useful starting points for evaluating the sensitivity of the river and tributary temperatures to potential natural thermal potential based temperature targets." This statement and the discussion are not consistent with the use and application of the data in the TMDL. For the Corps dams, these estimates of NTP developed for System Potential 2 go beyond being a starting point for evaluating the sensitivity of the river. These estimates become the basis for the dam load allocation. (33).
Response	*The level of analysis used to establish waste load allocations far exceeds the level of analysis used to develop USACE load allocations. This reflects the simple reality that ODEQ must develop NPDES permits for dischargers that reflect wasteload allocations while NPDES permits are not currently required for reservoirs.* *ODEQ has discussed this issue at length with USACE and acknowledges the limitations in the approach taken. However, ODEQ will continue to use a system potential 2 approach for load allocations, as was used to develop the PGE Clackamas Project load allocations.*
Comment 132. USACE Reservoirs LA	Page 4-68, Natural Thermal Potential Temperatures, paragraph 1, Reference the 2nd and 3rd sentences, "Loading capacity and allocations are based on biological criteria when " " temperatures are less than the biological criteria. On the other hand, loading capacity and allocations are based on natural conditions criteria when the "natural thermal potential" temperature exceeds the biological criteria." These statements directly contradict the heat load allocation of zero applied to the Corps dams (pg. 4-114), even in those cases where NTP estimated under System Potential 2 are colder, in some cases much colder, than the numeric biological criteria. (33).

	Page 4-39, 4-47, System Potential 2 Upstream Boundary Temperatures, paragraph 5, When the calculated "natural thermal potential" for a dam tailrace exceeded 17.8 °C, 17.8 °C, was used for System Potential 2 rather than calculated NTP." This decision seems contrary to Oregon Water Quality Criteria (OAR 340-041-0028(8)) which states "Where the natural thermal potential of a waterbody exceeds the biological criteria, the natural thermal potential temperatures become the applicable criteria." The Corps requests that the temperature load allocations for Corps dams be based on the new temperature standard where, as noted in this section, such exceedances could be permissible. (33).
Response	*This has been corrected with the revised allocations. ODEQ will change the values to reflect flow weighted tributary temperature targets and remove the temperature limit of 17.8°C.*
Comment 133. System Potential 2	In developing System Potential 2, every effort was taken by ODEQ to use conservative approaches to estimating NTP, including use of 7 day average instead of the standard 7 day average maximum, and use of the 25th percentile of monthly temperature data rather than median or average values. The only justification for this approach was that it is needed to provide an added margin of safety but no clear rationale, policy or guidance for the decision is provided. (33).
Response	*Revisions were made to the load allocations for the final TMDL. These include the use of median monthly upstream temperatures, rather than 25th percentiles, to estimate targets for USACE reservoirs to meet load allocations. As was detailed in Appendix C, data used to develop flow weighted tributary temperatures may have been collected 10 to 20 miles upstream of the tailrace location. Natural warming of these tributaries occurs between the sample location and the tailrace. Also, a simple review of satellite images and maps clearly illustrate these tributaries flow from watersheds that are not in "pristine condition". Rather they are checkerboard landscapes of harvest units dissected by roads, so some anthropogenic warming likely occurs. The selection of the coolest 25th percentile of flow-weighted tributary temperatures was intended to ensure that target temperatures did not exceed natural thermal potential temperatures when meteorological conditions resulted in cool upstream temperatures. In reality this was an unworkable approach for many of the reasons USACE and others have identified. Namely it creates fixed monthly targets that, by definition, may be exceeded 75% of the time. In order to address these concerns, ODEQ has used median monthly upstream temperatures, rather than 25th percentiles, to estimate targets for USACE reservoirs to meet load allocations. Additional monitoring and modeling will allow ODEQ and USACE to refine the estimates of natural thermal potential that are the target temperatures for reservoir operations..*
Comment 134. Natural Thermal Potential Temperatures and USACE Load Allocations	Page 4-8, Policy Implications, last paragraph: ODEQ recognizes that many of the waters flowing into reservoirs are not at their "natural thermal potential" NTP) but will require the Corps to lower the temperature to that of NTP. This is inconsistent with Oregon Water Quality Criteria (OAR 304-041-0028(12)(a)). (33) Page 4-8, Policy Implications, last paragraph: Reservoir models for most of the large reservoirs in the basin (Lookout Point, Hills Creek, Green Peter, Cougar and Detroit) are complete. The Corps is committed to using these models in collaboration with ODEQ to perform additional analysis with the intent of improving and revising the temperature load allocations for the dams. (33) Page. 4-69, Natural Thermal Potential Temperatures, paragraph 4: Temperature data for the tributaries utilized for the current estimate is limited and often gathered some distance (up to and exceeding 10 miles) above the reservoir. Therefore there is a cooling bias in the estimates since the estimates do not account for any natural warming of the water as it travels from the point of measurement to the location of the outflow of the dam. Therefore, in the present load allocation for the

	reservoir, the Corps must offset the natural warming of the water from the site of measurement to the dam outflow. This is not consistent with Oregon Water Quality Criteria (OAR 340-041-0028(12)(a)). (33) Page 4-113, Willamette Project Reservoir Allocations, paragraph 6: The statement, "The difference between flow-weighted NTP temperatures and current 7DADM temperatures are the project effects on downstream temperatures", is incorrect unless it is assumed that the temperatures entering the reservoir are at the NTP. Since ODEQ states that most of the waters entering the reservoirs are presently above the NTP, it must be assumed that from the statement above that the Corps is responsible for lowering the temperature of the water entering the reservoirs. However, this is in contradiction to Oregon Water Quality Criteria (OAR 340-041-0028(12)(a)). (33)
Response	*ODEQ has discussed this issue at length with USACE and acknowledges the limitations in the approach taken. In order to address these concerns, reservoir temperature targets were based on water temperature and flow data from streams tributary to each reservoir. Recent tributary data were used to calculate flow-weighted seven-day rolling average temperatures and individual reservoir targets were derived from the monthly medians of these values. This simple approach does not provide data of the quality generated elsewhere in this TMDL, but it does provide an estimate of natural seasonal temperature patterns and how these patterns differ from current thermal regimes.* *Revision of USACE reservoir load allocations and target temperatures will benefit from modeling of the tributaries to each reservoir as well as the reservoirs themselves. It is not the intent of ODEQ to require USACE to compensate for natural warming or the anthropogenic heat loads associated with past and present land use activities not associated with the Willamette Project Reservoirs (e.g., roads, forest management and mining activities). Additional monitoring and modeling will allow ODEQ and USACE to refine the estimates of natural thermal potential which are the target temperatures for reservoir operations.*
Comment 135. Project Reservoir Allocations	Page 4-113, paragraph 4, The last sentence in this paragraph states that the 7DADM temperatures were used. However, in Appendix C it states that the 7D avg temperature was used instead of the 7DADM temperature. Even though ODEQ believes these values are the same in respect to the Corps dams, ODEQ should remain factual and consistent in their statements to avoid confusion and misunderstanding. (33)
Response	*Correction made in the final TMDL.*
Comment 136.	Page 4-68, Conclusions, paragraphs 2 and 3, The Clackamas PGE project influence is based on a median basis while project influences are based on a 25th percentile basis. Also the Clackamas PGE project influence is considered over the entire year and considered to have a neutral effect, while the projects are considered on a month-by-month basis. Please explain the inconsistent approaches for allocating temperature loads at federal versus utility projects. What is the basis for these varying approaches? (33)
Response	*The availability of a better estimate of system potential 2 and natural thermal potential allowed ODEQ and PGE to evaluate temporal and spatial effects of the PGE hydroelectric project. Information was not available to support such detailed analysis for USACE reservoirs. More important however are revisions ODEQ has made to ensure allocations are comparable. PGE Clackamas, PGE Willamette Falls, and USACE Willamette Project load allocations are presented in a similar way in the final TMDL.*
Comment 137. Project Reservoir Allocations	Page 4-113, paragraph 4, The statement, "Furthermore, it is likely that the temperatures used to generate these flow-weighted numbers were in themselves affected (warmed) by recent and historic activities", is a broad sweeping,

	generalizing statement with no factual evidence to support it. In fact, the McKenzie River basin above Cougar and Blue River reservoirs is close to pristine and any historical anthropogenic affects have been returned to a "natural state." (33)
Response	*Based on a review of satellite images of the subbasin ODEQ disagrees with USACE opinion of watershed condition.*
Comment 138.	Page 4-68, The Corps agrees that the Willamette River Basin Project reservoirs may impact stream temperature, but also notes that solar radiation and possibly groundwater temperature influx have the greatest affects on stream temperatures. (33)
Response	*These and other factors affect stream temperatures in the Willamette Basin. The sensitivity analysis documented the Willamette model sensitivity to several of these parameters.*
Comment 139.	Page 4-113, The Corps concurs with the statement in this section that no single number can accurately reflect "natural temperatures" for a given month. The Corps suggests having a load allocation that includes a range of temperatures rather than a single value per month. (33)
Response	*ODEQ agrees and will work with USACE to accomplish this.*
Comment 140. USACE Reservoir LA Period	Page 4-113,: Table 4.24 This table and the accompanying text should discuss what is required during the months where no target value is established. (65)
Response	*Load allocations will not apply to USACE reservoirs when downstream waters attain biologically-based numeric criteria. This is approximately mid November through mid April. Thus USACE load allocations of background temperatures are not necessary December through March.*
Comment 141. USACE Reservoir LA	This TMDL should have addressed the dams' adverse effect on the designated uses, an adverse effect that is more complicated than the numeric criteria established by Oregon's water quality standards. These adverse results are no doubt a combination of both flow and temperature alterations and should be addressed in this TMDL. (52)
Response	*ODEQ believes that the TMDL adequately addresses the numeric water quality criteria and identifies measures necessary to address the narrative elements of the temperature standard and protect beneficial uses. Flow alteration is not considered a pollutant and thus not explicitly addressed in the TMDL. However, flow alteration does affect fisheries throughout the basin. The flow regime adopted by USACE and approved by the US Fish and Wildlife Service and National Marine Fisheries Service addresses some of these concerns.*
Comment 142. Reservoir Load Allocations	Hydro and flood control projects: The output of dams and reservoirs are treated as boundary conditions for downstream modeling predictions (i.e. the thermal impacts of the dams and reservoirs is accepted as background conditions). In addition, the draft Water Quality Management plan states that the temperature TMDL will be implemented through the establishment of water quality based effluent limits for most point sources, but federal and private flood control and hydropower projects will be allowed to use temperature management plans. These sources of impacts should be addressed consistently with other temperature sources, given a designated WLA, and required to take mitigating actions. In addition, the control strategy must be consistent for all sources, and if flood control and hydropower projects can use temperature management plans to respond to their TMDL requirements, point sources should have this option as well. Also, it would be helpful to compare existing temperatures to the targets shown in Tables 4.10 and 4.24 on pages 4-48 and 4-113 respectively. Note too the data discrepancies between these tables which must be corrected (48, 50, 55, 56)
Response	*The USACE reservoir projects are allocated no portion of the human use allowance. They are held to a much more stringent criterion than any point source allocated a portion of the human use allowance. The comments do correctly indicate that temperature management plans are available to reservoirs as*

	provided in OAR 340-41-028(12)(h), but are not available to NPDES point sources. As mentioned elsewhere small changes were made to load allocations to the reservoirs to better reflect background conditions and these revisions will be included in Tables 4.10 and 4.24 as appropriate. The final determination of compliance for both point and nonpoint sources remains the seven day maximum temperature metric.
Comment 143. USACE Reservoir Load Allocations	Inadequate data and modeling exist to finalize temperature targets for the dams and there are strong indications that some of these targets may be lower than those that would have occurred on the absence of the dams (17a p.8).
Response	*ODEQ has made some small changes to the load allocations for these projects. ODEQ also agrees that inadequate data exists to refine temperature targets for dams. The TMDL lays out a plan to address these data deficiencies...*
Comment 144. USACE Reservoir Load Allocations	DEQ's deferral of TMDL requirements affecting the Army COE, one of the most significant heat sources in the Willamette system, fundamentally undermines the validity of the TMDL itself. (29)
Response	*TMDL requirements affecting USACE have not been deferred. Rather, as discussed above, the load allocation for each Willamette Project reservoir has been set in the final TMDL to "no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded." .*
Comment 145. USACE Reservoir Load Allocations	Deferring adoption of a TMDL implementation plan for the Corps for 18 months means that neither the public nor decision makers have the ability to accurately evaluate the effectiveness of the proposed TMDL. (29)
Response	*All DMAs have 18 months from the time the TMDL is signed by the ODEQ Division Administrator to submit an implementation plan.*
Comment 146. USACE Reservoir Load Allocations	Monthly target temperatures were based on the best available data but the data were filtered through several assumptions that decrease target temperatures. These target temperatures may be unachievable and may not represent conditions that would have occurred in the absence of the dams (17a). Target temperatures were not based on best available science because they are determined largely by a set of subjective and conservative assumptions. DEQ Cougar Reservoir targets are lower than those agreed upon by NOAA Fisheries, USFWS, ODFW prior to the design of the just completed selective withdrawal tower at Cougar Dam. (17a).
Response	*As discussed above, in order to address such concerns ODEQ has revised the TMDL. Median monthly upstream temperatures, rather than 25th percentiles, were used to estimate targets for USACE reservoirs to meet load allocations. Additional monitoring and modeling will allow ODEQ and USACE to refine the estimates of natural thermal potential which are the target temperatures for reservoir operations.*
Comment 147. USACE Reservoir Load Allocations	Page 4-70, Natural Thermal Potential Temperatures, The Corps agrees that the altered "with-dam" operations do reflect the preferred regime on which to base downstream temperature waste load allocations presented in this TMDL. Given the logic of this argument, the Corps does not understand the decision to assign the temperature load allocations for the dams based on a "no-dam" estimate of natural thermal potential that is not only impossible to achieve with the dams in place but also represents an extremely biased approach that is described as a very "rough" estimate throughout this document. What is the basis for this inconsistent approach to assigning temperature allocations to the Corps Dams versus all the point-source dischargers in the basin? (33).

Response	*The estimates of NTP downstream from USACE reservoirs are preliminary and additional modeling and analyses are needed to accurately define appropriate targets for reservoir operations. Such targets may consider that the USACE manages reservoir operations for a variety of purposes including flood control and flow augmentation for navigation, irrigation, fisheries and dilution of pollutant loads. In addition, considerable time may be needed for the USACE reservoirs to meet appropriate temperature targets. Consequently, simulations with a well calibrated model and based on current USACE reservoir operations, boundary conditions, and system potential vegetation were used for purposes of establishing the wasteload allocations for point source dischargers for the mainstem Willamette River.* *Additional discussion is provided in the Natural Thermal Potential section of the final TMDL document.*
Comment 148. Waste Load Allocations	Page 4-7, second full paragraph, second sentence. It would be helpful to name the two sources that do not meet the assumed condition. (65)
Response	*The two sources are Cottage Grove and Weyerhaeuser Springfield.*
Comment 149. Hydroelectric Projects Clackamas	Allocations for Point Sources and Hydro Projects – A number of thermal allocations have been defined in the TMDL that are not clearly justified, and appear to be arbitrary or inconsistent. On page 4-16, the Department graphically shows that the temperature increase caused by the PGE Clackamas River Hydroelectric Project is approximately 0.4 ˚C, assuming the 50th percentile is representative of the thermal effects, yet states that the project has "very little if any impact." This increase does not seem to be minimal when compared with the policy decisions affecting point sources (i.e. with a defined de minimis impact of 0.3 degrees centigrade). (48, 55)
Response	*As stated in the draft document, the period when the project has very little impact on temperature is when ambient temperatures are warmest. Note that the 5th percentile ΔT values are less than 0.0°C. The load allocation for some point sources exceeds that for the PGE project. The allocation framework was not arbitrary, but was the product of lengthy discussions and model simulations to come up with allocations that imposed load reductions on few existing NPDES permitted facilities and in fact allocated greater heat loads to these sources than current operational loads.*
Comment 150. Hydroelectric Projects	Providing hydro projects variable flow-proportional load allocations based on monthly average flow conditions as described on page 4-116 is highly inconsistent with the monthly load allocations given point sources which are based on 7Q10 and non-variable river flow. Point sources should also be assessed variable flow-proportional load allocations. (48, 55)
Response	*ODEQ has provided for this.*
Comment 151. Hydroelectric Projects	Point Sources – Table 4.18 appears to list multiple exceptions to the allocation framework of dividing the human use allowance of 0.3 ˚C among the point sources at 0.2 ˚C, non-point sources at 0.05 ˚C, and reserve capacity at 0.05 ˚C. No explanations are given for the allocations, thus these exceptions appear to be arbitrary.
Response	*The allocation framework was specified on page 102 of the draft TMDL*
Comment 152. EWEB Hydroelectric Project	FERC issued an operating license to EWEB for Leaburg and Walterville Projects in 1997 and amended the license in 2001. (5)

Response	*ODEQ did not issue a 401 certification for this project.*
Comment 153.	Figure 4.57 legends are thought to be incorrect and appears to disagree with Figure 4.32. (17a p8)
Response	*The figures have been revised to reflect the results of modeling with updated models.*
Comment 154. PGE Clackamas River Hydroelectric Project	a) PGE is now determining how to recalibrate the model, and will incorporate this improvement, along with the improvements mentioned above in the revised application for a water quality certificate for the Clackamas Project that must be filed by August 18, 2005, and which is now scheduled to be filed by April 30. If the final TMDL is issued before the revised water quality certification application is filed, PGE believes that the final TMDL should provide for the automatic incorporation of these improvements without the necessity of reopening and revising the entire TMDL. (39) b) DEQ is responsible to implement the Clackamas TMDL through the 401 process for the FERC relicensing of the Clackamas Project. As a result, the 18-month deadline otherwise applicable to the TMDL implementation process should not be applicable in this case. Moreover, since the Clackamas River does not contribute any heating to the Willamette River, completion of the Clackamas TMDL could be deferred until PGE has been able to refine the NTP calculation. This can be undertaken in the upcoming 401 proceeding. Alternatively, DEQ should note in the final TMDL report that the Clackamas NTP is being recalculated, and that this refinement will be incorporated as an improvement of the model input, not as a revision to the TMDL. (39) c) PGE's review of the Draft Willamette Basin TMDL indicates that there are several respects in which the calculation of NTP can be improved, thereby increasing the fairness and accuracy of the final TMDL. The analysis completed to date has improved the fit of calculated NTP to measured data. This analysis shows that the impact of the Clackamas Project is less than modeled in the draft TMDL. It also shows that temperature impacts are ameliorated at the mouth of the Clackamas River and that the Clackamas River does not contribute any measurable warming to the Willamette River. Additional modeling would improve the calculation of NTP, and would tend to further reduce the impact of the Project on the lower Clackamas River. (39)
Response	*PGE has submitted final model runs for the Clackamas. The outcome of these simulations does not substantially change the conclusions and load allocations in the draft TMDL.*
Comment 155. PGE Clackamas Hydroelectric Project	Page 4-114, PGE Clackamas River Hydroelectric Project, last paragraph: Is it possible to provide any better quantification of the impact a HUA of 0.3°C in the Clackamas River would have on the HUA in the Willamette below the Clackamas River? As currently written, it appears possible that a small portion (up to 0.027°C) of the Lower Willamette HUA needs to be allocated to the Clackamas River. Please provide further quantification to show that this allocation will not lead to exceedence of the Lower Willamette HUA. (65, p.8)
Response	*The final TMDL document discusses the impact of the PGE Clackamas River Project on Willamette River temperature. As discussed, while current impacts of the Clackamas Project on the Willamette River appear to be significant, if the Clackamas Project is able to meet its load allocation, then the impact of the project on the Willamette should be virtually eliminated. Summer impacts of the Project on*

	the lower Willamette currently range from 0.05 to 0.3°C and median impacts range from 0.1 to 0.2°C, prior to dilution with Columbia River water near the mouth. In the Clackamas River, current overall Clackamas Project impacts are as much as 1.5°C in the reach from RM 23 to RM 8. If these are reduced to the allocated 0.15°C of impact, it is likely that the impact of the project on the Willamette River will be reduced a similar percentage amount. Therefore, it is reasonable to assume that maximum impacts on the lower Willamette will be reduced to less than 0.03°C and that median impacts will be reduced to no more than 0.02°C.
Comment 156. PGE Clackamas Hydroelectric Project	Is 0.025°C an appropriate allocation for nonpoint sources in the Clackamas River below PGE's hydroelectric project? What assistance will the State provide to the NPS community to meet this allocation? (37)
Response	*This is consistent with the framework of the TMDL. Various state and federal programs exist to assist designated management agencies as described in the water quality management plan Chapter 14.*
Comment 157. PGE Willamette Falls Hydroelectric Project	Page 4-117, 1st full paragraph: Please provide further documentation to show that the 0.1°C allocation for this project will not lead to an exceedances of the 0.3°C HUA in this section of the Willamette River. (65, p.8) Page 4-68, Conclusions, paragraph 3. Reference the statement, "The Willamette Falls Project at certain times and locations heats the river slightly and at other times and locations cools the river slightly. Overall the impact on the river temperatures is neutral." This seems like a broad oversimplification of the relationship not consistent with the scope and content of the analysis conducted elsewhere in the document. (33).
Response	*Additional modeling has been presented in the final TMDL. During periods when the biological-based numeric criteria is exceeded, the Willamette Falls Project results in slightly cooler overall temperatures in Newberg Pool and slightly warmer overall temperatures in the lower Willamette River. Cumulative frequency distribution plots show that the overall combined influence of the Willamette Falls and Clackamas River projects at their load allocations plus point sources at their wasteload allocations on the lower Willamette River is 0.25°C (see Chapter 4 Appendix 4.6).*
Comment 158. Mainstem Willamette Reserve Capacity, Option 2	Page 4-121,: EPA prefers that option two be employed in distributing the reserve capacity, thus ensuring that some reduction occurs prior to the allowance of increases to other sources. To distribute the reserve capacity prior to documented non point source reductions could translate in an actual heat load increase to the system under the TMDL. (65, p.8) Option two, the option proposed by USEPA, is preferred because of the limitations of natural thermal potential temperatures used in the TMDL. (58). Because of the system wide concern over temperatures, the many uncertainties to clarify such as the timing of actions needed to restore temperatures, option two is the best course of action. (60). Similarly, the assumption that DEQ will be able to require stream restoration under existing tools such as SB 1010 and the State Forest Practices Act on private and State lands is unrealistic and assumptions about temperature reductions that would be achieved by this increased shading are therefore unrealistic and overly optimistic. (29) DEQ's claim that there is a lack of adequate information about the impact of Willamette River dams only makes the need to wait prior to allocating "reserve capacity" more evident. Accordingly, EPA's more conservative approach is

	certainly preferable to DEQ's planned approach. (29) DEQ's proposal to allocate so called "Reserve Capacity" is reckless and would undermine any chance of reducing temperatures in the Willamette Basin. (29)
Comment 159. Mainstem Willamette Reserve Capacity, Option One	Commenter favor selection of Reserve capacity option one; reserve capacity becomes available at the time the TMDL is issued (37 p5). P 4-120. Favors option one as it is consistent with laws, precedents and policies. Option two confuses reserve capacity with margin of safety. Sources shouldn't be held hostage by infighting between USACE and EPA (46 p6). Reserve Capacity is part of the human use allowance which has been determined to have no significant impact on beneficial uses. Therefore it should be made available immediately as allowed in option 1. (61) We support the Department's position regarding determining and using reserve capacity for temperature at the time the TMDL is ultimately approved. Waiting to make the reserve capacity available until federal action is decided for the dams and reservoirs in the Willamette system is not fair to Oregon municipalities and industries that operate under NPDES permits. The Department needs to develop a system to make the reserve allocation and amount of reserve capacity in the Willamette transparent to permit holders and policy makers, and we would like to help in this effort. (48, 55, 56 and 63)
Response ***Comment 158 & 159***	***One half of the reserve capacity will be available for allocation to point source and nonpoint source sectors when the TMDL is finalized. The remainder will be held until analyses of the USACE dams have been conducted and meaningful measures are underway to decrease anthropogenic heat loads in the basin. Implementation of reserve capacity is discussed in detail on page 14-33 of the water quality management plan.***
Comment 160.	Portland Metropolitan Regional Government (Metro) has added 15000 acres to the urban growth boundary. How will future requests for additional heat loading for the Willamette River below Willamette Falls. (37)
Response	*New major sources will require EQC approval. New minor sources will require ODEQ staff approval.*
Comment 161. Mainstem Willamette Reserve Capacity	Reserve capacity for MWMC should be based upon the 2025 Facilities Plan projections. The Metropolitan Wastewater Management Commission has recently completed a facilities planning effort that incorporated flow and loading projections for the next twenty year period for the Eugene/Springfield area. The temperature wasteload allocations in the proposed TMDL for MWMC should use the projections from the 2025 Facilities plan in determining growth needs of the area. (48) As a matter of DEQ public policy for the Temperature TMDL, can excess assimilative capacity for temperature be assigned to pulp and paper facilities? (66)
Response	*Reserve capacity is not assigned to any individual source. Pollutant assimilative capacity as reserve capacity is a public resource allocated through the antidegradation review processes. Allocation of reserve capacity to MWMC or any other stakeholder without adequate review defeats the purpose of Oregon's antidegradation policy. However, ODEQ will evaluate load capacity of the system to evaluate if adequate assimilative capacity actually exists to accommodate growth as envision in facilities plans or identify the need for alternative solutions.*

Comment 162. Mainstem Willamette Reserve Capacity	P 14-29 and 14-30. The City does not agree that unused load allocations be returned to the reserve capacity bank. This unused allocation should be available for trading or growth
Response	*The WLA is valid for the life of the permit and into the future if needed to be in compliance with the TMDL. However, any portion of the WLA unused by the source after a ten-year period from the time of allocation, or if the permit is terminated, will revert back to the reserve capacity. This is true unless the source demonstrates a future need or the allocation has been committed to a trade to another source. More on this subject is found in the temperature water quality management plan in Chapter 14.*
Comment 163. Mainstem Willamette Reserve Capacity	Would a source be allowed a portion of the human use allowance allocated to reserve capacity or would a trade be required to receive a heat load increase? (37)
Response	*Following necessary review and if there is adequate load in reserve capacity, to allocate, a new or existing source seeking an increase in heat load may be allocated a portion of the human use allowance currently assigned to reserve capacity.*
Comment 164. Margin of Safety	Margin of safety: The proposed TMDLs address the margin of safety in an implicit manner, i.e. they presume that a margin of safety is sufficient because the model input parameters are set at critical conditions which are believed unlikely to occur simultaneously. This implicit approach does not generate any quantification of the margin of safety, and without a statistical analysis to assess uncertainty associated with each assumption it is not possible to determine whether the assumptions provide a reasonable overall margin of safety. The Department must employ statistical methodologies to develop credible, quantifiable margins of safety, especially when margins of safety are the basis for defining regulatory waste load allocations and load allocations. (48, 55)
Response	*Margin of safety in the TMDL is addressed in a manner consistent with USEPA and ODEQ guidelines. The abundance of ambient and effluent data and the selection of critical source and receiving stream conditions eliminate the need for an explicit margin of safety. Moreover, simulations at maximum allocations demonstrate compliance with temperature criteria at the 95th percentile of simulated outcomes. Effluent and receiving stream variability will be addressed during development of NPDES permits. Statistical methodologies will be employed to calculate highest allowable discharges on daily, weekly and monthly basis.*
Comment 165. Margin of Safety	The proposed temperature TMDL for the Willamette basin presumes that a margin of safety is incorporated and that model input parameters are set at critical conditions that are believed unlikely to occur simultaneously. Unfortunately in most instances uncertainty analysis is not performed so it is difficult to quantify the margin of safety. Statistical analysis is necessary to assess margins of safety associated with each assumption. Since cumulative estimates of the margin of safety (e.g., confidence intervals) are not provided it is impossible to determine whether the assumptions provide a reasonable degree of environmental protection. Nor is it evident how the cumulative margin of safety manifests itself in the current pollutant load and loading capacity of the Willamette Basin. Statistical methodologies must be employed to develop credible margins of safety, especially when margins of safety are the basis for defining thermal load allocations. Examples of undefined margins of safety include: a) NPDES Point Sources – DEQ considers the thermal load contributions from point sources at Maximum Design Flow concurrent with Maximum Effluent Temperature. DEQ Guidelines for making flow projections for sewage treatment plants in Western Oregon define the maximum monthly average dry-weather flow at 10% probability of occurrence. The joint probability of maximum monthly average dry-weather flows and the maximum monthly effluent temperature was not

	determined by DEQ. Such an event is extremely unlikely because temperature of the receiving water body and the POTW effluent are inversely related to flow. b) 2002 Low River Flows in July and August – The return interval for these flow events and concomitant probability of occurrence, was not assessed. c) Influence of Small Tributaries on Willamette River Temperatures – In considering the influence of small tributaries on dilution, DEQ selected flow rates at the 10th percentile as being a conservative margin of safety. d) Maximum Permitted Levels from Industrial and Municipal Sources occur simultaneously – DEQ has commented that flow and temperature data for some permitted facilities is inadequate, thus conservative assumptions were made in establishing their data sets. (48, 55)
Response	*a) ODEQ followed the June 16, 2003 ODEQ guidance memo Methodology for Calculating Permit Limits for Excess Thermal Load for initial waste load screening. However, as a result of the combination of maximum reported effluent flows with maximum temperatures individual waste load allocations are greater than they might be under most expected scenarios. Temperature-flow duration plots also demonstrate that at low river flow temperatures tend to be warmer, but the relationship did not appear strong enough to use as a predictive tool for waste load allocation.* *b) Effluent loads were screened at 7Q10. Calculated 7Q10 low flows at Albany of approximately 4,000 cubic feet per second were observed in July 2001 and 2002 (Figure 4.7 page 4-43 of Draft TMDL). Water quality standards require attainment of temperature criteria at 7Q10.* *c) The median effect of full HUA allocations in selected small tributaries on mainstem temperature is shown as well. However rather than simulated tributary values, observed tributary conditions were used in the system potential analysis to calculate natural thermal potential temperatures.* *d) Where possible ODEQ used existing data but may have extrapolated or used other data to characterize effluent loads as necessary. Existing ODEQ guidance was followed when possible. It is unlikely that all sources will realize maximum loads simultaneously. Some municipal sources currently operate closer to design flows or TMDL allocations than others, creating opportunities for effluent trading or other mechanisms for TMDL compliance.*
Comment 166.	In the Watershed Sciences report "Aerial Surveys in the Willamette River Basin, Thermal Infrared and Color Videography, January 15, 2003," the authors explain that FLIR images of small width streams contain fewer in-stream pixels upon processing and non-water features such as rocks and vegetation are integrated into the computed temperature, thus higher inaccuracies are expected in the radiant temperatures. In some cases, small tributaries were detected in the images, but not sampled due to the inability to obtain a reliable temperature sample. Relevant questions which must be answered include how the thermal mass balance model compensates for these inherent errors, and the magnitude of these errors. (48, 55)
Response	*Because these "small width streams" are typically smaller than one meter in width, they were not explicitly sampled as part of the FLIR images. However, if they influenced the stream system, their effect was quantified in the FLIR thermal profile because they either cooled or warmed the stream. Actual FLIR sampling occurs with the thermal stream profile being sampled by a technician to accurately sample stream temperatures and not upland rock or vegetation thermal temperatures. They are able to distinguish between wetted and dry surfaces. This is a pretty intensive sampling and statistical process that is specified within our FLIR contract*

	with Watershed Sciences. While there is increased error when sampling small width streams, generally streams are wide enough and sufficient continuous thermistors are present to allow modeling error to be minimized at the location of point sources which require wasteload allocations. *Note that for the Willamette Mainstem CE-QUAL-W2 model, all reaches are quite wide. Therefore, the above concern does not pertain to this modeling.*
Comment 167.	Page 4-128. Table 4.29 replace the table with one that shows load and not temperature differences at point of maximum impact (46)
Response	*This table summarizes anthropogenic impacts to subbasin stream temperatures at the point of maximum impact. The actual load summary for each subbasin TMDL is identified in chapters five through 13. For example, current loads, background loads, and anthropogenic loads in kilocalories per day are identified for the Upper Willamette Subbasin streams Coyote Creek, Luckiamute River, and Calapooia River in Table 10.9 of Chapter 10*
Comment 168. Subbasin TMDL Waste Load Allocations	Page 4-125, , 1st paragraph: As discussed previously, this paragraph should include a sentence which explains that facilities which are found to have no reasonable potential to warm the receiving water are allowed to discharge at their current heat load (not at WLA=0 kcal/day). (65)
Response	*This language was added to Chapter 4.*
Comment 169. Subbasin TMDL Reserve Capacity	Page 4-129, Subbasin TMDL Reserve Capacity: Contrary to what is stated here, most of the subbasin TMDLs indicate that none of the HUA was allocated to the reserve capacity. Furthermore, there was no discussion in the subbasin TMDLs regarding the1/4 to ½ of the HUA which is not allocated to point sources and thus becomes part of the reserve capacity as noted here. Please make the corrections needed for this section to accurately portray the information presented in the subbasin TMDLs. (65, p.8)
Response	*This section has been revised for the final TMDL. Note that Appendix 4.6 also includes a section on small tributary impacts.*
Comment 170. Subbasin TMDL Seasonal Variation and Critical Conditions	Page 4-129, Subbasin TMDL Seasonal Variation and Critical Conditions, 4th sentence: This notes that no more than 0.3ºC was allocated to point sources. However, the subbasin TMDLs noted that point sources never received more than 0.2ºC of the HUA. (65) Page 4-129, Subbasin TMDL Seasonal Variation and Critical Conditions, last sentence: Please further explain this sentence. Are the allocations applied only during certain months or under specific conditions? If so, please specify. (65, p.9)
Response	*Anthropogenic load allocations allow no more than a 0.3°C increase in water temperature above numeric criteria throughout the period of concern. Waste load allocations are equal to or less than 0.2°C increase in seven day average of maximum temperatures. Allocations are applicable throughout the beneficial use period for which the waterbody is listed as temperature impaired. This is usually during the salmon and trout rearing designated use period of late spring, summer and early fall. The exact period for each designated use is specified in the subbasin TMDL. TMDL limitations do not apply when water quality standards are attained, but NPDES permit limits to control near field effects and nonpoint source controls will remain in effect.*

Comment 171. Subbasin TMDL Margin of Safety	Page 4-129-130, Subbasin TMDL Margin of Safety, second paragraph: 1) This section notes that the portion of the HUA not allocated to point sources is set aside as a reserve capacity. This portion of the HUA can not serve both as a MOS and part of the reserve capacity if there is potential for that reserve to be further allocated to sources at a later date. Specifying a quantity as part of the reserve suggests that future distribution will occur. 2) This paragraph notes that a detailed analysis is required to demonstrate attainment of water quality standards is required prior to the reserve capacity being available for allocation. This is the only reference to such a demonstration which we found in the document. If such a demonstration is required, it should be discussed in the section addressing the "Reserve Capacity" and outlined in detail in the Water Quality Management Plan. (65, p.9) p. 4-129-130, Subbasin TMDL Margin of Safety, last paragraph: Please provide further explanation of what is the margin of safety provided through this measure. If this is referring to the fact that anthropogenic nonpoint sources are being required to improve to the maximum possible extent (no anthropogenic nonpoint source allocations) and thus can not be reduced any further, please state this conclusion. (65, p.9)
Response	*This section has been revised for the final TMDL. Note that Appendix 4.6 also includes a section on small tributary impacts.*
Comment 172. Chapter 4 Appendices	If the table is retained, we strongly suggest that wording be added to the table found in Appendix 4.5 and Appendix C that indicates that the calculations for municipal dischargers above river mile 115 are intended to reflect CURRENT discharges in 2001 or 2002 PLUS 35%, and that future permits can be adjusted to reflect the accurate calculations of that policy goal. ACWA believes that the monthly allocations in Appendix 4.5 and Appendix C should be based on model runs for each month. The 'point of maximum impact' was run for the months of August through October. The point of maximum impact should be run for each month, (April, May, June, and July) in order to determine the waste load allocations for those months. The waste load allocations should then be calculated using the maximum week flows for dischargers during the specific months. Wastewater treatment plant discharge flows in April are much higher than in May and are normally considered with wet weather flows. Monthly limits should be based on actual conditions also because of anti-degradation implications. Therefore, separate analyses should be conducted for each month with both the representative statistically-based discharge flows and point of maximum impact model runs. (55)
Response	*Substantial changes have been made to waste load allocations. New load information and flow-based waste load allocations better utilize the seasonal changes in load capacity. ODEQ did ensure that human use allowance limits were not exceeded during the critical period when waste load allocations apply*
Comment 173. Appendix 4.5 and Appendix C	Because the table in Appendix 4.5 and Appendix C is subject to change as better data is accumulated, we suggest moving this Table to a guidance document so that it can be more easily adjusted in the future (55) (63) Use a narrative standard instead of tables in Appendix 4.5 and Appendix C. (63)
Response	*Revisions were made to the appendices to include flow-based waste load allocations, narrative language and equations that may be used to determine NPDES permit limits.*

Comment 174. Appendix 4.1	Appendix 4.1 should identify the mainstem Willamette as migration corridor with a 20°C criterion from river mile 0 to 50 rather than rearing use and the 17.8°C criterion for RM 0 to 54.8. (31).
Response	*Appendix 4.1 includes numeric criteria in place when the 303(d) list was revised in 2002. Changes in water quality standards are reflected in this TMDL as well as the subbasin TMDL.*
Comment 175. Appendix 4-2	Define + and * (46).
Response	*The "+" symbol next to the number of exceedances denotes that additional days of exceedances of numeric criteria were likely during the season. This occurs when temperature data sets do not span the period of highest seasonal temperatures. For example the second site in Appendix 2 is the Coast Fork Willamette at Goshen. The number of days identified exceeding the summer criteria was 48+ and the period of exceedance begins "before" 8/19/2001 to 10/04/2001". Available data suggest it is likely that undocumented exceedances of the summer rearing criterion occurred before August 18th, but it is unlikely that exceedances occurred after October 4th. Furthermore the "+" symbol next to the corresponding highest seven day moving average value (23.7) suggests that warmer maximum values may have occurred prior to August 19 in 2001. Maximum summer temperatures often occur late July to mid August. Farther down the page in Appenidix 4.2 in the fourth site, Willamette upstream of McKenzie, the "*" symbol next to 22.0 denotes that the highest seasonal seven day temperature was likely captured although thermister data may not span the entire time period of criterion exceedance.*
Comment 176. Appendix 4.5- No Allocation	Page 4-146, Appendix 4.5 - Point Source Wasteload Allocations: Please provide a note which discusses how months with no quantified allocation are to be addressed during permitting. (65, p.9)
Response	*Waste load allocations apply April – October except in the Lower Willamette Migration Corridor where they apply June –September.*
Comment 177. Appendix 4.5	Does the minus sign in column "Change in River Temperature" mean that the Tryon Creek treatment plant cools the Willamette under the modeled scenario in April and May? (37)
Response	*Not under the modeled scenario but it does indicate at the screening exercise calculated the WWTP would cool the river given the effluent flow and temperatures and receiving stream flows and temperatures included in the table.*
Comment 178. Appendix 4.5 – HNET	In Appendix 4.5, Appendix C, and perhaps elsewhere, we believe there is a fundamental error in the formula for HNET. In this formula for the Maximum Allowable Net Heat from Effluent, one of the terms is TPSMAX, presumably expressed as degrees C, although not specified. As written, this formula is incorrect, and the temperature term should be included as degrees Kelvin. As an illustration, given a constant flow, HNET calculated for an effluent temperature of 22 degrees C would be 10% greater than the HNET calculated for an effluent temperature of 20 degrees C. This is not the case, and the percentage calculated depends on the arbitrary location of zero on the Celsius scale. The solution is to either use degrees Kelvin in the formula, or, because this is somewhat unwieldy, we recommend that a temperature difference be used in the formula for HNET in order to eliminate this problem (55)
Response	*The equation no longer applies as the waste load allocations have been revised.*

Comment 179. Appendix 4.5	Siltronic requests the baseline waste load allocation reflect the design capacity of the plant and permit limit for temperature. (22)
Response	*The revised flow based waste load allocations allow Siltronic to utilize design capacity when the river has available assimilative capacity. ODEQ cannot allocate the full design capacity at low flows as the cumulative impacts from these discharges would violate water quality standards.*
Comment 180. Appendix 4.5	Appendix 4.5 contains proposed allocations that are inconsistent with the increased assimilative capacity of the river during spring months, do not reflect actual plant flows for some facilities, and are not calculated correctly. We propose to substitute a narrative discussion of the principles behind the table, and delete the table. We propose this language be substituted: Waste Load Allocations for Large Point Sources, which are estimated to individually have a temperature impact of 0.01 °C or greater, will be established using the following approach: • If the 7dADM of the point source effluent is below the biological criterion or system potential temperature plus the available cumulative human use allowance (HUA) of 0.23°C, no WLA will be established. The effluent discharge has no adverse impact on the river temperature. • If the 7dADM of the point source effluent is above the biological criterion or system potential temperature plus the available cumulative HUA of 0.23°C, use one of the following options: 1. The WLA is equal to the modeled July or August (whichever is greater) Net Effluent Heat Load (see revised Appendix 4.5), which was shown to be protective of the river temperature under the most critical conditions. 2. If a point source wants to discharge a heat load greater than the modeled July or August (whichever is greater) Net Effluent Heat Load (see revised Appendix 4.5), then the point source must show that the increased heat load is protective of the river. (55)
Response	*For sources above river mile 50, waste load allocations will be applicable for the period April 1 through October 31 because exceedances of the biological based numeric criteria occur during this period. Specifically at the ODEQ ambient monitoring location in Albany 6 of 36 grab samples collected in April were at or above 13°C. Grab temperatures of 13°C, 14°C and 15.6°C were recorded in 1992,1994 and 2004, respectively, and while these samples were not seven day values, they were also collected early in the day. Of the 28 samples collected between October 15 and October 31, 75 percent exceeded the applicable 13°C criterion (DEQ LASAR number 10350). During this period when temperature exceeds the criterion the human use allowance defines the load capacity available for anthropogenic sources.* *Below river mile 50, WLA apply from June 1 through September 30 because this is when exceedances of the 20°C biological criterion for salmon migration were observed at the Hawthorne Bridge ambient monitoring site. (DEQ LASAR number10611). As discussed elsewhere, ODEQ has revised the waste load allocation framework to reflect changes in load capacity during designated use periods.*
Comment 181.	The seven-day average maximum temperature effluent is used for human use allowance calculations, page 4-17. Why is a seven-day average maximum effluent flow not also used in the calculation? It would appear that since heat load is based on temperature and flow, then the averaging of the effluent flows would be justified.(22)

Response	*The final TMDL utilizes seven-day average maximum effluent temperatures and seven-day average effluent flows.*
Comment 182.	As a general comment, the actual calculations for using Qpsmax and Tpsmax are somewhat confusing and leave the reader unsure of how to apply calculations to determine impact on permit compliance or operational activities. As an example, much of the TMDL and data demonstrate that there is little measurable temperature impact on the Willamette River from point sources. Graphs of Seven Day Average Daily Maximum Temperatures show essentially no increase in maximum temperature for the lower 132 miles of the river which includes the majority of the population of the State.(22)
Response	*ODEQ clarified definitions used in the TMDL. Figures 4.18 and 4.19 demonstrate that current point source loads are indeed a relatively small influence on overall river temperatures. However, without some limitations it is possible that future loads could cause temperatures to warm more than water quality standards allow.*
Comment 183.	Reliance on limited sampling from only a one-year period is arbitrary. By excluding data from other years, the Department is leaving the determination of waste load allocations to happen-stance, resulting in arbitrary allocations not based "current" loadings that would likely occur. Such reliance would penalize some dischargers (as would be the case for OLSD) and unfairly benefit others because of circumstances beyond the particular discharger's control. Reliance on such a limited data set is scientifically invalid and will result in inaccurate and arbitrary allocations. The Department should revise the temperatures and the calculated Effluent Heat values (both received by river and net) applicable to OLSD in Appendix 4.5 (page 4-149) to reflect actual conditions. (35)
Response	*ODEQ allowed sources to submit additional data to better characterize effluent loads.*
Comment 184.	Page 4-4, Data Collection, This section does not really adequately describe the data that was collected and analyzed to develop the temperature TMDL. That data should be summarized here and described in more detail in other chapters or appendices. The overall limitations in the data used to develop the TMDL and additional data and information needed to continue to refine the TMDL discussed. (33)
Response	*ODEQ believes the summary adequately communicates the collaborative nature of the temperature TMDL effort, the period of interest and the data requirements of the model.*
Comment 185.	Page 4-4, the sentence "slower moving streams warm up faster than faster moving streams because the water is exposed to more solar warming over the same amount of time" makes no sense. Where does this apply? (24)
Response	*This discussion has been revised to provide additional clarification .* *Note that the discussion pertains to time of exposure in a given reach. Slower river velocities translate to longer travel times through a specified reach. Model simulations and analysis of PGE Willamette Falls hydroproject demonstrated that the project changed the time of travel through Newberg Pool. Water traveled more slowly through the pool with the concrete cap and flashboards in place than without the cap and flashboards. This affected the distribution of heat and daily maximum temperatures in the pool Other simulations, such as those for the EWEB project on the McKenzie, demonstrate that diversions result in slower stream velocities in bypass reaches. Slower velocities result in longer travel times and greater times of exposure to solar loads within the bypass reach, which generally results in warmer daily maximum temperatures.*

Comment 186.	Page 4-7, Setting Allocations, paragraph, The Corps recommends the sentence "Dams are to target estimates of natural stream temperatures and…" be rewritten as "Dam operators are to target temperatures to meet estimates of natural stream temperatures. (33)
Response	*Discussion revised in final TMDL.*
Comment 187.	Page 4-17, It would be useful to have a table which presents information for those waterbodies addressed in Chapter 4. (65)
Response	*Additional detail is provided in Appendix 4.2.*
Comment 188.	Page 4-19 Map 4.4 Willamette Basin 303d Listings. It would be helpful to see which of these waterbodies were being addressed in Chapter 4. (65)
Response	*Map 4.8 of the draft TMDL illustrates this. Additional language was added to specify which impaired segments are addressed in Chapter 4 and which are addressed in subbasin TMDLs.*
Comment 189.	Figure 4.7 page 4-43, One of the data sets plotted in the upper left graph in figure 4.7 must be incorrect. The PSU calibration report documented excellent agreement between simulated and measured streamflow at Salem during 2001 (17a p.8)
Response	*The model has been updated and the final simulations show excellent agreement between simulated and measured river flow rates at Salem. The TMDL document has been revised to reflect this.*
Comment 190.	P 4-102 rephrase sentence to read Heat loads for storm water sources (MS4 and CSOs) were not given…. and add that MS4 NPDES permits will not include temperature limits. (46)
Response	*ODEQ has specified that stormwater sources are not considered significant contributors of heat load to the extent that attainment of temperature criteria in the Willamette is affected by runoff.*
Comment 191.	Page 4-99, This table combines the allowance for point sources and dams. However, in the text which follows and the summary table (Table 4.1) on page 4-9 discusses each source separately. To eliminate the confusion which this can cause, we recommend that point sources and dams be placed in separate rows within this table. (65, p.6)
Response	*No changes were made because reservoir and point source load effects are not simply additive. This is because point source impacts tend to be greater on days when reservoir dam and project impacts are minimal, and less on days when dam and project impacts are greater.*
Comment 192.	Page 4-60, 1st line. This sentence references 4 major hydroprojects while p. 4-32 only mentions 3 projects. (65)
Response	*The Federal Energy Regulatory Commission identifies the Leaburg-Walterville Projects as a single project (Project number 2496). Thus there are three large hydroelectric projects in the system in addition to the federal Willamette Project that is capable of producing 2100 megawatts of power. Appropriate changes were made to the text.*
Comment 193.	Figure 4.1 depicts the lower Willamette River segment ending at river mile 24.8. (37)

Response	*The legend and text for the figure indicate this location is in the lower river and does not delineate the boundary between the lower and middle rivers. That boundary location remains Willamette Falls.*
Comment 194.	Correct Figure 4.5 or change the title. (46)
Response	*It is correct. It is the calibrated model for the years 2001 and 2002. It is not the BiOp flow simulation output.*
Comment 195.	Figure 4.39. There is not an obvious connection between point sources and increases in temperature in the figure. (46)
Response	*Figure 4-39 plots the difference in 7DADM temperatures between current condition vegetation and system potential vegetation. The upper 95th percentiles values are plotted in these differences are plotted. Point source loads are not included in either simulation, which is why you don't see point source impacts. Point source locations are provided for reference only.*
Comment 196.	SP Newsprint discharge point is located at river mile 49.7 as stated in table 4.12. It's location is incorrectly identified elsewhere in the document. Check all references including the model. (31)
Response	*Table 4.12 lists point source locations by river mile according to NPDES permits which are based on somewhat dated OWRD information. Figures 4.19, 4.61, 4.96 and other model outputs are based on more recent GIS mapping of the river channel.*
Comment 197. Appendix C	Table 5 of the W2 Model Calibration Summary in Appendix C performance statistics for the Santiam/North Santiam model need to be changed from mean absolute errors to root mean square errors (17a p10).
Response	*The statistics presented have been updated to RMS errors.*
Comment 7 Appendix C	Page 14 W2 Model Calibration Summary in Appendix C the absolute mean error statistic would be more correctly termed mean absolute error. The equation for the root mean square error unnecessarily uses and absolute value function (17a p11).
Response	ODEQ agrees that absolute mean error may be more correctly termed mean absolute error. However, the equation and calculated values are correct. In order that the description be consistent with other CE-QUAL-W2 documentation, no change has been to the text. ODEQ also agrees that, while the RMS error equation and values calculated by it are correct, the equation can be simplified by leaving out the absolute value. ODEQ has revised the document accordingly.
Comment 198. Appendix C	In the Potential Near-Stream Land Cover section of Appendix C the term geomorphic unit is often used when the correct term is geologic unit. (17a p11)
Response	*ODEQ will continue to use the term geomorphic units as surficial deposits as mapped by O'Conner, et al 2001 (full reference on page 18 in Potential Near-Stream Land Cover). Pat McDowell, a geomorphologist, at the University of Oregon assisted ODEQ with the development of the Potential Near-Stream Land Cover and assisted with a response to this comment. McDowell replied that "geomorphic unit can be used as a general term (i.e., a map unit depicting some aspect of geomorphology), or as a more specific term meaning a unit defined on the basis of geomoprhic (surface) form. O'Connor followed the geologic tradition of mapping the deposits. O'Connor's "floodplain deposits" is probably co-extensive with and equivalent to the geomorphic floodplain (a geomorphic unit), but he is*

	naming it as a deposit. So the best term would be surficial deposits".
Comment 199. Appendix C	Appendix C. Effluent limits for Tryon Creek WWTP are outside period when biological criterion is applicable. Even though river flow is greater and river temperatures lower and therefore a higher load capacity, the maximum effluent temperatures is lower. (46)
Response	*Noted*
Comment 200.	Page 4-9, TMDL Loading Capacity and Allocations, Load Allocations (Nonpoint Sources). The addition of a line which states that "this allocation was not divided amongst specific sources as part of this TMDL." would provide important information. (65) •
Response	*ODEQ agrees and has revised the text accordingly.*
Comment 201.	Page 4-9, TMDL Loading Capacity and allocations, Load Allocations (Reservoir Operations). Page 4-116 states that the PGE Willamette Falls Project has an allocation of 0.10°C, not 0.15°C as indicated here. (65, p.5
Response	*In the final TMDL, the PGE Willamette Falls Hydroelectric Project is allocated 0.11°C of the human use allowance.*
Comment 6 ***Response***	p. 4-11, Some portions of this section appear to address the entire basin while others only address the mainstem reaches covered in Chapter 4. Unless otherwise noted, it appears all references should be to just the waters addressed in the mainstem TMDL. (65)
Response	*Changes were made to the text which should provide additional clarification.*
Comment 202.	Page 4-11, 2nd paragraph. For clarity we recommend the following sentences be added after the first sentence. "This chapter presents TMDLs for the mainstem Willamette River and its major tributaries. Chapters 5 through 13 present TMDLs for the individual subbasins." (65)
Response	*The sentence was added as suggested.*
Comment 203.	Page 4-15, Map 4-2, Designated Fish Use. Blues and greens shown on the map are not discernable on the legend. (33)
Response	*ODEQ agrees. This map and others have been improved.*
Comment 204.	In addition, page 4-17 appears to be the only reference that refers to the seven-day average maximum temperature effluent as the method to calculate effluent temperature. Please include definitions of the terms used in the table on page 4-155. (22)
Response	*This appendix and table have been significantly revised.*
Comment 205.	Page 4-30, USACE Willamette Project Reservoirs. In the 1st paragraph, 2nd sentence, reference the statement "the project includes a series of 13 dams with 11 reservoirs…" All 13 dams impound reservoirs. Eleven of those are relatively

	large reservoirs with seasonal flood control and multiple purpose conservation storage space. The remaining two projects are re-regulating reservoirs with small storage capacity designed flatten out downstream flows from large daily fluctuations caused by hydropower peaking. (33)
Response	*The document has been revised accordingly.*
Comment 206.	Page 4-15. Does not have matching shading or a clear Key for the Cool Water designation of Rickreall Creek, only the Long Tom River. (65)
Response	*This map has been improved for the final. Rickreall Creek is not included on the map, since it is addressed in the Middle Willamette Subbasin TMDL document (see Map 7.4)*
Comment 207.	Page 4-52 second paragraph, change boundary temperature to boundary flow (17a)
Response	*Final revised accordingly (see Appendix 4.6).*
Comment 208.	Text on page 4-52 describing the seasonal influence of boundary conditions incorrectly references temperature; this should be changed to flow. In addition, the order of variables Simulations 15 and 16 should be reversed so that the overall temperature trends correspond to the text describing the relationships in summer and fall. (48)
Response	*Final revised accordingly (see Appendix 4.6).*
Comment 209.	Page 4-60, 1st paragraph. Remove first paragraph. (5)
Response	*Changes were made to clarify this section.*
Comment 210.	Page 4-68 Double check OAR citations. (17a)
Response	*The OAR citation is the definition of natural thermal potential.*
Comment 211.	Page 4-69. Cite data source and time period for average monthly flows shown in figure 4-35 (17a)
Response	*The USGS gage number has been cited in final document.*
Comment 212.	Table 4.12 should list sources by river mile not alphabetically.
Response	*The final TMDL document does not include this table.*
Comment 213.	Page 4-76 references figure 4.65 when it should reference 4.38 (17a)
Response	*Revised in final*
Comment 214.	Page 4-17, , 3rd paragraph, last sentence. Please note that these tables are found in Appendix 4.1. (65) Page 4-7 second full paragraph substitute “these would be sources found upstream of river mile 115” for these would be sources found from the Santiam

	River southward to the Marys River (17a p10). Page. 4-9, Waterbodies: delete 2nd "streams" in first line (after parens) Page 4-67, Conclusions, paragraph 3. Reference the last sentence. Replace the word "form" with "from". Page 4-47, last paragraph, 2nd line: add space between "Table 4.10" and "have". Page 4-67, 1st paragraph, last line: add period to end of sentence. Page 4-77, 4th paragraph, 2nd line: Two should not be capitalized. Page 4-93, first line: "do" should be "to". (65)
Response	*All changes were made*
Comment 215.	p. 4-79, Table 4.15 and page 4-111, Table 4.23: In both these tables Mosby Creek is mistakenly referred to as "Mosby River. (6)
Response	*The document has been revised accordingly.*
Comment 216.	Page 4-97. Figure 4.57 incorrectly identifies PGE as owner of the Leaburg and Walterville Projects. (5)
Response	*Correction made*
Comment 217.	Page 4-98, 6th paragraph, 1st line: Second "loading capacity" should be deleted. (65)
Response	*Done*
Comment 218.	Page 4-102, 1st paragraph, 2nd line, last word: Delete the "s" from point sources. Should be "...some point source allocations ..". (65)
Response	*Done*
Comment 219.	Page 4-102, Mainstem Willamette Waste Load Allocations, first paragraph, 5th sentence: This sentence could be strengthened by adding an explanation of why this is true in this case. We recommend, "Due to the small size of many of these discharges relative to the size of the receiving water (the Willamette River) and thus their extremely small impact on overall river temperatures, assignment of individual ...". (65)
Response	*This section has been revised significantly.*
Comment 220.	Page 4-107, last sentence: As the table only provides information on the large sources, this should be so noted. "A summary of waste load allocation for large point sources ...". This same change should be made to the heading for Table 4.21. (65)
Response	*This section and table have been significantly revised.*
Comment 221.	Page 4-110, 3rd paragraph, last sentence: Add a space between "Table 4.22" and "are". (65)
Response	*Done*
Comment 222.	Page 4-69, 2nd paragraph, 1st sentence, As Appendix 4.6 follows this paragraph, we recommend this sentence be edited to read "Plots of model ... Potential 1 conditions were discussed previously (*note section*) and are presented in detail in Appendix 4.6 ..." (65)

Response	*Changes were made to clarify sentence*
Comment 223.	Appendix C, Potential Near-Stream Land Cover in the Willamette Basin for Temperature TMDLs, p. 12: blank page (65, p.10)
Response	*Revisions have been made for the final*
Comment 224.	Appendix C, Potential Near-Stream Land Cover in the Willamette Basin for Temperature TMDLs, Appendix 4, p. 47: This page is a repeat of the previous page. (65, p.10)
Response	*Revisions have been made for the final*
Comment 225.	Provide table headings for each page of tables greater than one page (46 p6).
Response	*ODEQ agrees that this would provide for a more readable document.*
Comment 226.	Page 4-103, Large Point Sources, 2nd paragraph, next to last sentence: We find this sentence awkward and suggest the following revision. "Due to exceedances of the human use allowance, some facilities received allocations which were more stringent than the maximum allowed under this framework." It would be informative to also include a list of those facilities which did receive more stringent limits than allowed under the general allocation framework. (65)
Response	*Change made as suggested.*
Comment 227.	The table on page 4-127 is formatted in such a manner that Equations 4-4 and 4-5 are not visible. (48)
Response	*Revisions have been made for final*
Comment 228.	References to figures on page 4-157 and 4-158 are incorrect. (48)
Response	*Corrections made*
Comment 229.	Legends depicting linear features are indistinguishable for many maps throughout the TMDL documents (for example, see Maps 4.2 and 10.4). (48)
Response	*A number of maps have been improved for the final.*
Comment 230.	Links to External Data – In several instances reference is made to external data sources. This practice is strongly discouraged because the link can be discontinued by the third party thereby eliminating access to critical information applicable to the TMDL. The Department is strongly encouraged to maintain and provide access to all data, models, and other materials on their own server. (48)
Response	*ODEQ agrees and will attempt to improve access to this information via its web page .*
Comment 231.	In the Subbasin Temperature Analysis Summary in Appendix C the equation for net heat load (Hwla) is incorrect. (17a p9).

Response	*The equation no longer applies as the waste load allocation hasbeen revised.*
Comment 232. Appendix C	Equation 4 page 88 of Subbasin Temperature Analysis Summary in Appendix C the variable Ax_i is not cross sectional area but is actually stream surface area. (17a p9).
Response	*The factor has been labeled to be more clear.*
Comment 233.	Page 4-36, Incorrect link to the PSU model calibration report (17a)
Response	*ODEQ updated the PSU link 24 May 2005. http://www.ce.pdx.edu/w2/index.html?*
Comment 234.	Page 4-73 Table should be identified maximum point source impacts. Where are the other 8 of 26 sources screened but not included in the table? Which month had the maximum impact? (17a p10)
Response	*The table has been removed and replaced with plots showing current point source impacts at the point of maximum impact.*
Comment 235.	Page 4-41, last paragraph: change the word acceptable to target (17a)
Response	*Agreed. This section has been revised.*
Comment 236.	Page 4-113, USACE Willamette Project Reservoir Allocations: Table 4.24. This table does not include Hills Creek where as Table 2 in Appendix C: Temperature: Estimated targets for stream temperature below U.S. Army Corps of Engineers Willamette River Basin Project dams to meet “natural thermal potential” (NTP) temperatures on Pg. 3 does. This also brings up the point of titles and section labels in the document. (33)
Response	*This table has been revised.*
Comment 237. Implementation	The Department must also proactively support local community’s efforts to restore and maintain appropriate riparian conditions, as directed by the TMDLs. This is especially important given the potential impacts of the Measure 37 ballot initiative, which has the potential to inhibit or severely raise the costs of such waterway protection measures
Response	*ODEQ intends to continue to support efforts to restore and maintain riparian vegetation.*
Comment 238. Implementation	Support the water quality trading component of the TMDL. (50, 61)
Response	*ODEQ intends to continue to support effluent trading opportunities*
Comment 239. Implementation	The Department should identify and define in more detail the specific locations of potential shade, the persons or entities that the Department proposes address the shade targets, the amount of coverage needed by each such person or entity, and the authority of the person or entity to address such shade target, and should more clearly describe the technical requirements for and ability of achieving the shading targets. (35)

Response	*This kind of detail is more appropriate in individual implementation plans.*
Comment 240. Implementation	The City supports use of use attainability analysis as a tool at site-specific locations. (50)
Response	*The comment is acknowledged.*
Comment 241. Implementation	This TMDL is misleading in presenting the role of logging practices in complying with water quality standards. No matter how ineffective or substandard Oregon's forest practices are they are deemed in compliance with water quality standards as defined by Oregon's water quality rules themselves. Therefore, the logging practices define the standards, not visa versa. Oregon's forest practices do not protect the upstream waters to the coldest levels required to maintain the coldest levels downstream, ensuring that the TMDL allows for more anthropogenic warming than is theoretically allowed by the numeric biological criteria and the natural thermal potential and more warming than is protective for cold water species. (52)
Response	*Natural thermal potential temperatures are derived using system potential vegetation and effective shade levels. NTP is also the basis for load allocations and waste load allocations.* *Separately, ODEQ staff continue to participate in the review of forest practices rules as well as other nonpoint source pollution control programs.*
Comment 242. Implementation	Under current federal law, most new civil works projects constructed by the Corps require a non-federal sponsor to share the costs of planning, design and implementation. An important strategic and policy implication to consider or at least raise in this TMDL document is whether or not the State of Oregon or other non-federal entities would be in a position to sponsor selective withdrawal modifications at the other Willamette Projects in order to meet the temperature TMDL. (33)
Response	*The comment raises a key point that implementation of load allocations and attainment of water quality standards will require considerable resources. However, prior to implementation ODEQ, USACE and other stakeholders will need to better understand impacts of each USACE project on water quality and beneficial uses. Once this is accomplished, priorities can be set and a strategy for implementation developed.*
Comment 243. Implementation	Reference is made to the possibility of using "trading" to meet load allocations. The Corps is not certain that trading is an option for Corps facilities but is willing to explore that option further with ODEQ. (33)
Response	*The comment is acknowledged.*
Comment 244. Implementation	Page 4-111. Which DMAs are responsible for cold water refugia? Clarify why the City must identify them. (46 p6).
Response	*DMAs that through their actions can influence the processes that create or maintain stream channel complexity, riparian vegetation, floodplain and watershed processes will be expected to document how their actions protect, maintain or as appropriate, restore these features and processes. Thus, to the extent allowed through MS4 permits, municipal implementation plans will address not only the quality of runoff but also peak storm flows associated with high levels of impervious surfaces in urban areas. Communities not regulated through MS4 permits will identify similar measures in their implementation plans.*

Comment 245. Implementation	DEQ needs to provide more guidance for determining system potential vegetation where there is no cover potential documented in the literature or evident from ground level studies and data. Moreover, DEQ needs to provide guidance for using ground level studies to determine system potential vegetation similar to the "Riparian Area Management" Series published by the USDI Bureau of Land Management [e.g., "Riparian Area Management (TR 1737-15): A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas"]. (23)
Response	*ODEQ has assembled guidance information from a number of sources that will be available on the ODEQ web page. Designated management agency staff and other interested stakeholders may refer to these documents for guidance on development of implementation plans and other watershed protection strategies. For specific information such as impropriate vegetation targets, local agencies such as soil and water conservation districts are a valuable resource.*
Comment 246. Implementation	We assume that monitoring for TMDL compliance will be done with the same technique as defined in the DEQ Laboratory Division Mode of Operations Manual. The grab samples described here does not inspire confidence that calculations of the 7-day average maximum daily temperatures of 1°C or less have any meaning. (24)
Response	*ODEQ generally uses continuous temperature monitoring to determine temperature compliance, rather than grab sample values. These values are useful for calculations of dissolved oxygen saturation levels. Thermistor data that meet QA/QC criteria (accuracy of ±0.5°C) are used for TMDL development. For more on this see Chapter 5 of the DEQ Watershed Assessment Mode of Operations Manual at http://www.deq.state.or.us/lab/qa/DEQ03-LAB-0036-SOP.pdf DEQ: Guidance and Technical Reports*

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Comments on March 2006 Chapter 4: Mainstem Temperature Revisions	
Comment 1.	Proposed TMDL is overly conservative and is a misallocation of regulatory focus. Point sources are small part of overall problem. Substantially limits point sources while not directly limiting NPS. Great costs for no measurable improvement in environmental quality (59), (22), (66)
Response	*The TMDL is conservative. Point sources are a small part of the basin scale temperature problem, but they are a contributor to the problem. The load and assimilative capacity of the river is finite and ODEQ is committed to working with all sources to develop and carry out implementation plans to reduce temperature of streams in the Willamette Basin.*
Comment 2.	Unable to make the connection to Willamette River environmental enhancement from implementation of the temperature TMDL as currently drafted. (50)
Response	*The temperature TMDL sets the targets for reducing temperatures in the Willamette Basin. Actions carried out under permits and under nonpoint source implementation plans developed by Designated Management Agencies to achieve these targets along with voluntary actions carried out by a number of entities and groups will provide the environmental enhancement.*
Comment 3.	DEQ needs to demonstrate tangible water quality improvement to the Willamette River through implementation of the proposed TMDL before compelling communities to invest their limited financial resources. (50)
Response	*Increased solar radiation heat loads due to loss of riparian vegetation, along with impacts due to point source heat loads, increase overall Willamette River temperature up to 1.1°C (2.0°F) during the summer. Load and wasteload allocations provided in the TMDL are designed to limit the impacts of anthropogenic sources of heat to a stream temperature increase of no more than 0.3°C (0.5 °F) above the applicable biological criteria or the natural condition criteria. This is achieved when the cumulative heat input of all point and nonpoint sources results in no greater than a 0.3°C increase in temperature above the criteria at the point of maximum impact. In order to address concerns regarding limited financial resources, heat load trading is allowed between individual sources and sectors provided that all applicable water quality criteria are attained and sufficient legal or other mechanisms are put in place that ensure the trade will be implemented as designed. This is discussed further in the Water Quality Management Plan (WQMP), Chapter 14.*
Comment 4.	The temperature problem is getting worse. This TMDL will not help. What are we going to do about it? (29)
Response	*ODEQ disagrees. Implementation will result in riparian protection and restoration measures throughout the basin with benefits to water quality and beneficial uses.*
Comment 5.	CRITFC continues to support the efforts of ODEQ in addressing water quality degradation in the Willamette Basin, particularly temperature pollution. We are pleased with the high quality of the modeling analysis that went in to the Chapter 4 revisions. CRITFC looks forward to working with ODEQ on future efforts to conduct comprehensive temperature modeling of the Willamette River Basin (e.g., impacts of land use to headwaters), and other water basins in the state of Oregon. (60)
Response	*ODEQ also looks forward to working with CRITFC on future efforts.*
Comment 6.	Need to continue monitoring the river to see if it is really meeting the WQS. (55)
Response	*Monitoring will be necessary to track trends, document changes in water temperatures, and support adaptive management. This will be address in the implementation phase of the TMDL.*

Comment 7.	We do not believe that it is either fair or appropriate to force one municipal discharger to shoulder the majority of the burden for reducing the point sources' temperature impacts on the Upper Willamette River (48)
Response	*ODEQ is not forcing MWMC to shoulder the majority or the burden for reducing point sources temperature impacts. Heat load allocations for the MWMC facility in Eugene are more restrictive than for other municipal dischargers upstream of the Santiam because of the disproportionate impact this municipal treatment plant has on cumulative heat loads at the point of maximum impact near Albany. Without these additional reductions, all facilities downstream would have been severely limited by their WLAs.* *The MWMC facility has a large impact on Willamette River temperatures because the effluent flow rate is large relative to the river flow rate in this area. The wasteload allocation for the facility is based on an allowable temperature increase of 0.12^{o}C at 7Q10 river low flow rate, which is one of the largest allowable temperature increases for any single point source. This equates to 40% of the human use allowance in this area. If the wasteload allocation for this facility were to be increased, wasteload allocations for a number of downstream dischargers would need to be reduced.*
Comment 8.	It is unreasonable and unfair to impose operational restrictions on point sources when they are not the major cause of the problem. (72)
Response	*While point sources are often not the most significant source of Willamette River heating, the cumulative impacts of point sources are still significant. Currently, point sources consume a significant percentage of the human use allowance of the Willamette River. Generally, waste load allocations in the mainstem and subbasin TMDLs limit the allowable increase in stream temperatures to no more than 0.20°C above natural thermal potential temperatures, although this allocation may be as large as 0.25°C as conditions warrant. The remainder of the 0.3°C human use allowance is provided to nonpoint source activities or reserved for future growth and/or new and expanded sources.*
Comment 9.	DEQ deviated from recommendations from Willamette Council in giving MWMC a substantially reduced scaling factor for spawning period. Should not have adjusted only the MWMC scaling factor, forcing them to shoulder the entire burden of meeting basin allocations. Should have considered taking more from industrial point sources. (55)
Response	*See Comment 7. ODEQ maintained the recommendations of the Willamette Council to the greatest degree possible. In the end, the choice was between maintaining the equality of the allocations for MWMC relative to other municipal discharge and significantly reducing the wasteload allocations for all other dischargers upstream of the Santiam River. ODEQ is responsible for these allocations and must ensure the least harm is done to the majority of sources.*
Comment 10.	Requests DEQ to reopen the TMDL process to develop consensus opinion of a scientifically based approach. (35)
Response	*ODEQ established and worked closely with two committees: an advisory council which represented a broad cross-section of stakeholder interests, and a technical modeling committee, which consisted of qualified staff from Portland State University, USGS, the U.S Army Corps of Engineers, Northwest Pulp & Paper Association, ODEQ, and several stakeholders from the broader advisory council. ODEQ met frequently with these committees to insure that the analytical approaches utilized were scientifically sound and to insure that, to the extent possible, all stakeholders had frequent opportunities to contribute to the TMDL. The contributions of the numerous individuals who participated in these committees insured that appropriate scientifically based approaches were used for the TMDL.*
Comment 11.	Requests DEQ develop a process that results in equity in the assignment of waste load allocations. (35), (63), (48)
Response	*ODEQ made every effort to craft a fair and equitable process for allocating wasteloads despite the reality that discharges individually have variable effects on receiving waters. The current structure is based on the premise of equal rates of increase with increasing*

	flow for municipal dischargers, but ODEQ must also keep a view toward minimizing the likelihood of those dischargers being in immediate violation of the wasteload allocations. Ultimately, ODEQ has the responsibility for setting wasteload allocations in the fairest, most equitable way, even if there are natural disadvantages to a small number of dischargers.
Comment 12.	Clearly state how this document will address the non-EPA approved Cool Water Criteria waters such as the Long Tom and Rickereall Creek. Is a TMDL being written for these streams? (65)
Response	*Because these waters are tributary to the mainstem Willamette, nonpoint source load allocations will be implemented to target natural thermal potential stream temperatures for these streams. No wasteload allocations were provided for dischargers to Long Tom River, since no point sources currently discharge to this waterbody. The Dallas wastewater treatment plant discharges to Rickreall Creek. The loading capacity for Rickreall Creek and the wasteload allocation for the Dallas wastewater treatment plant will not be proposed until a standard for Rickreall Creek is approved.*
Comment 13.	Believe the Oregon WQS for temperature is not fully attainable. No alternative but to pursue a UAA. (33)
Response	*The standard does not require that biologically-based numeric temperature criteria be met where the department determines that the natural thermal potential temperature for all or a portion of a water body exceeds the biologically-based criteria. Where ODEQ determines that the natural thermal potential temperature for all or a portion of a water body exceeds the biologically-based criteria the natural thermal potential temperatures supersede the biologically-based numeric criteria and are deemed the applicable criteria for that water body. Therefore, if the load allocations and wasteload allocations provided in the TMDL are achieved, water quality standards for temperature will be achieved.*
Comment 14.	Federal Dams have sovereign immunity and are not subject to the laws of the State of Oregon. (73)
Response	*The water quality standards adopted by the State of Oregon were approved by the USEPA for implementation of the federal Clean Water Act. This TMDL, when approved by USEPA, will be the implementation plan for the federal act as well as Oregon law. There is no universal agreement that federal dams are not expected to meet the requirement of the Clean Water Act, regardless of their federal mandates for providing other benefits. Indeed, Congress appears to expect the range of federal projects from federal highways to dams to meet the requirements of other federal environmental acts.*
Comment 15.	Temperature standard discusses regulating private federally licensed dams through 401 certification, but federal dams are not included in the rule. (73)
Response	*That is true that federal dams are not regulated under the 401 certification process. Federal dams are clearly sources with significant effects on water quality and are addressed under the TMDL. The Department will be seeking Temperature Management Plans from these dams to address their heating.*
Comment 16.	Application of NTP with no human activity creates an untenable situation [for ACOE]. Cannot be reconciled with the congressional intent of enabling legislation. (73)
Response	*See response to Comment 14.*
Comment 17.	DEQ should not focus on the most sensitive beneficial use in determining what appropriate standard to apply. Should consider multiple beneficial uses. (73)
Response	*ODEQ disagrees. ODEQ develops standards to protect the most sensitive beneficial uses. This approach provides that all uses less sensitive will also be protected.*
Comment 18.	The temperature standard should be reasonable and attainable based on historical data and that EPA adopt reasonable temperature standards. (9)

Response	*The natural thermal potential criteria is an attempt to target attainable temperatures based on the natural physical and climatic features of a watershed. These standards have been found to be reasonable and achievable, and protective of the beneficial uses they are designed to protect.*
Comment 19.	Given the uncertainty in the actual date of initiation of spawning, the TMDL should acknowledge that this abrupt change in criteria is not reflective of meaningful biological conditions, and the TMDL should make some allowance for infrequent exceedances of the WLA at the beginning of the spawning period (48)
Response	*The date the spawning criterion applies is identified in the temperature standard. The salmon and steelhead spawning criterion is biologically meaningful because it is designed to protect eggs and fry from excessive increases in temperature. The waste load allocations for the spawning criterion apply from October 15th thru October 31. However, the application of the natural thermal potential criteria (see Comment 21) often will supersede and smooth out the transition between the biologically-based numeric criteria.*
Comment 20.	There is no strong evidence of rainbow trout (Oncorhynchus mykiss), steelhead (Oncorhynchus mykiss), or whitefish (Prosopium williamsoni) spawning in the river reach near the MWMC outfall. Rearing of rainbow, steelhead and whitefish may occur in the receiving water near the outfall part of the year. Cutthroat trout (Oncorhynchus clarki) do not spawn in the receiving water area nor is there strong evidence of rearing activity by this species in the area of the MWMC outfall (48)
Response	*ODEQ relies on fisheries biologists at Oregon Department of Fish and Wildlife to identify the fisheries uses and timing of uses for each waterbody. In some circumstances, recent historical uses may have been considered when water quality standards for temperature were developed. See the web page http://www.deq.state.or.us/wq/standards/wqstdshome.htm for more on water quality standards development.*
Comment 21.	The TMDL proposes a sudden change in the river temperature criteria from 18 ^{o}C to 13^{o}C.on October 15 of each year. The temperature criteria should more closely mimic a natural river system where there would be a gradual reduction in river temperature over a longer period of time into the fall/winter months. (50), (48), (55)
Response	*The TMDL uses the numeric biological criteria set out in the temperature standard approved by USEPA. Where the department determines that the natural thermal potential temperature for all or a portion of a water body exceeds the biologically-based criteria, the natural thermal potential temperatures supersede the biologically-based numeric criteria and are deemed the applicable criteria for that water body. Therefore, during such periods of transition, natural thermal potential temperatures may supersede the biologically-based numeric criteria.*
Comment 22.	The DEQ should conduct a more dependable analysis using a longer model simulation period prior to establishing final waste load allocations for the spawning period. (48)
Response	*The model was run from for 2001 from June 1 to October 31 and for 2002 from April 1 to October 31. In general, the 13^{o}C spawning criteria is met before April 1 and after October 31, so the spawning period is adequately modeled for Fall of 2001 and Spring and Fall of 2002.*
Comment 23.	The modeled impacts of current point source thermal loads demonstrate variability near river miles 130 and 121 that is apparently not related to point source or tributary impacts, since there are no point source discharges or tributaries in this stretch of the river (see Figure 4.7 on page 4-31). (71)
Response	*Figure 4.7 on page 4-31 shows a gradual increase in temperature impacts downstream from Evanite Fiber and City of Corvallis discharges. Point source impacts on a river which experiences diel temperature fluctuations, such as the Willamette River, may be greater, in terms of ΔT, early in the morning when river temperatures are cooler than late in the afternoon when river temperatures are warmer. Therefore, maximum impacts on daily maximum temperature may occur at some distance downstream from a discharge,*

	rather than immediately at the discharge.
Comment 24.	The McKenzie River CE-QUAL-W2 model may no longer be valid because of changes in river bathymetry. A sensitivity analysis for bathymetry is warranted. (5)
Response	*The analyses presented in the report were performed using the best model of the river currently available. While localized changes may occur in the river from year to year, net changes should be minimal on a river wide basis. Therefore, the current model should accurately represent current and future river conditions. Note, however, that if changes are made to the model to reflect bathymetry changes that have occurred since the model was calibrated, then the revised model could be used to evaluate compliance of the project with the load allocations provided by the TMDL.*
Comment 25.	The modeling conducted using the McKenzie River CE-QUAL-W2 model no longer represents current conditions due to recent implementation of the Cougar Reservoir temperature control tower project. (5)
Response	*Modeling to determine the TMDL was performed for 2001 and 2002, which are years for which extensive river flow and temperature data was collected. Similar extensive river flow and temperature data is not available for subsequent years, so it is not possible to model the river with the same level of accuracy as 2001 and 2002. If sufficient data is collected for a future year that allows modeling to be performed for that year, then the TMDL could be revised to reflect the results of that modeling.*
Comment 26.	Because the modeling analysis is flawed, EWEB disagrees with DEQ's statement that the Leaburg and Walterville projects may result in significantly increased temperatures downstream from bypass reaches. (5)
Response	*Modeling using the best available McKenzie River model showed that projects may result in significantly increased temperatures downstream from bypass reaches. If in the future additional data is collected and improvements are made to the model, the improved model could be used to evaluate project compliance.*
Comment 27.	DEQ should describe the operating rules used when modeling the Leaburg and Walterville projects and provide the public with an opportunity to submit additional comments following review of this information. (5)
Response	*The Leaburg and Walterville projects were modeled as operated in 2001 and 2002. Model calibration documents and input files are available at the Portland State University Water Quality Research Group web site: http://www.ce.pdx.edu/w2/index.html?projects_willamette_river.html, as well as directly from ODEQ.*
Comment 28.	Two cases of model instability occur in the 2002 simulations, although neither appears to affect model results (17)
Response	*In order to prevent any anomaly of this nature from influencing wasteload allocations, when modeling point source impacts quantities of flow equal to effluent flow rates are withdrawn from the river immediately upstream from all point source discharges.*
Comment 29.	Discontinuities occur in model output plots. (17)
Response	*Such discontinuities were eliminated by insuring that all output from model simulations is at consistent 0.05 day intervals.*
Comment 30.	Modeling analyses which pertain to the impact of PGE Clackamas River Project operations on Willamette River temperatures should not be presented until modeling simulations are repeated using the most recent PGE estimates of River Mill Dam natural thermal potential temperatures. These estimates were derived from modeling performed by PGE using a version of the PGE Clackamas River model that has been revised recently in response to DEQ comments. (39)
Response	*Modeling underway by PGE could result in more accurate estimates of Clackamas River natural thermal potential temperatures and of the impacts of the Clackamas River project. However, it appears unlikely that the calculations will affect the load allocations*

	provided for the project.
Comment 31.	The fact that DEQ's modeling found 0.5 C of "unused" heat load shows the fallacy of the models. The river greatly exceeds the WQS for temperature, yet DEQ discovered 0.5 C of "unused" heat load. (29)
Response	*Currently the entire human use allowance is consumed by point and nonpoint source heat loads, so there is no unused heat load. Waste load allocations are based on allowing no greater than a 0.3°C increase in stream temperatures above the applicable temperature criteria at the point of maximum impact. Generally, waste load allocations in the mainstem and subbasin TMDLs limit the allowable increase in stream temperatures to no more than 0.20°C above natural thermal potential temperatures, although this allocation may be greater as conditions warrant.*
Comment 32.	The thermal impacts of point source effluent discharges on river temperature are too small to be accurately characterized by the model used by DEQ. A model with accuracy on the order of ±0.5°C cannot be used to define a cumulative point source median impact on the order of 0.1°C, or to predict individual point source impacts as low as 0.02°C. (71)
Response	*A water quality model can accurately calculate impacts that are less than the root mean squared (RMS) error of the model. For example, the wasteload allocation for a point source may be designed to limit the impact of the discharge for a given flow to 0.1°C using a model with an RMS error of ±0.5 °C, as follows:* Q_{river}= *10,000* *River flow rate u/s from discharge, cfs* T_{river}= *20.0* *River temperature u/s from discharge, °C* $Q_{effluent}$= *100* *Effluent flow rate, cfs* ΔT= *0.10* *Allowable temperature increase, °C* DF= *101* *Dilution Factor* $T_{effluent}$= *30.1* *Allowable effluent temperature, °C* *As shown, for the given flow rates and river temperature, an effluent temperature of 30.1°C would result in a ΔT of 0.10°C.* *Since the river temperature upstream from the discharge is calculated using a model with an RMS error of 0.5°C, it could range from 19.5 to 20.5°C. If the river temperature were 19.5°C, the ΔT impact of the discharge would be 0.105°C, while if the river temperature were 20.5°C, the impact would be 0.095°C. Therefore, the ΔT impact of the effluent would be 0.10 ± 0.005 °C, which equates to an accuracy of ± 5%.*
Comment 33.	DEQ has not clearly described the accuracy of the model. (22), (66)
Response	*The accuracy of the model is described on p. 4-23. On average, model calculated temperatures were within +/- 0.5 °C of observed temperatures.*
Comment 34.	Several odd model inconsistencies were identified, but none appear to be of significant consequence. (17)
Response	*The model inconsistencies do not influence calculated load allocations.*
Comment 35.	There is an apparent modeling anomaly in Figure 4.55 (p. 4-138) at RM 53. (71)

Response	*Figure 4.55 shows the sensitivity of modeled temperatures to adjusting Cougar Reservoir (S.F. McKenzie R) and Blue River Reservoir (Blue River) tailrace temperatures ±5 ^{o}C. The figure shows the S.F. McKenzie River (shown as RM 61 to 57 on the figure) and the McKenzie River downstream of its confluence with the S.F. McKenzie (RM 57 to 0). Since no adjustment is made to McKenzie River temperatures at the point of it's confluence with the S.F. McKenzie River (RM 57 on the figure), the impact of the Cougar Reservoir temperature adjustment is buffered below the confluence.*
Comment 36.	A modeling anomaly exists for the 2001 model year which results in apparent point source impacts that are about 0.02^{o}C greater than true impacts in the reach from RM 159.4 to 108.5. (17), (48)
Response	*In order to prevent any anomaly of this nature from influencing wasteload allocations, when modeling point source impacts quantities of flow equal to effluent flow rates are withdrawn from the river immediately upstream from all point source discharges.*
Comment 37.	DEQ should explicitly describe on p. 4-33 how corrections are made for time-of-travel impacts when developing wasteload allocations. (71)
Response	*Time-of-travel impacts were eliminated when modeling by removing river flow rates equal to effluent flow rates immediate upstream from effluent discharge locations.*
Comment 38.	DEQ should provide an explanation for the oscillating appearance of Figures 4.92 and 4.93 (p. 4.159). (71)
Response	*The oscillating appearance is likely due mainly to the impact of eliminating the McKenzie River and Willamette Falls hydroelectric projects for the system potential scenarios. These projects cause river temperatures to be warmer at certain locations and times and cooler at others. Meteorology may also contribute to this oscillating appearance since the impact of moving to system potential shade is greater on sunny days than on cloudy days.*
Comment 39.	A model error on the order of +/- 1.0C for the McKenzie River could have a profound impact on the allocations for MWMC. (48)
Response	*An error on the order of +/- 1.0C for the McKenzie River should not significantly impact allocations for the MWMC effluent discharge, which discharges to the Willamette River upstream from the McKenzie River confluence. The heat load available for point sources, in terms of kcal/day, is a function of the portion of the human use allocation available for point sources multiplied by the river flow rate and a conversion factor, as follows:* $WLA = \Delta T \times QRiver \times CF$ *Therefore, wasteload allocations are dependent on the river flow rate and the allowable ΔT, not the river temperature. The corresponding allowable effluent temperature, however, is influenced by the river temperature at the point of discharge, as follows:* $Teffluent = WLA/(Qeffluent \times CF) + TRiver$ *Thus, the allowable effluent temperature for the Weyerhaeuser Springfield discharge to the McKenzie River could be influenced by McKenzie River temperature.* *There is a possibility that the temperature of the McKenzie River could influence the rate at which heat loads added by the point sources are dissipated. This could influence the allowable heat loads for point sources which discharge to the Willamette River, both upstream and downstream of the McKenzie. However, a difference of +/- 1^{o}C should not be influence the rate of heat load dissipation enough to significantly influence the point source wasteload allocations.*
Comment 40.	The potential errors in the model also cause concern about the level of precision and accuracy involved in the development of the scaling factor for MWMC, and raise

	questions of whether the process of adjusting the scaling factor for MWMC is within the boundaries of the precision and accuracy of the model. (48)
Response	*The CE-QUAL-2E used for calculating the cumulative impacts of proposed wasteload allocations is quite accurate, as evidenced by an RMS error which is generally less than 1.0 °C. The accuracy of the model is sufficient for calculation of scaling factors for MWMC and the other point sources for which wasteload allocations were derived.*
Comment 41.	Modeled allowable point source flow rates differ from allowable point source flow rates calculated via the rules set forth in the proposed wasteload allocation framework. This error affects the model results for those times when the 7dADM river temperature is less than the numeric criteria. (17)
Response	*ODEQ acknowledges the difference in modeled point sources flows but feels this difference is insignificant since it occurs during times when the 7-day average daily maximum are below the numeric criteria.*
Comment 42.	TMDL misrepresents meteorological conditions in the Willamette Basin. Should use a wider range of years for characterizing temperatures in the Willamette. (59)
Response	*The Willamette Mainstem Modeling Coordination Team (MCT), which included representatives from NWPPA, ACWA, USGS, and ODEQ, considered appropriate meteorological conditions to use when performing modeling simulations for purposes of deriving point source impacts. It was concluded that the most accurate river temperature calculations could be obtained by using the actual meteorological conditions which corresponded to each model year, rather than synthesizing a set of meteorological conditions that would represent a multiple year average or some other set of conditions.*
Comment 43.	DEQ needs to make an additional model run excluding the heat load of MWMC to substitute the assertion that it has a disproportionate impact on the cumulative heat loads at the point of maximum impact near Albany. (63)
Response	*ODEQ already did such a model simulation and are providing the results in this response. [Do we need to put it in the document]*
Comment 44.	DEQ should calculate the impacts of water withdrawal on river temperature and address this human use in the allocation scheme. (71)
Response	*While it would be useful to evaluate the impact of water withdrawals on river temperature, the TMDL was based on actual flows in the river, as observed in 2001 and 2002. Release of stored water from reservoirs during the summer provides water for a variety of uses, including irrigation.*
Comment 45.	DEQ uses volume flow rates rather than mass flow rates of point source discharges and river flow rates in equations used to compute human use allowance and wasteload allocations. This methodology ignores that density is a function of temperature. DEQ should mention this simplification in the TMDL document. (71)
Response	*As indicated by the equations presented in the text, volume flow rates were used for all load and wasteload allocation calculations.*
Comment 46.	The TMDL and waste load allocations need to be revised to reflect correct specification of boundary flows and temperature. This would require simulation of reservoir reaches with out the dams (72)
Response	*The load allocation for each Willamette Project reservoir is no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded. Monthly stream temperature values presented in the TMDL are not the load allocations, but are ODEQ estimates of median seven day average values to meet the load allocations. Targets include summer temperatures warmer than those currently observed below some USACE reservoirs and cooler than current water temperatures in the late summer and early autumn.* *Monthly reservoir target temperatures are preliminary and ODEQ anticipates that these target temperatures will be revised. Additional monitoring and modeling are needed to refine the estimates of natural thermal potential that are the target temperatures for*

	reservoir operations. Stream models are needed of currently impounded reaches to determine heating that would occur in these reaches in the absence of reservoirs. Stream models of streams above the reservoirs are also needed to determine the natural thermal potential of streams where they flow into reservoirs. Reservoir models, currently being developed by USACE and others, are needed to optimize reservoir operations and evaluate potentials for achieving target temperatures. With these tools, cost-benefit analyses can be performed and load allocations greater than background may be provided. However, until better information is available, heat load allocations equivalent to natural background loads apply to all USACE Willamette Project reservoirs.
Comment 47.	The TMDL is not reflective of current conditions since the Cougar Reservoir selective withdrawal structure has been finished. River may be meeting standards. Huge public works projects should not be forced by an outdated analysis. (55)
Response	*It is possible that, with construction of the selective withdrawal structure, the Cougar Reservoir project is in compliance with the load allocation provided in the TMDL. The load allocation for each Willamette Project reservoir is "no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded" (p. 4-72). As discussed in the TMDL, additional monitoring and modeling is needed to refine the estimates of natural thermal potential temperatures that are the targets for reservoir operations. Completion of a selective withdrawal structure at Cougar should allow additional flexibility for operating the project to meet these targets.*
Comment 48.	Cougar Dam reservoir tailrace temperatures have changed, now that the recently constructed temperature control tower is fully operational. It would be useful to perform modeling to determine whether these changes could influence point source wasteload allocations. (17), (48), (63)
Response	*ODEQ agrees that it would be useful to perform modeling to determine whether these changes could influence point source wasteload allocations. Adjustments in wasteload allocations could be made in the future if these changes were found to be significant.*
Comment 49.	Consider the selective withdrawal tower in Cougar reservoir in potentially controlling temperatures. Demonstrates that much control may be exerted on discharge temperatures from dams, but these are still unlikely to meet the water quality standard. (33)
Response	*ODEQ believes the analysis of the Cougar Controlled Release structure is a good example of what needs to be done for development of temperature management plans. We anticipate working with USACE on continued improvements to temperature control*
Comment 50.	Presentation of effects of Cougar Dam selective withdrawal structure on discharged water temperature relative to NTP, WQS, and Fishery Recommendations. (33)
Response	*Analyses of this nature will be useful for determining whether, with construction of the selective withdrawal structure, the Cougar Reservoir project is in compliance with the load allocation provided in the TMDL. The load allocation for each Willamette Project reservoir is "no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded." As discussed in the TMDL, additional monitoring and modeling is needed to refine the estimates of natural thermal potential temperatures that are the targets for reservoir operations. Completion of a selective withdrawal structure at Cougar should allow additional flexibility for operating the project to meet these targets.*
Comment 51.	Pg 4-41, section states "11 relatively large reservoirs" in basin, however Table 4.10 and 4.18 (pg 4-72) only presents analysis from 10 reservoirs. Identify which reservoirs are not addressed in the analysis and why. (65)
Response	*The project includes 13 reservoirs. Several of the reservoirs presented in Table 4.10 and Table 4.18 are combinations of two reservoirs. These include Dexter and Lookout Point reservoirs, Foster and Green Peter Reservoirs, and Big Cliff and Detroit Reservoirs. Two are small re-regulation reservoirs, hence the reference on page 4-41 to 11 relatively large reservoirs.*

Comment 52.	The ACOE supports NTP but believes dams should be considered as background as recommended by the FAC on TMDLs. (33)
Response	*Monthly heat load allocations have been assigned to all USACE Willamette Project reservoirs. At times these reservoirs significantly heat downstream river reaches tributary to the Willamette River and also contribute to warming in the mainstem river itself. To meet temperature standards, load allocations assigned to the USACE reservoirs provide for no portion of the human use allowance and therefore no heating of river temperatures above background levels. Additional data collection and analysis are necessary to better understand the magnitude of individual and cumulative reservoir impacts and provide meaningful allocations of the human use allowance to USACE.*
Comment 53.	Taking dams out for modeling is inappropriate given DEQ's allocations to downstream users based on the existence of the dams (33)
Response	*ODEQ performed a large number of simulations, including simulations to evaluate the impacts of dams on river temperature. For these simulations, upstream boundary river temperatures were set to estimates of natural thermal potential temperatures. Results of these simulations are presented in detail in Appendix 4.6. Note, however, that while such simulations were performed, the TMDL does not specify that dams must be removed.*
Comment 54.	DEQ has not addressed the arbitrary policy decision to use dams in allocating wasteloads downstream, but not include them in the baseline to set load allocations for the dams. (33)
Response	*In part the comments have to do with the application of the natural thermal potential component of the temperature standard. Natural Thermal Potential (NTP) means the determination of the thermal profile of a water body using the best available methods of analysis and the best available information on the site potential riparian vegetation, stream geomorphology, stream flows, and other measures to reflect natural conditions. The NTP is an important component of the Natural Conditions Criteria (NCC) of the temperature standard. Where ODEQ determines that the NTP of all or a portion of the water body exceeds the biologically-based criteria for the temperature standard the NTP supersede the biologically based criteria and are deemed to be the applicable temperature criteria for that water body. The NTP therefore establishes the process for determine the stream temperatures that are the applicable water quality criteria. The NTP does not establish conditions, such as stream flow, used for evaluating assimilative capacity or assigning allocations.* *The determination of NTP for the Willamette TMDL utilized the best available method for analysis of the available information. The available information was assessed using water quality models. The models were calibrated using site specific data collected as part of the TMDL. The calibrated model for the main stem was modified to eliminate point sources of heat and include system potential riparian vegetative shade where shading may influence stream temperature to determine NTP. Existing flows observed for the calibrated model were used to determine a conservative NTP. The lower flows that would have occurred without flow augmentation would result in higher derivation on NTP. No objective scientific analysis or information was available to estimate the impact of other factors such as historic stream channel morphology, hyporheic exchange, or upstream tributary temperatures without impoundments. These factors could combine in many was to either increase or decrease estimates of NTP and could be evaluated into updates to the TMDL as they become available.*
Comment 55.	Heat from dams is not the equivalent of runoff from the dams and was not the intent of the CWA. (73)
Response	*The analogy is a poor fit for the situation. Dams harbor collected pollutants and discharge them as a byproduct of their operation. These pollutants would not be present in the concentrations they are without the dams.*

Comment 56.	DEQ should not go forward with this document without describing appropriate methods of compliance for dams, including development of UAAs. (73)
Response	*See response to comment 54*
Comment 57.	DEQ has not answered all questions regarding the effects of dams on downstream temperatures and has derived poor estimates of natural temperatures at the dams based on flawed methods and information. (73)
Response	*The load allocation for each Willamette Project reservoir is no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded. Monthly stream temperature values presented in the TMDL are not the load allocations, but are ODEQ estimates of median seven day average values to meet the load allocations. These values were estimated by ODEQ based on the best available method for analysis of the available information.* *Additional monitoring and modeling are needed to refine the estimates of natural thermal potential that are the target temperatures for reservoir operations. Stream models are needed of currently impounded reaches to determine heating that would occur in these reaches in the absence of reservoirs. Stream models of streams above the reservoirs are also needed to determine the natural thermal potential of streams where they flow into reservoirs. Reservoir models, currently being developed by USACE and others, are needed to optimize reservoir operations and evaluate potentials for achieving target temperatures. With these tools, cost-benefit analyses can be performed and load allocations greater than background may be provided. However, until better information is available, heat load allocations equivalent to natural background loads apply to all USACE Willamette Project reservoirs.*
Comment 58.	Agree with DEQ that flow augmentation should be basis of allocations for downstream dischargers, and that without dams there would be roughly half the flow available during low flow conditions. The TMDL should be consistent and include dams in the baseline condition. (33)
Response	*See response to comment 54*
Comment 59.	When modeling to calculate Willamette River NTP temperatures that will be used to calculate wasteload allocations, flow rates and temperatures at upper boundaries should be revised to reflect natural conditions. (39)
Response	*See response to comment 54*
Comment 60.	Table 4.7, pg 4-25, inconsistencies between text regarding boundary flow conditions and the system potential conditions in the table. Explain terms and elements of table in a clear fashion. (65)
Response	*Sections entitled Willamette Mainstem Model (p. 4-23) and Natural Thermal Potential Temperature (p. 4-26) have been revised to provide additional clarity.*
Comment 61.	DEQ should examine the past 5 years of record from all point sources to evaluate the likelihood of point sources peaking simultaneously. (17), (72)
Response	*Such an analysis may be useful if analyses are performed by dischargers to evaluate potentials for heat load trading. Heat load trading is allowed between individual sources and sectors provided that all applicable water quality criteria are attained and sufficient legal or other mechanisms are put in place that ensure the trade will be implemented as designed. This is discussed further in the WQMP, Chapter 14.*
Comment 62.	Grab sample temperature data used underestimated energy discharges of mills. This has resulted in DEQ setting WLAs too low. (59), (66)

Response	*Grab sample data is not as robust as continuous data and, therefore, ODEQ has treated both types of data sets differently to acknowledge this difference. Whenever possible, ODEQ used continuous monitoring data. How the department used grab sample data is described in Appendix 4.5. If there is data to show the department has underestimated discharges we did not receive it. Without continuous data this is the best the department can do with the information it has. It is recommended that, in the future, dischargers perform continuous temperature monitoring so that the department can better estimate daily and seven day heat loads discharged to the river in future permit renewals.*
Comment 63.	Suggest replacing table showing collected temperature downstream of Cougar Dam with one provided showing the effectiveness of selective withdrawal. (33)
Response	*ODEQ believes the table as it is reflects the modeled conditions.*
Comment 64.	Please compare the monthly median rolling average temperatures upstream of the dams presented on Table 4.10 with the monthly target temperatures shown on Table 4.18. It is our understanding that the monthly temperatures presented in these two tables should match up but in most cases (for most months) they do not. It appears as though the numbers were transposed incorrectly from one table to another. (33)
Response	*The numbers were, indeed, transposed incorrectly from one table to another. This table has been revised.*
Comment 65.	The TMDL does not account for variability in weather patterns such as significant rainfall in warm weather months. (35), (63)
Response	*See comment 136. Significant rainfall in warm months is unlikely to affect wasteload allocations other than a possibility of slightly higher wasteload allocations due to increased river flow. In general, these variations would not significantly alter a mean temperature.*
Comment 66.	Would like coordinated effort on water quantity and temperature monitoring in the Mary's River. Concerned that water withdrawals in smaller streams are degrading water quality (increasing temperature). (2)
Response	*Withdrawals may result in warmer water temperatures and changes in other water quality parameters such as dissolved oxygen. ODEQ and other state and federal agencies support watershed council monitoring efforts that examine local water resource issues.*
Comment 67.	Would like more funding and technical assistance for the confined animal feeding operation program in order to remove animal waste from the streams. (70)
Response	*Confined animal feeding operations and their permits are managed by the Department of Agriculture in Oregon. We appreciate the concern for these sources of pollutants and agree that technical assistance is very important. ODEQ has a role in managing pollutants from these sources through Nonpoint Source Pollution Prevention grants under Section 319. Many of the projects funded through this program directly prevent livestock access to streams or restore vegetation that helps attenuate loads of pollutants.*
Comment 68.	Another underlying problem in the TMDL is the use of the Human Use Allowance of 0.3 C. This is another trick that DEQ passed as a rule that allows water quality limited rivers to suffer more temperature load. The Human Use Allowance is likely illegal. (29)
Response	*Oregon water quality standards approved by USEPA have provisions for human use when temperatures exceed applicable numeric criteria. The standard specifies that insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria. Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3^{o}C (0.5^{o}Ft) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact. Determination of the human use allowance is a key element of the Willamette Basin TMDLs because it often determines the heat loading capacity of receiving streams.*

Comment 69.	DEQ has exceeded its legal authority in selecting a lower target HUA of 0.18 C for the Lower Willamette River. Requests DEQ to reevaluate the WLA and human use allowance based upon OAR 340-41-0028 (35), (37)
Response	*The human use allowance for the lower Willamette River is 0.30^{o}C. The TMDL limits Point Sources plus PGE Willamette Falls and Clackamas River hydroelectric project impacts on the lower Willamette River to 0.25^{o}C. The 0.18^{o}C value applies to point source allocations. The remaining capacity is allocated to other nonpoint sources and reserve capacity.*
Comment 70.	DEQ should consider the impact of hyporheic exchange and groundwater flow on McKenzie River temperature. (5)
Response	*Groundwater inflows are considered by adding inflows to the river that result in calculated flow rates at USGS gage stations matching observed flows. These net inflows equal groundwater and small tributary inflows minus irrigation diversions. Hyporheic exchange, however, is not considered in the model, since it cannot be accurately quantified. However, even without the inclusion of hyporheic exchange, an acceptable model calibration was obtained, with RMS error less than 1.00C at all stations.*
Comment 71.	Disappointed that TMDL council disbanded and not able to provide comments on the 2nd draft temperature TMDL; and that no additional time was granted for public comment to accommodate the hiring of a consultant that would provide technical expertise and prepare qualitative comments. (66)
Response	*The TMDL council was not disbanded; rather the last meeting of this group was held following major revisions in the TMDL resulting from the first public comment period. This meeting, held in the spring of 2005, was intended to explain the results of modeling for all parameters and final wasteload allocations. At this time ODEQ expected to issue the TMDL by fall of 2005. Accepting comments during the interim between this finalization and issuance would have been inappropriate. ODEQ decided in late 2005 that changes resulting from the first comment period and subsequent changes to methods were significant enough to require additional public comment on the temperature TMDL for the Willamette River. ODEQ provided an initial public comment period of 45 days. Two formal requests for extension of this period were received and one was granted, extending the comment period for an additional two weeks. The other request was for an extension of approximately 2 months, which the department decided was excessive and would not result in additional value to the TMDL.*
Comment 72.	DEQ has not identified and provided a response to public comments on which changes to the Temperature TMDL are based. Therefore, the public has been deprived of an opportunity to meaningfully comment on the revised draft. (5)
Response	*ODEQ did incorporate many of the recommendations and comments on the first draft into the second draft submitted for public review and comment. Response to comments submitted on the first draft accompany this document.*
Comment 73.	The ACOE is disappointed that DEQ did not release the entire set of TMDLs for public comment. Cannot tell how DEQ responded to first set of comments on the entire document. (33)
Response	*The temperature chapter for the Willamette River was re-released because it had changed so substantially from the original draft. Responses to comments on the other chapters will be available when the TMDLs are issued as orders. It is normal for these responses to be released to the public at the time of issuance, and there is no opportunity for comment on the TMDL between the end of the formal Public Comment period and issuance of the TMDL.*
Comment 74.	Pg 4-67, needs policy language included from pg 4-122 to give information on the context of flow based implementation. Also, reference Appendix 4.5 or other references in document that would help develop a permit. (65)
Response	*The text has been updated to reflect the permit implementation options.*

Comment 75.	Should change the photo of Cougar Reservoir to include the completed selective withdrawal tower. (33)
Response	*Thank you, but we believe the photo in the document rightly represents conditions as they were modeled. Future efforts at analyzing the effects of Cougar Reservoir and its more modern release structure should include the photo you've provided.*
Comment 76.	Pg 4-67, Flow Based Allocations, the first paragraph references "flow-weighted WLA benchmarks", other parts of the document and tables reference "flow-based allocations". Use consistent terminology. Appendix 4.5, the tables use the terms "Lookup Table WLA's" and "Equation WLAs" which are not referenced in the main text of the document. Table 4-15, descriptors as the other basis of the allocation should be provided. (65)
Response	*The narrative will be changed to be consistent.*
Comment 77.	Does use of a tilde before river mile 116.5 indicate the WLA may be used at approximately river mile 116.5 and is not limited to precisely river mile 116.5? (49)
Response	*Yes, the tilde is to indicate the WLA shall be applied to Wah Chang's newly constructed outfall in the vicinity (+/- 2 miles) of Willamette river mile 116.5.*
Comment 78.	Page 4-29, last Paragraph. It seems high that 600+/- point sources discharge stormwater. What categories are encompassed by the 1,200 point sources? (63)
Response	*A query of the ODEQ permit database in April 2003 yielded 126 individual domestic and industrial NPDES permits in the Willamette Basin. There were 64 general permits for non-contact cooling water, boiler blowdown and fish hatcheries. There were about 1000 general permits including many industrial stormwater (in Northwest Region there were 160 1200 Z permits). Not included in the original tally were the approximately 150 construction stormwater permits active at the time.*
Comment 79.	Page 4-63 first paragraph and page 4-65 first paragraph appear to contradict each other. “Point source loads are currently less than allocated…," and "… reductions in maximum observed effluent loads were necessary to ensure compliance…". (63)
Response	*By “current point source loads”, we are referring to the point source discharges recorded in 2001-2002. The cumulative impact of these discharges is 0.15 ^{o}C. This is less than the 0.20 ^{o}C allocation. The maximum observed effluent loads are the single largest recorded discharge observed in the entire data set. If all sources were discharging their maximum load at the same time the cumulative impact would be greater than 0.20 ^{o}C, therefore a reduction is required.*
Comment 80.	The TMDL contradicts itself when, on the one hand it states on p. 4-63 that current effluent heat loads consume only slightly more than 0.15 ^{o}C, an amount which is well within the human use allowance (HUA), while on the other hand it states on p. 4-65 that reductions in maximum observed effluent heat loads are necessary to ensure that the HUA is not exceeded at 7Q10 low flow conditions. (71)
Response	*Figure 4.7 on p. 4-63 shows that the 95th percentile summer impacts of actual 2001 discharges are only slightly more than 0.15^{o}C. However, effluent flow rates during this period were generally less than the design flow rates for the facilities. If all facilities discharged at the design flow rates for the facilities, then temperature impacts upstream from the Santiam River confluence would exceed the portion of the human use allowance allocated to point sources. Therefore, reductions in maximum observed effluent heat loads were necessary to ensure compliance with water quality standards.*
Comment 81.	The statement on p. 4-143 that “as expected, there is an inverse relationship between flow and temperature…” is potentially misleading. (71)
Response	*The modeling showed that during the summer, reductions in river flow rates generally result in warmer river temperatures. During the fall, reductions in river flow rates may result in cooler river temperatures.*
Comment 82.	Pg 4-66, Table 4-15, unclear if the allocation in the table are expressed in terms of "excess thermal load". Equations used by the facilities to evaluate discharges against

	the WLA should also be included. Do Allocations in this table apply to daily maximum discharge, &DADM or other metric? Discuss how the daily allocations will be implemented in the permit if the facility is not monitoring daily or continuously. (65)
Response	*The waste load allocations are expressed as an excess thermal load. Appropriate allocations metrics are discussed in appendix 4.5. The section has been revised to make this clearer.*
Comment 83.	Requests DEQ revise Appendix 4.5 to clarify that the spawning use WLA applies only from October 15 through October 31 and April 1 through May 15. (49), (48)
Response	*This has already been clarified in the waste load allocation section in chapter 4, although it could be confusing to some readers so ODEQ will make revisions to the narrative in both appendix 4.5 and chapter 4 to clarify when the waste load allocations apply.*
Comment 84.	What is the meaning of the very lightly shaded blocks with target temperature for April and May? (33)
Response	The table has been revised and the blocks are no longer shaded.
Comment 85.	Regarding DEQ simulated impacts of PGE Clackamas Hydroelectric Project on the Lower Clackamas, if buffering results in warmer waters released in the morning, it should also result in cooler water waters being released later in the day relative to no project condition. This is seen in Figure 4.36 immediately below the confluence. However, further downstream, Figure 4.36 shows a significant impact on all temperatures (95th, median, and 5th percentiles). This result is counterintuitive and needs further review. It is also surprising that the effect of buffering of temperatures is not diluted to insignificant levels as the Clackamas water mixes with Willamette River at RM 25. (39)
Response	The increase in temperatures downstream from the confluence is likely a manifestation of the sinusoidal pattern in daily maximum temperatures observed downstream from reservoirs which buffer diel fluctuations. Immediately below the reservoir, daily maximum temperatures are cooler than natural thermal potential. A half day or so time of travel downstream, daily maximum temperatures tend to be warmer than NTP. A day or so time-of-travel downstream, temperatures tend to be similar to NTP. A day and a half time-of-travel downstream, temperatures tend to again be warmer than NTP. This day and a half time-of-travel location is, in the case of the Clackamas, in the Willamette River, so impacts are reduced quite a bit by dilution. However, they are still observable. Note that regarding the 95th, median, and 5th percentiles, all of these statistics are calculated using 7-day average daily maximum temperatures.
Comment 86.	Pg 4-31, last paragraph, "This may be because…" (65)
Response	*The narrative has been corrected.*
Comment 87.	Pg 4-72, Table 4.18, there appears to be a typo on the June entry for Cottage Grove (15.5.0 ??). Clarify that the table should include a notation that the November entries are estimated. (65)
Response	*The table has been revised to read 15.5°C for Cottage Grove. Insufficient data were available to calculate November temperature targets, but it is anticipated that attainment of October targets will also result in attainment of November allocations. Note that in the summer, streams heat significantly as the water flows downstream, so it's important to meet NTP at dam tailraces in order to meet NTP further downstream. But in November, the water released from reservoirs tends to cool as it flows downstream. So as long as the tailrace temps are meet spawning criteria, temps downstream should also meet spawning criteria. Therefore, since insufficient data is available to calculate November temperature targets, and since October targets should be sufficient to protect spawning uses in downstream reaches, the table has been revised to specify October targets for November for reaches where wasteload allocations are needed for November.*

Comment 88.	Map 4.1 states the Molalla-Pudding and Yamhill River TMDLs are to be completed by 2006, while map 4.5 says 2010. (37)
Response	*The maps have been updated to reflect the current TMDL schedule. The Yamhill and Molalla-Pudding River TMDLs are scheduled to be completed in 2008.*
Comment 89.	Page 4-19, Last Sentence: The Luckiamute River is southwest of Salem, not southeast. (63)
Response	The sentence has been changed to say southwest.
Comment 90.	At several locations, the TMDL document incorrectly infers that EWEB's Leaburg and Walterville projects include reservoirs. The projects are run-of-the-river projects which do not store water. (5)
Response	*Changes will be made to the TMDL document to indicate that the projects are run-of-the-river projects which do not store water.*
Comment 91.	The date of the FERC license is incorrect. (5)
Response	*The TMDL document incorrectly states that the EWEB FERC license date is 1993. The correct license date is 1997. This will be revised in an errata.*
Comment 92.	DEQ should revise Tables 5 and 6 (p. C-182) to include median error. (71)
Response	*The Willamette Mainstem Modeling Coordination Team (MCT), which included representatives from NWPPA, ACWA, USGS, and ODEQ, agreed that error could be adequately quantified via mean error (ME) and root mean square (RMS) error statistics.*
Comment 93.	Did DEQ consider waiting until the NTP was accomplished before issuing the WLA based on the NTP? (29)
Response	*No. The waste load allocations are based on natural thermal potential because that is more protective and because the standard requires it..*
Comment 94.	Estimates of NTP vary widely from biologically based criteria in WQS. In many tributaries, NTP temperatures appear to be too cold to support life cycle requirements of species they were intended to protect. (33)
Response	*Estimates of NTP are based on physical attributes of the river and its tributaries, and are generally comparable to temperatures observed in segments upstream of the modeled reaches. It is not surprising that these temperatures are lower in many instances than current ambient temperatures, or that optimum temperatures for fish may be considered higher at some times and places (e.g., below Cougar Reservoir).*
Comment 95.	Data used to estimate upstream temperatures is inadequate and results in temperatures lower than historic NTP at the dam locations (33)
Response	*Few of the watersheds in the basin were without human influence when pre-dam data was collected. The use of historic data as a simple proxy for NTP is inappropriate. The estimates of NTP are the best available given the information ODEQ had. We are committed to improving these estimates based on new information and additional modeling of areas upstream of the federal dams.*
Comment 96.	The TMDL identifies the need for additional monitoring and modeling to refine estimates of natural thermal potential and targets for reservoir operations. There is no indication as to the responsible parties and time schedules for developing those models, nor for reopening the TMDL to reflect findings resulting from that work. Some expressed commitment on the part of the DEQ to complete this work in a timely manner is need in the TMDL document. (63)
Response	*There is little doubt that the USACE Willamette Project substantially affects water quality in the basin and it would be useful that positive and negative impacts on beneficial uses*

	be further identified. ODEQ will work with USACE to develop an implementation plan to do just that. However, additional analysis is contingent upon the availability of sufficient resources to support the work.
Comment 97.	Point of maximum impact is not clearly defined. (22)
Response	*The point of maximum impact for all anthropogenic sources of heat is approximately at Willamette River mile 137 near Corvallis. The largest cumulative portion of heat from point sources occurs just upstream of the Santiam River at about river mile 115 near Albany. To illustrate this better the department has provided a graph of the total cumulative heating impacts in "Existing Heat Sources" section of Chapter 4.*
Comment 98.	DEQ staff refers to two points of maximum impact. One for Non-point sources as about river mile 132 near Corvallis and one for point sources near Albany. This seems nonsensical, as from the river's perspective there should only be one point of maximum impact, reflecting all of the sources of heat (point, non-point, and background). We question what difference it would make to the waste load allocations and load allocations if the regulated point of maximum impact is indeed at the river mile 132 location. (63)
Response	*With guidance from the Willamette TMDL Council, ODEQ determined that point source waste load allocations may, in general, create no more than a 0.2°C temperature increase above the applicable criteria. This allocation represents two-thirds of the of the human use allowance and applies at the point of discharge where an individual source has its maximum impact on river temperature as well as downstream where cumulative impacts of multiple sources are greatest. The council also recommended that an additional increment of the HUA – up to 0.23 – be allowed if necessary for existing discharges. In addition, the TMDL council recognized that demands on municipal sources would grow in step with population growth and recommended that, when possible, growth in point source loads be weighted in favor of municipal sources over industrial sources. This weighting factor is evident in the wasteload allocations for the upper river sources.* *The current point of maximum impact, with large anthropogenic heat impacts, may be different than the point of maximum impacts after load allocations and wasteload allocations are met. The POMI at current loads is near RM 132 near Corvallis. However, the POMI when load allocations are met will be near Albany. Regardless, there would be no difference to waste load allocations when looking at the combined impacts of both point and nonpoint sources because the point sources are still restricted to sector allocations of 0.20 ^{o}C and 0.23 ^{o}C.*
Comment 99.	The load allocation for the PGE Clackamas River Project should be increased from 0.15^{o}C of the human use allocation to 0.22 ^{o}C of the HUA, in order to utilize 0.07 ^{o}C of presently unallocated HUA capacity. (39)
Response	*The PGE Clackamas River Hydroelectric Project was allocated 0.15^{o}C of the human use allowance for the Clackamas River, while 0.03^{o}C was allocated to the ODFW Clackamas Fish Hatchery. This implies that an additional 0.07^{o}C could be provided to the PGE Clackamas River Project. While this may be the case for the Clackamas River itself, the PGE Clackamas River Project also impacts the lower Willamette River. Due to impacts on the lower Willamette by the PGE Willamette Falls Project, point sources, and other non-point sources, insufficient capacity exists in the lower Willamette River to increase the PGE Clackamas River Hydroelectric Project to 0.22^{o}C. Therefore, the allocation remains 0.15^{o}C at this time.*
Comment 100.	Page 4-72 states "The load allocations for each Willamette Project reservoir is no increase in natural thermal potential temperatures when biologically-based numeric criteria are exceeded." What are the consequences and possible remedial actions if those temperature aren't met? (63)
Response	*Additional information will identify the magnitude of individual reservoir and project scale impacts and should lead to a decision process that identifies possible remedial actions. The TMDL is issued as an order and is thus a regulatory action. Failure to implement the*

	TMDL could eventually trigger enforcement measures.
Comment 101.	ACOE appreciates the difficulties of establishing NTP and expect improved estimates over time, but cannot support the specific target temperatures for reaches below dams on basis of data and methods that are admittedly flawed. Expect to work through this in the UAA process. (33)
Response	*Individual reservoir targets presented in the TMDL were estimated by ODEQ based on the best available method for analysis of the available information. ODEQ agrees that additional monitoring and modeling are needed to refine the estimates of natural thermal potential that are the target temperatures for reservoir operations and looks forward to working the U.S. Army Corps of Engineers to refine these estimates.*
Comment 102.	Requests DEQ recalculate the available assimilative capacity. (50)
Response	*ODEQ is confident in its calculation of assimilative capacity and does not feel any new modeling is required at this time.*
Comment 103.	DEQ must take into account minimum instream flow requirements when developing the Temperature TMDL. (5)
Response	*Minimum Instream flow requirements were taken into account when modeling EWEB Leaburg and Walterville project impacts.*
Comment 104.	Supports tributary shading as a mechanism for cooling the Willamette River. (22)
Response	*ODEQ also supports restoration of riparian vegetation in the tributaries to cool the Willamette; although we would like to stress that using shade alone on tributaries will not be enough to cool the Willamette. Restoring channel complexity, connections to wetlands, historic side channels, and floodplain are also important protective elements to salmonids in the Willamette.*
Comment 105.	Page 4-21, Last full paragraph, last sentence. Concerned how DEQ intends to implement shade curve targets and how they may or may not inter-relate with NPDES permits, MS4, DLCD Goal 5 and 6 responsibilities. DEQ needs to clarify in the TMDL or in an IMD. (63)
Response	*Implementation of shade curves will be specified in implementation plans submitted by designated management agencies to ODEQ within 18 months of completion of the TMDLs. DMAs may relate these actions to Goal 5 and 6 as well as other local land use objectives (such as ESA goals).*
Comment 106.	The draft TMDL does not allow MWMC to use treatment capacity that has been constructed and approved by the department. (48)
Response	*Approval of the MWMC facilities plan (2004) reflected our understanding of environmental requirements at the time and best estimate of future conditions. Correspondence from ODEQ recommended periodic revisions to the plan including an update of the plan in 2009 based on these and other uncertainties. Notably, the plan does call for development of wastewater reuse capacity that should assist MWMC with attainment of waste load allocations.*
Comment 107.	Decreased thermal waste load allocations from current permitted levels were not agreed upon by the TMDL council. These decreases mostly apply to the summer and shoulder season. This is a policy change that was not agreed upon at the TMDL Council. (66)
Response	*The department is reducing wasteload allocations from currently permitted levels because modeling has shown cumulative impacts from dischargers at these levels would violate Oregon's water quality standard at low river flows.*
Comment 108.	Sources that have built capacity with plans to the future and appropriate growth are being punished by the proposed WLAs and will never be able to use this capacity. (55)

Response	*This has not been observed with implementation of the stringent wasteload allocations included in the Tualatin Subbasin temperature TMDL. For this TMDL, heat load trading may allow built capacity to be utilized. Heat load trading is allowed between individual sources and sectors provided that all applicable water quality criteria are attained and sufficient legal or other mechanisms are put in place that ensure the trade will be implemented as designed.* *For more information on trading, see WQMP, Chapter 14.*
Comment 109.	The Executive Summary (pg VII) and in Chapter 4 (pg 4-65), specifically state that "wasteload allocations will be equal to currently permitted levels", however the TMDL has reduced the thermal wasteload allocations beyond the current permit design flow limits. This is contrary to what the TMDL states. Decreased thermal waste load allocations mostly apply to the summer and shoulder season. This is a policy change that was agreed upon at the TMDL Council, and thus it seems that the Department ignored the "industrial growth allowance and the bubble allocation" of "15% limitation on future growth of current permit design flows". (22), (66)
Response	*We do not find on page 4-65 of the March 2006 draft where it states waste load allocations will be equal to currently permitted levels. The text in the October 2004 executive summary summarizes the temperature allocations in the October 2004 mainstem Willamette temperature TMDL. Because the department has revised the mainstem Willamette temperature TMDL and sought public comment on a newly revised draft, the October 2004 executive summary is no longer relevant. Additionally, the department cannot allocate currently permitted levels because modeling has shown this would result in an exceedance to the human use allowance in both the summer and fall time periods. Exceedance of the human use allowance is a violation of Oregon's temperature standard. This is one of the reasons the department revised the temperature TMDL.*
Comment 110.	If the 7dADM is less than the numeric criteria, then the allowable cumulative heating at the point of maximum impact, should ODEQ choose to allocate it, is greater than the HUA: ΔTallowable = HUA for TRM ≥ TRC and TRM defined at NTP ΔTallowable = TRC – TRM + HUA for TRM < TRC and TRM defined at NTP (17)
Response	*The department acknowledges when the NTP is less than the numeric biological criteria the assimilative capacity is larger and the increase in the river temperature from point sources will be larger than the HUA. This does not mean however that allocations will be based on heating the river up to the criteria plus the HUA. The department's interpretation of the temperature standard indicates allocations should be based on a HUA above the biological numeric criteria.*
Comment 111.	It would be useful to evaluate the impacts of basing calculated point source allocations on observed river temperatures rather than on the river's biologically-based numeric criteria. (17)
Response	*ODEQ did evaluate current point source loads on ambient temperatures. Median impacts as shown in figure 4.7 through 4.10 of the March 2006 draft were less than 0.15C. Full WLA impacts on ambient temperatures would likely fall between these scenarios and those illustrated for NTP in Figure 4.34 of the draft.*
Comment 112.	Proposed spawning period wasteload allocations for MWMC may be unnecessarily restrictive because analyses were based on an insufficient number of simulation days. (17)
Response	*The department disagrees. The number of simulation days is not relevant in this case.*
Comment 113.	We question why the only scaling factor that was adjusted was for MWMC, and why the Department did not look to adjusting scaling factors or the Human Use Allowance for industrial point source dischargers as another approach to addressing temperature reduction needs (48)

Response	*There are two major industrial sources in the vicinity of MWMC: Weyerhaeuser Springfield and University of Oregon Heat Plant. The department did not adjust Weyerhaeuser's scaling factor because their allocation already requires a significant reduction to current discharges. Further reductions to The University of Oregon's allocation could also require reductions of current discharges during critical conditions. MWMC was reduced relative to other municipal sources because of its location on the Willamette River, and the limited loading capacity available..*
Comment 114.	Fort James requests that rather than using scaling factors, DEQ allow computation waste load for Fort James through application of the CE-QUAL-W2 model specifically for the Halsey Mill at different river flows. (72)
Response	*The CE-QUAL-W2 model was used to develop Fort James and other source's waste load allocations. Fort James has complete access to this model and may request it from the department at any time. The department has no plans to use the model on a daily basis to implement permits. Application of the model in this way is not appropriate nor technically feasibly.*
Comment 115.	Does the waste load allocation accurately reflect the NTP based standard? (72)
Response	*Yes. The cumulative increase of the load and waste load allocations does not exceed 0.3 ^{o}C above the natural thermal potential at the point of maximum impact.*
Comment 116.	Requests larger WLA to accommodate community growth. (50)
Response	*Wasteload allocations have been developed as fairly as possible to allow the least restrictive limits to all sources. Once the TMDL is signed as an order half the reserve capacity set aside to accommodate future growth will be available for further allocation. These allocations will be subject to priorities as described on page 14-33 of the Water Quality Management Plan.*
Comment 117.	Requests increased WLA to accommodate full utilization of existing wastewater treatment capacity. (50)
Response	*There simply is not enough capacity in the river to allow all sources to discharge at design capacities and still meet water quality standards. ODEQ developed the wasteload allocations in the fairest way, with the intention of honoring the concerns and wishes of the Willamette Council.*
Comment 118.	Request DEQ to recalculate and revise waste load allocations for the period of April 1 through May 15 and the months of September and October using the natural thermal potential rather than the biological criteria as the reference temperature to determine if there is excess assimilative thermal capacity, and if so, assign the excess capacity to the point sources and revise the waste load allocations accordingly. (66)
Response	*It is beyond the scope and purpose of the TMDL to ensure that load capacity is fully allocated. However, the model is available for sources to investigate these and other scenarios.*
Comment 119.	Requests DEQ to recalculate and revise waste load allocations and make an interim allocation of the Reserve Capacity to point sources upstream of the Santiam River in order to allow discharge at current permit design flow levels. (66)
Response	*ODEQ is committed to adaptive management and, subject to funding, will consider revision of the TMDL when compelling information is presented that there are substantial errors in the model or that parameters or assumptions have changed. At this time one half of the reserve capacity will be available for allocation at the time the TMDL issued as an order, as described on page 14-33 of the Water Quality Management Plan.*
Comment 120.	WLAs will have a significant impact on existing dischargers. (68)
Response	*ODEQ acknowledges that implementation will affect many sources along the river as heat loads approach waste load allocations.*

Comment 121.	DEQ is granting WLA's that are greater than the maximum amount of heat currently being discharged. How can the river temperature decrease if WLA are greater than currently being discharged? How does DEQ expect to meet WQS for temperature when it increases the amount of heat point sources can discharge? (29)
Response	*The wasteload allocations are designed to ensure that water quality standards are not violated. They limit the amount of temperature increase from point source discharges to an insignificant increase over natural temperature. The temperature problems in the Willamette Basin are overwhelmingly caused by non-point sources. ODEQ expects to meet water quality standards for temperature as non-point sources of pollution are controlled.*
Comment 122.	Pg4-63, Mainstem Willamette Waste Load Allocation section needs to be clarified, specifically for the two options available for setting WLA's. (i.e. Option 1: Single Allocation Based on 7Q10 Flows, Option 2: Flow-Based Allocations) (65)
Response	*The section has been rewritten to clarify the options.*
Comment 123.	Pg 4-66, Table 4-14. This table does not have appropriate explanation of derivation and application; please provide information in the text. Or move table to appendix. (65)
Response	*The table has been moved to the appendix…*
Comment 124.	We disagree that WLA do not restrict current operations of dischargers in the valley. Several sources besides MWMC and W/Springfield will be out of compliance with WLAs. (55)
Response	*The department agrees more sources than the two mentioned could potentially be out of compliance under certain conditions.*
Comment 125.	Pg 4-65, Explain the scaling factor better, how the model was used to develop the scaling factors, and explain how "d" was obtained from the model. (65), (66)
Response	*Appendix 4.5 describes the function of the scaling factor "d". The scaling factors were derived by calculating wasteload allocations with various iterations of d that would not exceed the human use allowance. Scaling factors were derived through Willamette Mainstem CE-QUAL-W2 model iterations.*
Comment 126.	The wasteload allocation methodology fails to fully utilize the portion of the river's assimilative capacity assigned to point sources. DEQ should revise the method used to adjust the allocated heat discharges in order to better utilize river temperature and flow rate induced changes in assimilative capacity. (17), (71), (55)
Response	*The goal of modeling and setting wasteload allocations is first to ensure that water quality standards are not violated. This may result in some capacity remaining in the system, but provides some conservatism to the estimates of impacts to the river. In some cases full utilization is not possible because downstream cumulative impacts prevent full utilization upstream. Also under some river flow conditions it is impossible for sources to physically discharge enough effluent to fully utilize available capacity. In the Lower Willamette River, point sources must share their allocation with PGE's Willamette Falls project, which limits the available capacity.*
Comment 127.	The use of biologically-based numeric criteria rather than natural thermal potential (NTP) river temperatures to calculate point source wasteload allocations may result in wasteload allocations that are unnecessarily conservative. (17), (55)
Response	*The department disagrees, see comment # 132*
Comment 128.	"Two specific cases in which tying point source wasteload allocations to the river's biologically-based numeric criteria, rather than the river's NTP temperature, could result in unnecessarily conservative wasteload allocations and should be addressed: 1. When a particular point source effluent temperature is greater than both the river temperature and the river's numeric criteria. 2. When a particular point source effluent

	temperature is less than the NTP river temperature but greater than the river's numeric criteria. (17), (55)"
Response	*See comment 132 regarding the use of the NTP. The department may decide to make special conditions in the NPDES permit to acknowledge such a condition if it is determined that such a scenario actually occurs and would require reductions to current discharges.*
Comment 129.	What data did DEQ utilize to demonstrate that the flow-based WLA will not adversely affect salmonids? (29)
Response	*Impacts from sources of pollution were determined using the CE-QUAL-W2 water quality temperature model. Data used in this model include point source discharge data, flows from dams, channel morphology data, riparian vegetation data, and climate data. Refer to Temperature Appendix C and the model calibration report found at http://www.ce.pdx.edu/w2/index.html?projects_willamette_river.html. Figure 4.34 in the "Waste Load Allocations" section of chapter 4 shows the impact from flow based wasteload allocations. These impacts do not violate the water quality standard adopted to protect salmon and trout (IMST, 2004).* *IMST, Oregon's Water Temperature Standard and its Application: Causes, Consequences, and Controversies Associated with Stream Temperature. Technical Report 2004-1.*
Comment 130.	During the periods when the River temperature is less than the temperature standard, the TMDL should allow for more flexible WLAs that reflect the additional assimilative capacity available for thermal loads. (48)
Response	*The TMDL ensures that water quality standards are achieved under critical conditions and includes an opportunity for sources to take advantage of greater load capacity during periods of higher flow. The TMDL does not ensure that the load capacity is fully allocated at all times, but does offer sources and permit writers some flexibility to meet waste load allocations.*
Comment 131.	Request DEQ to provide a detailed analysis of how the waste load allocations were calculated. (35)
Response	*Appendix 4.5 provides much detail. Also, ODEQ staff spent much of the last year working with stakeholders to explain methodology.*
Comment 132.	The method used to calculate wasteload allocations for heat should be based on use of the natural thermal potential (NTP) river temperature rather than on the biologically based numeric criterion. This approach should eliminate the perceived need to drastically reduce point source WLAs via a step change on the dates on which biologically based numeric criterion changes. The use of biologically based numeric criteria river temperatures also results in erroneous estimates of temperature impacts. (71)
Response	*ODEQ has investigated this option and determined that developing wasteload allocations using the natural thermal potential at the point of discharge would be too complex to determine compliance in all time periods under varying conditions. It would also be cumbersome to implement and not necessarily beneficial to all sources. It would also go against one of the TMDL advisory council goals of treating each source equally as it would tend to benefit downstream sources to the detriment of upstream sources. Using the natural thermal potential also does not eliminate the need to reduce maximum observed discharges when a use change occurs. During the salmon and steelhead spawning use period, the critical conditions are simply more restrictive than in the summer period.*
Comment 133.	DEQ needs to provide a better explanation of the purpose and need for the thermal wasteload allocation scaling factor, d, and the adjustment to the scaling factor, a. (71)

Response	*The purpose and need for these waste load allocation factors is to allow sources the flexibility to discharge heated effluent at the rate the waterbody can assimilate that heat and not violate water quality standards. Further explanation of these factors is described in appendix 4.5. Sources are welcome to discuss the purpose and need for these factors with ODEQ staff at any time.*
Comment 134.	The "a' factor for the Springfield mill is overly conservative during spawning. Reduce "a" to 0.15 from 0.3, consistent with summer factor based on real difference between daily average and daily max temperatures, OR allow narrative to allow modified "a" values upon demonstration by sources.. (59)
Response	*The "a" factor is required to meet the human use allowance at the point of maximum impact. The department allows sources to calculate the adjustment factor using real time ambient temperature data which is not overly conservative.*
Comment 135.	DEQ has discretion to set individual WLAs and can maintain or increase Weyer/Springfield's allocation. (59)
Response	*An increase to Weyerhaeuser's allocation would require a significant reduction in all other allocations in the upper Willamette River. This stems from the location of the facility relative to river flows.*
Comment 136.	Requests an exemption or modifications to allocations in the TMDL when an exceedance occurs as the result of a warm weather or flow increase due to a rainfall event. (50), (59), (35), (37), (48), (55)
Response	*The department uses its enforcement discretion under the air temperature exclusion provision in OAR 340-041-0028(12)(c) if a violation is attributed to excessive air temperatures.*
Comment 137.	The revision of waste load allocations to assign point sources excess thermal assimilative capacity in shoulder seasons, when it is available, would not compromise Oregon's antidegradation policy because it would not be considered a degradation of water quality under OAR 340-41-0004(3)(a-c). (66)
Response	*Agreed.*
Comment 138.	Requests DEQ include provisions in the TMDL stipulating that the WLA are applicable only during times when the temperature of the Willamette River exceeds the criteria and the discharge temperature exceeds the actual river temperature. (35)
Response	*The waste load allocations apply April 1 through November 1 for sources upstream of river mile 50. Waste load allocations apply June through September for the lower 50 river miles. The department may make special conditions in the permit when the discharge temperature is cooler than the NTP but warmer than the biological criteria. See comment number 128.*
Comment 139.	Equations on pages 4-128 to 4-131 contain inconsistencies and typographical errors. (71)
Response	*Some of the symbols have been changed and the equations are numbered differently to connect to the text better.*
Comment 140.	Weyerhaeuser's Albany outfall 002 has not been addressed in the TMDL. The department should include a WLA for this outfall. (59)
Response	*Weyerhaeuser-Albany discharges a portion of its industrial wastewater to seepage ponds near the Willamette River. Though preliminary data suggests this groundwater is cooler than the ambient river temperature, there is insufficient information to determine if this inflow has a cooling or heating effect on the river. The ultimate effect of this water on the Willamette River will be determined during the next permit renewal cycle. If ODEQ determines that this source needs a wasteload allocation, it will be provided from the Reserve Capacity managed by the department as described on page 14-33 of.the Water Quality Management Plan.*

Comment 141.	The policy implications of determining heat load up to design flows that will put a growth moratorium on every community unless they physically cool their effluent, remove their discharge from the river, or trade for temperature credits under a trading program should be recognize in the TMDL document. (63)
Response	*Wasteload allocations for the majority of discharges to the Willamette River allow some measure of increased heat load relative to current conditions. These limits are necessary to maintain river temperatures for protection of aquatic life. While it is true that at some time, sources of anthropogenic heat will need to adopt new technologies or strategies to comply with waste load and load allocations, most sources have time to plan for these changes. Policy statements calling for the protection and restoration of water quality through employment of pollution control measures can be found through federal and state regulations including 340-042-0025, the goal statement of the TMDL rule.*
Comment 142.	Define "small point sources". Pg 4-31, top paragraph. (65)
Response	*Heat loads with receiving stream impacts less than 0.01C*
Comment 143.	Pg 4-68, New Point Sources or Increased Loads from Existing sources, It is not clear whether new point sources covered under the Small Point Source Bubble will be required to comply with the limitations on reserve capacity specified for the larger point sources as discussed on page 4-78; if not, why. (65)
Response	*New sources will be held to the same requirements for demonstrating minimal heat load requirements, regardless of their size. There is no implicit extra reserve capacity in the "bubble allocation" for small point sources.*
Comment 144.	Make an interim allocation of reserve capacity to sources upstream of Santiam River. (6)
Response	*The Department may allocate reserve capacity once the order is signed as outlined on page 14-33 of the Water Quality Management Plan.*
Comment 145.	Page 4-68 third paragraph says that "Available reserve capacity will be drawn upon as the small source heat load approaches the bubble allocation limit." We believe that this contradicts with policy on page 4-78 second paragraph that says "One half of the reserve capacity will become available for use at the time the TMDL is issued by DEQ". We believe that this premature "give away" of a portion of the reserve capacity is contrary to the policy discussion of the Willamette TMDL council. (63)
Response	*ODEQ will allocate reserve capacity based on request and demonstrated need. This capacity is available as outlined on page 14-33 of the Water Quality Management Plan..*
Comment 146.	EPA suggests reserve capacity be held until demonstrated reductions in river temperature are realized. (65)
Response	*One half of the reserve capacity is available for allocation once the TMDL order is signed. Once available, this reserve capacity will be retained to the extent possible, and will be allocated based on priorities described on page 14-33 of Water Quality Management Plan.*
Comment 147.	It is unrealistic to expect that major changes to channel morphology will occur within the timeframe outlined in the TMDL. (72)
Response	*Improvements in morphology, including restoring some of the channel complexity lost over the years, should improve stream temperatures. In particular, such improvements should provide improved areas of cold-water refugia. However, the overall impacts of such improvements were not modeled, so the amount of stream temperature improvements has not been quantified. Therefore, the TMDL does not specify quantified targets for channel restoration, but does encourage that steps to improve morphology be taken. It is quite possible that improvements in riparian conditions may be achieved if mandated improvements in riparian vegetation are achieved. Additional improvements*

	could be achieved through wasteload trading avenues, if heat load reductions obtained through improvements in morphology are traded for other heat loads, such as heat loads from point sources.
Comment 148.	Requests thermal loads issued as a WLA to a NPDES permit that have been removed from the river be available for trading and not revert back to reserve capacity. (37)
Response	*Wasteload allocations of thermal loading are intended to define the permitted limit of heat that individual sources may discharge. Where a source does not need all of its WLA for continuing operations, that excess may be traded to other sources with insufficient load to cover their operations. Extra load allocation like this that is not used by the permittee or committed to a trade with another permittee for a period of ten years will revert back to the reserve capacity managed by the Department. As long as the load is being used in an approved trade, it will remain with the NPDES permit it was allocated to. The NPDES permit to which these allocations were granted will need to be regularly renewed to maintain control of the wasteload allocation.*
Comment 149.	The TMDL should include a more expanded discussion of water quality credit trading and acknowledge that the WLAs are commodities that are available for trading. (48)
Response	*Trading or other measures of pollutant load mitigation or offset may be an important implementation tool in the Willamette as well as other basins. ODEQ has an internal management directive to guide staff in this area. It is available for review online at http://www.deq.state.or.us/wq/wqPolicy/WQIMDTrading.pdf*
Comment 150.	Requests the TMDL incorporate and encourage solutions to the temperature concerns beyond the normal enforcement tools. (35)
Response	*Trading and other heat load cap and reduction measures will require new approaches to TMDL implementation.*
Comment 151.	Requests the amount of heat a source removes from its discharge must remain under the "ownership" of that discharger to facilitate trading. (50)
Response	*See Response to comment 148.*
Comment 152.	Trading is only tool available to accommodate growth in future. Need to establish all heat load allocations as a commodity. Allows sources to work among themselves to find most cost-effective heat load mitigation measures. Reductions in heat load by facilities should not revert back to DEQ but should remain as an asset to the discharger. (55)
Response	*ODEQ supports trading as a partial solution to immediate and near-term limits on heat load. We have developed an Internal Management Directive to describe trading options. This IMD is available on the ODEQ website at: [http://www.deq.state.or.us/wq/wqPolicy/WQIMDTrading.pdf]. Also see response to comment number 148*
Comment 153.	Trading; need credit for early reductions. Credit should be based on the first draft TMDL from 2004. Should also implement this policy for mercury. (55)
Response	*Trading policies are still being developed. Reductions in load below the wasteload allocation issued in the current TMDL would be available as tradable load. It is not appropriate to use the early iterations of the temperature wasteload allocations as a benchmark for these reductions, since they did not result in meeting water quality standards.*
Comment 154.	DEQ needs to have sufficient staff to assist with trading project options. (55)
Response	*Agreed*
Comment 155.	Does compliance schedule language in the TMDL intend to be a determination that an NPDES permit compliance schedule to achieve a WLA is consistent with the WLA, provided that the compliance schedule is otherwise appropriate? (49)

Response	*Compliance schedules will be developed for permittees that require time to meet wasteload allocations. These schedules will be part of a permit or other order issued by the department, and generally will be for a single permit period. The compliance schedule does not take the place of the wasteload allocation or permit limits on pollutants. Exceeding these limits is still a violation of the permit, and so of the wasteload allocations, but the Department agrees that it will not enforce against the permittee for these violations as long as the terms of the order (including the Compliance Schedule) are being met by the permittee.*
Comment 156.	Use compliance schedules to allow sources to meet WLAs over time. (59)
Response	*See Response to comment 155.*
Comment 157.	5-year compliance schedule is unrealistic, especially for shade targets. (63)
Response	*ODEQ acknowledges that development of riparian shade will take decades in some places. The compliance schedules in permits will allow permittees to upgrade plants, where that is the appropriate solution, or to develop trading agreements approved by the department. This latter approach will account for the time necessary to develop riparian shade where that is the method of heat load reduction.*
Comment 158.	Requests a 20 year time line for achieving compliance with the TMDL following approval of the temperature management plan by DEQ. (50)
Response	*Sources will be required to comply with permit limits within the period of a permit (generally 5 years). Compliance schedules may be used within a permit cycle to allow time for upgrades or other measures, such as developing pollutant trading agreements.*
Comment 159.	Request DEQ to view NPDES permit compliance schedule as a measure of last resort to achieve compliance; a step only to be taken after an interim allocation of the Reserve Capacity to point sources upstream of the Santiam River. (66)
Response	*Sources may have compliance schedules in permits that specify the actions required to meet permit limits. Compliance schedules may be an appropriate method of allowing permittees to develop these options within the period of a permit cycle. .Reserve capacity will be available in limited cases and based on a priority of need as described in the Water Quality Management Plan for the TMDL. In all cases, ODEQ expects that sources will consider alternatives to increased wasteloads to meet needs for growth.,*
Comment 160.	Need for adaptive management. Need flexible permitting to make use of flow-based WLAs. Need more than a single 5-year permit period to meet proposed WLAs. (55)
Response	*Adaptive management is a key element for TMDL implementation. Details for compliance schedules are included in individual NPDES permits.*
Comment 161.	EWEB proposes to initiate, in conjunction with DEQ and the McKenzie Watershed Council, a data collection effort designed to update and enhance the dataset currently in use for the McKenzie TMDL modeling effort. (5)
Response	*ODEQ welcomes any efforts designed to update and enhance the dataset available for water quality modeling.*
Comment 162.	The TMDL should acknowledge and include provisions to re-evaluate the load and waste load allocations if there is a significant change in the operational strategies for managing flows in the Willamette River. (48)
Response	*Adaptive management is an important element in all TMDLs as identified in the water quality management plan that accompanies the Willamette TMDLs and in the Oregon Administrative Rule 340-042-0040(7)*
Comment 163.	The TMDL should contain provisions for modification of WLAs following acquisition of new data (48)

Response	*After issuing the TMDL, the Department may revise the loading capacity and allocations to accommodate changed needs or new information. In making these revisions, the Department will comply with the public notice provisions in OAR 340-042-0050(2) and procedures for issuing TMDL orders in OAR 340-042-0060.*
Comment 164.	Page 4-71 and 4-72 identifies the USACE reservoir allocations as "preliminary" and "ODEQ anticipates that these target temperatures will be revised." We are concerned about the method and timing for these revisions. How are commitments of the USACE and DEQ going to be realized and what process with be used to translate the ultimate "targets" into load allocations? (63)
Response	*Collaboration between ODEQ and USACE will be necessary to provide the resources and staff necessary to refine Willamette Project load allocations. Any substantive changes to the TMDL, including revisions to load or waste load allocations, will include an opportunity for public participation (see OAR 340-042-0050).*
Comment 165.	Additional data collection and modeling anticipated by the TMDL is appropriate. It will require substantial effort and time to combine models from tributaries to the Willamette River with the CEQUAL W2 model used for the main stem of the river. Alternative scenarios may be run to develop plans for operations that will optimize temperature and flow conditions. These evaluations would also be consistent with a Use Attainability Analysis for dams in the system. (33)
Response	*ODEQ agrees that the collection of data will further understanding of the effects of federal hydroprojects on temperature of the river. ODEQ is not currently prepared to define the parameters for developing UAAs at this time.. Also, see comment number 53.*
Comment 166.	ACOE is committed to pursuing water quality improvements and appropriate limits through the UAA process (33)
Response	*ODEQ expects that the ACOE will determine how their operations can be adjusted to achieve the greatest possible reductions in temperature variance relative to the TMDL. This should be done as part of developing a temperature management plan. The development and implementation of the TMP would need to occur prior to the ODEQ accepting any proposal to consider pursuing a site specific standard (SSC) or use attainability analysis (UAA). ODEQ does not have adequate resources to undertake UAAs or SSC. Also the ACOE would need to describe the relationship between existing federal mandates and how such a UAA or SSC process would be approved by other federal agencies*
Comment 167.	Albany supports and reiterates comments of OACWA (68)
Response	*Acknowledged*

Comments on Chapter 5: Lower Willamette Subbasin	
Comment 1.	Our general concern relates to the lack of a clear articulation of how designated management agencies (DMAs) shall maintain existing shade and achieve site and system potential shade- and thereby the temperature standard- over time. ODEQ needs to articulate with greater clarity the need for "no-net-loss" of existing shade and some active and assured investment in enhancing shade. Page 5-84 Water Quality Attainment Analysis for the Columbia Slough in the Lower Willamette has the strongest language to this effect. Why is this language not replicated in the temperature nonpoint source Johnson Creek, Tryon Creek, or the Clackamas River? The management strategies in Appendix 14.B appear to be options. Hence, it is unclear how the desired future condition of system potential shade will be achieved by DMAs. (28)
Response	*The language from the Columbia Slough was repeated in other sections. ODEQ expects Designated Management Agencies to describe how they intend to achieve shade allocations in their TMDL Implementation Plans.*
Comment 2.	Page.5-21 **"**They include, but are not limited to: …. ; Johnson Creek Watershed Council Action Plan and Watershed Assessment (Adolfson 2003 Draft);…" This document was completed September 2003, please change to reflect the completion date. The same change is needed in the References 5-217 **"**Draft Watershed Action Plan. June 30, 2003.**"** Change to reflect completed- September, 2003. (51)
Response	*Suggested changes were made to the document.*
Comment 3.	Page. 5-21 **"**Johnson Creek is impacted by consistently very high concentrations of nitrate nitrogen and high concentrations of total phosphorous, fecal coliform, total solids, and biochemical oxygen demand." Please clarify this statement to indicate that except the bacteria standard no other water quality standard has been exceeded. (51)
Response	*The information is included as background for the paragraph discussing the Oregon Water Quality Index (OWQI) scores for Johnson Creek, some of the worst of the monitored sites in Oregon. An explanation of what the OWQI is and what it does is included, with no references to water quality standards exceedances. In fact, Oregon does not have numeric standards for nutrients, total solids or biochemical oxygen demand. Water quality standards and exceedances are discussed elsewhere in the document.*
Comment 4.	Page. 5-23, Figure 2.9 : Figure 2.9 shows the Crystal Springs stream flow monitoring station as being operated by USGS, where as the text and Table 2.3 show OWRD as the operator, please clarify. (51)
Response	*The legend of the figure was corrected.*
Comment 5.	Page. 5-149 Table 4.8: It is unclear how load capacities by flow level presented in Table 4.8 and the load reductions shown in Figures 4.17 – 4.21 are connected. Please add some explanation to show how this table fits in the context. (51)
Response	*This table is simply a tabular representation of the flow-based bacteria loading necessary to achieve the 126 cfu/100 ml water quality criterion, which is shown graphically in Figures 4.4 - 4.8 and 4.17 - 4.21. The following language was added: "The flow-based loading capacities shown in Table 4.8 represent the acceptable bacteria counts per day at a given stream flow (blue line in Figures 4.4 - 4.8 and red line in Figures 4.17 - 4.21)."*

Comment 6.	Page. 5-180 **"**Future monitoring and/or modeling efforts will be needed to confirm that the load reductions are adequate to achieve the Table 20 criteria for water and fish ingestion." What is meant by this statement? Who will be required to conduct future monitoring? (51)
Response	*Additional language was added to the TMDL document that describes how the criteria for protection of human health will ultimately be achieved. Future monitoring may be voluntary efforts by local stakeholders, required by NPDES permits or conducted by ODEQ.*
Comment 7.	Page. 5-181 "Since the aquatic life criterion for dieldrin is nearly twice that of DDT, ODEQ assumes that allocations and/or surrogate measures developed to meet the DDT criterion will also be protective of the dieldrin criterion." Please add a statement to note that this assumes the same mechanism drives the concentrations of dieldrin and DDT. (51)
Response	*The sentence above was modified to say "Since the aquatic life criterion for dieldrin is nearly twice that of DDT and their chemical behaviors are quite similar, ODEQ assumes that allocations and/or surrogate measures developed to meet the DDT criterion will also be protective of the dieldrin criterion."*
Comment 8.	Page. 5-181 "As discussed above, DDT and dieldrin have a strong affinity for sediment and degrade at some rate over time." It is thought that in Johnson Creek degradation may not be the process responsible for the reduction in instream concentrations. Rather, there is a limited supply of DDT and as more is exported via erosion, the concentrations in freshly exposed soils decrease. (51)
Response	*Noted. Whether observed reductions in DDT and dieldrin concentrations from historical levels is a result of chemical degradation, improved management practices, or the erosion and export of contaminated sediments is unclear. However, the statement that DDT and dieldrin have an affinity for sediments and chemically degrade over time is well documented.*
Comment 9.	Page. 5-183 "By normalizing the data for TSS the reduction of DDT and dieldrin becomes evident." Please add a statement to clarify how the normalization was accomplished. (51)
Response	*Data are typically normalized by a parameter, in this case TSS, simply by dividing by the parameter of interest. Current and historical DDT concentrations were divided by TSS and a linear relationship was assumed.*
Comment 10.	Page. 5-183 "DDT is highly persistent in soils, with a reported half life of 2-15 years, and there are clear indications that its breakdown can take much longer than originally anticipated (Hitch and Day, 1992)." The fact that the DDT concentrations were reduced by 74% over less than 15 years may indicate that degradation of DDT is not the main process of DDT reduction. Rather it may be that the primary means of removal of DDT is occurring thru soil erosion. The fact that the majority of total DDT is still in the form of DDT and not DDD or DDE seems to indicate that degradation is a much slower process than originally anticipated. If soil erosion is in fact the main removal process of DDT then it is reasonable to expect a similar reduction of DDT over the next decade, assuming soil erosion rates remain fairly constant. (51)

Response	*Noted. Whether observed reductions in DDT and dieldrin concentrations from historical levels is a result of chemical degradation, improved management practices, or the erosion and export of contaminated sediments is unclear.*
Comment 11.	Page. 5-186 The project was awarded funding thru DEQ 319 program in July of 2003. Please change the statement to reflect that sampling began in the Fall of 2003 and was completed in June 2004. (51)
Response	*Suggested changes were made to the document.*
Comment 12.	Page. 5-192 "Load duration curves showing the surrogate measure of TSS relative to flow and rainfall conditions were used to describe the seasonal variation and loading capacity of Johnson Creek." There is concern in using the surrogate TSS instead of DDT because of the amount of error that could occur in the assessment of load reductions required to meet the DDT criterion. Figures 5.6 and 5.7 show that there is substantial variability in the TSS vs. DDT regression. (51)
Response	*Load duration curves were not used to determine the TSS surrogate measure for Johnson Creek, but are included to illustrate current TSS loading relative to the 15 mg/l instream target. The TSS target of 15 mg/l was established using a regression analysis. Wet versus Dry data are included to illustrate that the target is generally met during dry conditions. ODEQ acknowledges the variability in the regression and encourages additional monitoring and evaluation of the relationship between TSS, DDT and dieldrin. Figures 5.14 - 5.17 are intended to address the surrogate measure of TSS.*
Comment 13.	Page 5-192 "Note that the blue line shown in Figures 5.14 through 5.17 represents the load necessary to achieve the instream target of 15 mg/l TSS, which ensures that the DDT freshwater chronic criterion is achieved." Using the 15 mg/L TSS target may not be appropriate for areas dominated by urban stormwater. As Figure 5.11 shows, DDT concentrations at the 17th Ave site are much lower than at the Palmblad site, thus requiring less of a reduction to meet the criterion. As stated above, the load duration curves may need to be adjusted for DDT loads instead of TSS loads, due to the amount of variability that occurs with the regression. (51)
Response	*The U.S. Geological Survey (USGS) performed an analysis of the same data set and reported the results in "Organochlorine Pesticides in the Johnson Creek Basin, Oregon, 1988-2002". Three geographically distinct data sets, corresponding to Johnson Creek at river miles (RM) 17.2, 10.2 and 0.3, were analyzed to determine the TSS concentrations necessary to achieve Oregon's instream chronic DDT criterion. The USGS determined that TSS concentrations of 8, 18 and 15 mg/l were necessary at RM 17.2, 10.2 and 0.3, respectively. The USGS also noted that the DDT/TSS relationship was relatively poor at the RM 0.3 sampling location. ODEQ's analysis used all of the available Johnson Creek data, which showed a good DDT/TSS relationship (R2 = 0.76) and resulted in an overall instream TSS target of 15 mg/l. Reach-specific instream TSS targets are not appropriate from an implementation standpoint nor are they necessarily supported by available monitoring data.*
Comment 14.	Page 5-20: Statement that Crystal Springs Creek temperature is essentially the same as that of Johnson Creek is contradicted on page 5-87. The statement on page 5-87 is true. (17)

Response	*The statement calling Johnson Creek and Crystal Springs Creek temperatures essentially the same was removed and the following statement was added: "In fact, Crystal Springs Creek is slightly warmer than Johnson Creek during the summer months and both waterbodies show similar bacteria concentrations."*
Comment 15.	Page 5-23, Figures 2.9, Table 2.3: The yellow box indicates USGS gages, but the flow monitor on Crystal Springs Creek is operated by OWRD. Please contact them for availability of data and period of record. In addition, in fig. 2.9 and MANY other instances, Kelley Creek is misspelled. A creek flows into the Sandy River nearby, named Kelly Creek, and may confuse to the reader. In general, the text of the TMDL spells Kelley correctly, and many figures and some tables are incorrect. In table 2.3 the record at the Johnson Creek at Milwaukie gage begins 1989 not 1998. (17)
Response	*The legend of the appropriate figure was updated. Figures throughout the document were corrected to refer to "Kelley Creek" rather than "Kelly Creek". The period of record for the Milwaukie flow gage was corrected in the table.*
Comment 16.	Page 5-23: In the equation, the variable 'n' is the number of daily mean flow values, not the number of measurements (providing the exceedance probability is calculated based on daily mean flows). 'Measurement', at least in the USGS lingo, refers to discrete flow measurements made by wading across a creek. (17)
Response	*The definition of "n" was changed to "the number of daily mean flow values".*
Comment 17.	Page 5-28 Fig. 2.13: Spelling is Regner not Regnor. Suggest identifying Johnson Creek on the figure. (17)
Response	*Spelling was corrected and Johnson Creek was added to the title of this figure.*
Comment 18.	Page 5-87: In comparison of thermal contributions from Kelley Creek and Crystal Springs Creek, it would be beneficial to discuss the flow component. Flow and temperature are both components of thermal load. For example: Summertime flow in Kelley Creek, using August 2002 as an example, is about <u>one fourth</u> the flow of Johnson Creek just upstream of the confluence with Kelley Creek. In contrast, during the same period the flow of Crystal Springs Creek is about <u>nine times</u> greater than the flow of Johnson Creek at Sycamore. In terms of the thermal budget for Johnson Creek, contribution of lower-temperature water from Kelley Creek may be lost when it reaches Johnson Creek. Similarly, contribution of the warmed flow from Crystal Springs Creek into the lower temperature water of Johnson Creek just upstream of the mouth may overwhelm the thermal condition of the main stem Johnson Creek. (17)
Response	*Correct. Relative flow information was added to the TIR data discussion.*
Comment 19.	Page 5-88, 5-95, Fig. 3.30, 3.36 and other figures throughout the report: Readability and understanding of the figures would be enhanced if the authors consistently picked an x-axis orientation, where 'upstream' or 'downstream' is on the left side of the graph. The interpretation of these figures and many others would be easier if they were all the same way. It would also improve clarity if tributaries were placed in a consistent location on the figure. (17)
Response	*Noted. ODEQ uses a variety of analytical tools and graphical displays. Tributaries are placed according to river mile.*

Comment 20.	Page 5-90 Fig. 5.32, 5.33: A location reference is needed on this map. Although fig. 5.33 is described in the text as a theoretical example, the proximity to fig. 5.32 showing instream ponds and the detail shown on the graph itself would indicate that the reader may be able to draw a conclusion on instream ponds in the Johnson Creek basin based on the flow and pond area. If this is not the case, then clarity may be enhanced by removing the figure. (17)
Response	*Location information was added to the title of the map and the text was clarified.*
Comment 21.	Page 5-98: Interpretation of cooling from Errol Spring contradicts earlier statement on pg. 5-89 about warming from dammed pools that comprise 85% of the stream habitat in upper Errol Creek. Refer to general comments above regarding the cooling effect of ground-water discharge. Even a steady increase in shade as cited on page 5-98 may not have the cooling effect as observed in 1998, where the ground water discharge accounted for an increase in flow of 50% from 82nd Avenue at RM 5.5 to 45th Avenue at RM 3.2. (17)
Response	*The interpretation of cooling in the Errol Springs area was attributed to increased riparian vegetation coverage and groundwater inputs, not the flow from Errol Springs.*
Comment 22.	Page 5-142: Climate data at Portland airport are collected by the National Weather Service, and may have been served by the Oregon Climate Service at http://www.ocs.oregonstate.edu/index.html . Please check this data source and credit the data and delivery as appropriate. (17)
Response	*Correct. The NWS collects the data and ODEQ retrieves the data via the OCS. Clarifying language was added to this section.*
Comment 23.	Page 5-178: Please check the logic involved in the indication of the margin of safety for dieldrin. Based on data collected in 2002 in Johnson Creek, we found both a poor relation of dieldrin to DDT, and a lack of correlation of dieldrin to TSS. For this reason, we have no reason to believe that if the DDT standard is met, the dieldrin standard will be met too. (17)
Response	*ODEQ's analysis of the instream data collected in 2002 showed a good DDT/dieldrin correlation with an R^2 of 0.81. Removing the data points that the USGS called outliers (1190 mg/l TSS, 0.071 ug/l DDT and 0.021 ug/l dieldrin) yielded an $R^2$of 0.058. These relationships were calculated only for instream samples, where the surrogate measure of 15mg/l applies. ODEQ found a reasonable correlation (R^2 0.059) between instream TSS and dieldrin concentrations. Ideally the correlation coefficients between TSS and dieldrin would be higher, but ODEQ decided to assume the dieldrin criterion will be protected when the DDT criterion is achieved because the dieldrin chronic freshwater standard is nearly double that of DDT while measured instream concentrations of dieldrin tended to be less than DDT concentrations.*
Comment 24.	Page 5-182, paragraph 3 and 4: Sampling, analyses and data interpretation by the USGS was funded through a cooperative study including the cities of Portland, Gresham, and Milwaukie, and Clackamas and Multnomah Counties. Although all municipalities are members of the Johnson Creek Interjurisdictional Committee, these are the entities that provide assistance and should be acknowledged by name. (17)
Response	*The acknowledgement was clarified to include the entities listed above.*

Comment 25.	Page 5-184, Figures 5.3 through 5.5: Since text and Table 5.4 refer to old and new samples in that order, consider orienting x-axis on these figures the same way. In addition to the new data being lower in concentration than results a decade ago, the recent data in general are more compressed. This may be attributed to the fact that many of the samples were taken during the same storm event, whereas the 1989-1994 samples spanned many storm events. (17)
Response	*Noted. Rather than changing all three Figures, the text in the appropriate table was modified.*
Comment 26.	Page 5-186: Similar to general comments regarding interpretations of the data as published in our report. There are some differences, however. The USGS study differentiated between a TSS target for the upper basin (represented by samples at the Palmblad Road site), the middle basin (represented by samples at the Sycamore site), and the lower basin (based on samples at the 45th Avenue, Milwaukie, and 17th Avenue sites). These data indicated a lower TSS threshold in the upper basin than in the lower basin. In our report we made these spatial differentiations because a single correlation did not adequately represent the processes contributing to sediment and organochlorine pesticide transport. In contrast, the TMDL lumps together all of the TSS and DDT data regardless of location within the basin. This may be splitting the data a bit finely considering the scope of the Willamette Basin TMDL, but then again, it is one of the few basins where we have actual current DDT data. The distinction is particularly important when assessing contributions of agricultural and urban land uses (and sediment sources) in the basin. Another process that may be at work here is the dilution of contaminated soils eroded into the stream upstream of the Palmblad Road site with uncontaminated soils from locations downstream. This could account for the observation of lower DDT level for a given TSS concentration in the lower basin when compared to the upper basin. (17)
Response	*The USGS determined that TSS concentrations of 8, 18 and 15 mg/l were necessary at river miles 17.2, 10.2 and 0.3, respectively. The USGS also noted that the DDT/TSS relationship was relatively poor at the RM 0.3 sampling location. ODEQ's analysis used all of the available Johnson Creek data, which showed a good DDT/TSS relationship (R2 = 0.76) and resulted in an overall instream TSS target of 15 mg/l. ODEQ believes that the 15mg/l TSS target is appropriate given the overall variability in the data and the potential difficulty in implementing reach-specific TSS targets.*
Comment 27.	Page 5-187 fig. 5.6: The high value (where the TSS is 1190 mg/l) was not used in our report because it has undue influence on the regression. See discussion in our report on page 26 and fig. 12a. Please check the sensitivity of the regression from this single point. The effect of removing this point could shift the target TSS concentration, where a lower TSS would be needed to avoid exceeding the DDT threshold. (17)
Response	*ODEQ believes that it is appropriate to include the data in question because a review of the associated quality assurance and quality control procedures indicates that the analytical results are valid.*
Comment 28.	Page 5-188: Although the text of the TMDL explains the problems associated with establishing a relation of TSS to DDT in stormwater (pipes), graphs are presented that could indicate otherwise to the reader. We agree that a regression based on a limited data set, where more than half are non-detects is problematic. If regression is not a valid technique, the graphs may not be warranted. (17)

Response	*It was not ODEQ's intent to imply that there is a relationship between TSS and DDT in stormwater, rather the opposite. The analysis that was performed on the instream data was also performed on the stormwater data and the results were included to graphically illustrate that no relationship exists and to provide context for why a TSS target was not developed for stormwater. ODEQ added several clarifications to the text describing this analysis to reinforce the fact that it shows that TSS targets are not appropriate for stormwater.*
Comment 29.	Page 5-189, Figure 5.10 The text discusses the potential use of turbidity as a surrogate for TSS, and by extension organochlorine pesticides, in the TMDL. Although we agree that this is likely to be a cost effective method for determining TSS loading, we suggest some logistical considerations. First, use and comparison of turbidity measurements over time and space is confounded when the types of turbidimeters used to collect the data are not consistent (see http://water.usgs.gov/pubs/circ/2003/circ1250/). Therefore, we suggest attention to the details and consistency of any turbidity monitoring program that is promulgated for the purposes of TMDL-related monitoring. Second, conversion of turbidity data directly to concentrations of TSS or DDT will be problematic without periodic collection of data to refine the turbidity-TSS or turbidity-DDT relations. The reasons for this are two-fold: a) relations indicated in our report and in the TMDL are based on limited data and do not cover the full range of expected TSS concentrations experienced in the stream, and b) the nature of the relations may change over time as regulations change the sources and quantities of TSS and DDT entering the stream, or as DDT degrades. We therefore urge any turbidity-data collection program be accompanied by periodic in-stream sampling for both TSS and organochlorine pesticides, at a variety of streamflows, seasons, and turbidities. (17)
Response	*Agreed. ODEQ expects additional monitoring may be used to both to refine relationships between various parameters and to develop relationships between turbidity and other parameters. ODEQ will encourage and support future monitoring efforts and will consult with USGS staff on data collection and interpretation techniques.*
Comment 30.	Page 5-190: The text indicates computation of storm loads for DDT and dieldrin. In our report, we indicated that the load computations and graphical depictions did not constitute computation of storm loads. This is due to lack of data to define the hydrograph, and in particular, at the most downstream location, lack of data during what was most likely the peak load of the storm. Although the gradient decreases downstream of Palmblad Road, this may not be sufficient to cause deposition of fine sediments typically associated with DDT. Any assumption made based on sediment size is speculative, since samples taken during the 2002 storm event were analyzed only for TSS and turbidity, and not sediment size. (17)
Response	*Agreed. The reference to "storm event loads" was removed from the discussion.*
Comment 31.	Page 5-75 of the TMDL states that "[t]he permit does not currently require temperature or flow monitoring." This statement is incorrect. The permit does include temperature and flow monitoring. The TMDL should be revised accordingly. (44)
Response	*The error was corrected.*
Comment 32.	The Draft TMDL fails to recognize that the dewatering activities do not occur on a continuous basis. Dewatering activities occur infrequently on an intermittent basis depending upon conditions encountered during

	construction within a specific drainage basin. Sometimes the dewatering activities involve land application with no point source discharge whatsoever. The Department should revise the TMDL to specifically state the Port's dewatering activities and related discharge are intermittent and infrequent. (44)
Response	*The following language was added to the TMDL document: "Dewatering activities occur on an intermittent basis depending upon conditions encountered during construction within a specific drainage basin."*
Comment 33.	Deicing Permit The Port supports the way the TMDL recognizes the Port's NPDES deicing permit. We agree with the Department's assessment that the deicing discharges do not have a reasonable potential to contribute to summertime temperature standard violations since deicing activities are limited to the winter deicing season as specified in the permit. The Port's deicing permit sets forth a waste load allocation for the constituent of concern, biochemical oxygen demand (BOD). Therefore, a temperature waste load allocation is not necessary and no change is required. (44)
Response	*Noted.*
Comment 34.	(The Port is concerned about the impacts the temperature TMDL has on attainment of water quality standards on the Columbia Slough. Although the water quality standard allows for natural conditions criteria to supersede the biological criteria, it is uncertain if the Middle and Upper Slough could ever meet the shade targets in order to be considered at the natural thermal potential. It is also not certain how the human use criteria could be applied. The Middle and Upper Slough have a number of restrictions that limit site potential shading. These include a federally-mandated Wildlife Hazard Management Plan (WHMP), Federal Aviation Administration (FAA) restrictions near Portland International Airport (PDX) that limit tree height and density, and flood management structures and activities. *PDX Limitations Based on Wildlife Hazard Management Plan* Bird strikes are a high risk at PDX, especially during the critical phases of departure and landing operations, given the eco-regional location of the airport, the open water features on three sides, and the extent of large contiguous areas of natural habitat available for wildlife use on and in the vicinity of the airfield. The Port is therefore required by federal regulations (14 C.F.R. § 139.337; FAA Advisory Circular No. 150/5200-33-A) to implement a WHMP to manage risk and reduce the probability of wildlife/aircraft collisions. The 2003 WHMP outlines several components including the development of an effective habitat management program to address the reasons that certain species of concern are attracted to the airfield. The habitat management program includes the incorporation of wildlife deterrent concepts and design in the early phase of all projects and other short and long term habitat modifications. Examples of long term strategies include the physical manipulation or complete removal of features or characteristics (both natural and constructed) that are attractive to wildlife species of concern and are spatially located such that they draw these species into or across the critical flight paths. Features that may attract wildlife and be targeted for removal include wetlands, trees and vegetation. Thus, the revegetation requirements in the TMDL for the Columbia Slough in some locations conflict with the federal mandate to reduce the probability of

	wildlife/aircraft collision. In addition to raising a question about whether the federal regulations would pre-empt the Department's requirements in these areas, as a practical matter of public safety, the Port believes that the FAA mandate to protect human life must take precedence over the Department's requirements. *PDX Limitations Based on Height Restrictions* Other federal regulations are necessary to maintain safe flight operations in and around PDX, including but not limited to 14 C.F.R. Part 77, which provides standards for determining when an object is an "obstruction to air navigation." In addition to potentially posing an unacceptable risk under PDX's WHMP, revegetation in the Columbia Slough area has the potential to violate FAA height restrictions. All decisions regarding the types of vegetation or trees must be carefully evaluated and planned to avoid violating these federal regulations. The Port is also required, through federal regulations that govern FAA grant funding to, among other things, work with the local land use authority to ensure that the use of land adjacent to or in the immediate vicinity of the airport is limited to activities and purposes compatible with normal airport operations. (FAA 5100.38A, Appendix 1 – Assurances, Airport Sponsors.) The proposed revegetation aspects of the TMDL have the potential to represent such an inconsistent land use. Beneficial Use for the Columbia Slough We are encouraged to see that the Department has included Use Attainability Analysis (UAA) as an implementation strategy for the Draft TMDL. This is particularly important for the Middle and Upper Columbia Slough. The beneficial use for the Columbia Slough has been designated as having salmon and trout rearing and migration use. This designation is inappropriate and imposes unnecessary restrictions on the Middle and Upper Slough because salmonid use does not exist today and the use is not attainable. The stream segments in the Middle and Upper Columbia Slough are impassable by salmonids due to flood control structures, and this has been the case since approximately 1917. Thus, as discussed in more detail below, the UAA analysis should be used to change the beneficial use to a less stringent water quality criteria. Recommendations Given the FAA restrictions on site potential shading for the Middle and Upper Columbia Slough and the inappropriate beneficial use designation, the Port makes the following recommendations to the Department: 1. The temperature TMDL should take into account the WHMP and FAA regulations that restrict revegetation and land use in the Middle and Upper Slough. If not, the TMDL for temperature for the Middle and Upper Slough will be based on shade target assumptions that are unattainable under the FAA restrictions, and the targeted water quality standard will likely not be achieved. 2. The WQMP should specifically require Implementation Plans for the Middle and Upper Columbia Slough to comply with the requirements of the Port's WHMP and FAA regulations that restrict revegetation and land use in these areas. As discussed above, the federally-mandated WHMP, FAA regulations, and public safety concerns supersede the Department's shade targets and requirements.

3. With respect to the Columbia Slough beneficial use designation, the Department should immediately initiate a Use Attainability Analysis and corresponding rulemaking to change the designated use. The Department should split the Lower Slough from the Middle and Upper Slough to recognize the physical differences in these systems, and re-designate the beneficial use for the Middle and Upper Slough. This would be consistent with the Department's finding that salmonids do not use the Middle and Upper Slough due to physical barriers, which have been in place since approximately 1917. Re-designating the Middle and Upper Slough will change the temperature criterion for these areas and in turn address the revegetation restrictions discussed above.

4. Ideally, the Department should also delay implementation of the temperature TMDL in the Middle and Upper Slough to provide time for the Use Attainability Analysis and rulemaking. If the TMDL proceeds as proposed, local and state government resources will be expended unnecessarily to achieve unattainable goals. This would be an inefficient use of limited government resources that should be allocated to other projects aimed at protecting water quality.

Although the Port believes a Use Attainability Analysis is necessary for the Middle and Upper Slough, the Port supports protection of salmonids in the Lower Columbia Slough. The Port will continue its voluntary efforts to improve vegetation and water quality on the Columbia Slough to the extent possible consistent with the Port's WHMP and FAA regulations. This includes participation in the City of Portland Re--vegetation Program, partnerships with the drainage districts within Multnomah County, and support to the Columbia Slough Watershed Council Action Plan Projects. (44)

Response

ODEQ recognizes that site potential vegetation may not always be achieved due to a variety of constraints. DMA-specific limitations should be described and evaluated relative to TMDL shade allocations in the TMDL implementation plans submitted to ODEQ. The development of a Use Attainability Analysis for the middle and upper portions of the Columbia Slough may be possible in the future if implementation of all feasible measures with respect to temperature fails to achieve conditions that are protective of existing beneficial uses.

Comment 35.

Potential riparian land cover provided for Fairview and Johnson Creeks, and the Columbia Slough should theoretically be similar, since they're all in the Portland/Vancouver basin. However, the height values found for climax vegetation types are quite different in Table 3.26 (pg 5-123) from the values in Tables 3.18 (pg 5-94) and 8.8 (pg 5-57). The difference is shown in Figure 2.

Figure 2. Vegetation Characteristics for Three Gresham Waterways.

Basin	Potl. Vegetation	Height (ft)	Overhang (ft)	Canopy Density (%)
Johnson Creek	Lg mix-high	77.1	7.7	60
Columbia Slough	Lg hardwood	85	12.8	75
Fairview Creek	Composite	108	13	75

	The height values for Fairview Creek seem significantly different from the other two Gresham waterbodies. Given that on-site calibration did not occur for Fairview Creek or other tributaries that have ecoregion-based shade allocations, DEQ may want to reconsider the values in Table 3.26. Although the implications for Fairview Creek are slight due to the narrow width of the stream, greater consistency would enhance the credibility of the ecosystem-based shade values. (57)
Response	*ODEQ strives for consistency and accuracy in determining attributes of system potential vegetation along various waterbodies. In the case of Johnson Creek and the Columbia Slough ODEQ was able to collect field data on riparian vegetation characteristics that allowed modification of the general composite dimension established in Table 3.26. ODEQ did not conduct a rigorous assessment of riparian vegetation along Fairview Creek because Fairview Creek was not modeled for stream temperature. ODEQ used the riparian vegetation height target found in Table 3.26. Fairview Creek is generally quite narrow and shade targets will likely be achieved long before riparian vegetation reaches maximum height.*
Comment 36.	Page 5-6, last paragraph, says, "…A surrogate measure of 15 mg/l TSS may also be used to express compliance with instream DDT concentrations…." As is stated earlier in the same paragraph, this value is meant to apply only to non-point sources--not to urban stormwater. We suggest adding the words "For nonpoint sources" to the beginning of the sentence to maintain clarity. (57)
Response	*Suggested language was added to the beginning of the sentence.*
Comment 37.	Table 1.1 (page 5-8) should include the City of Fairview as a DMA. (57)
Response	*The City of Fairview was added to this table.*
Comment 38.	Johnson Creek: Page 5-186 notes the differences, and clearly distinguishes between instream and stormwater data related to DDT. This distinction can be made stronger still by adding the words "an instream" as shown in the following sentence, (copied from the last paragraph on the page): "…The relationship appears strong, which suggests that turbidity may also be considered as an instream surrogate measure for DDT…" (57)
Response	*Agreed. Suggested change made.*
Comment 39.	The study referenced in paragraph four of page 5-186 has already been largely completed. The date references should be made current. (57)
Response	*Date references were updated.*
Comment 40.	At the time that the original draft of the DDT/dieldrin TMDL was developed, Gresham and others agreed that the proposed allocations were as accurate as possible, given the requirement to set a TMDL in the face of inadequate data. We appreciated the Department's recognition of the inadequacy of data to establish a relationship between TSS and DDT/dieldrin in urban stormwater, and the corresponding decision to not set a TSS proxy. Since the TMDL was originally drafted, DEQ has opted for a new approach to deal with scientific uncertainty, as manifested in the mercury TMDL. We believe that the same rationale that resulted in phased implementation of the mercury TMDL applies to urban stormwater and DDT/dieldrin on Johnson Creek. Consider the following statements from the TMDL about

	the adequacy of data and understandings of fundamental relationships with respect to DDT/dieldrin and urban stormwater: ○ "It is unknown what portion of DDT measured in Johnson Creek during high flow periods is due to re-suspension of previously deposited bed sediments." (last paragraph, page 5-190) ○ "Clear differences were observed between the instream and stormwater outfall monitoring data sets…" (second paragraph, page 5-186) ○ "The stormwater monitoring results showed no detections for dieldrin while virtually all instream sampling results showed measurable levels. Additionally, six out of ten stormwater samples were below the DDT detection limit (generally 0.001 ug/l) where only eight of 63 instream samples were below the detection limit." (third paragraph, page 5-186) ○ "…the application of a linear regression on stormwater data where only four samples had detectable amounts of DDT is potentially problematic…" (third paragraph, page 5-186). With only four data points in ten showing detectable pollutants, the representativeness of the data input to the statistical tools used to set TMDL allocations for urban runoff is questionable. The co-mingling of few stormwater outfall data with more copious instream data to create load duration curves from which percent reductions are determined for stormwater-in-general introduces potentially large, unquantifiable error with respect to urban stormwater. We suggest that DEQ work with stakeholders to collect additional data, and *then* set a wasteload allocation for urban stormwater. DEQ has already fostered collection of additional data through two 319 grants, which are a good start toward obtaining some of the needed data. (57)
Response	*ODEQ did not establish TSS target for urban stormwater using the load duration curve approach. Rather, the percent reduction in DDT concentration was determined conservatively by using the 90th percentile of the measured stormwater and instream samples. Discussion of the analysis that resulted in a 20mg/l TSS target for urban stormwater was intended to explain how the analytical technique used to establish the 15 mg/l instream TSS target is inappropriate for urban stormwater.*
Comment 41.	Columbia Slough and Fairview Creek: The map shown on page 5-14 in Figure 2.4 locates the mid dike at about the midpoint of the Upper Slough reach. The text in the third paragraph on the same page says that "The Upper Slough extends from the mid-dike to the outlet of Fairview Lake." It would help reader comprehension if these matched. (57)
Response	*The figure was corrected.*
Comment 42.	The model shows that water temperature in the Upper Slough is insensitive to increased shading. The TMDL, however, does not discuss this outcome in relation to expectations for shading in this reach. The TMDL should formally recognize this limitation and not require shading for TMDL implementation for this reach. (57)
Response	*Shade targets are established to address nonpoint sources of heating and are applied to all streams in watersheds that do not meet the numeric temperature criteria.*

Comment 43.	The last paragraph on page 5-14 notes the relative importance of groundwater flow over surface flow from Fairview Lake into the Slough during summer. While we recognize the need to minimize warming on this urban stream to provide suitable habitat for resident trout, the TMDL should provide better documentation of the rationale for setting a temperature TMDL for Fairview Creek. (57)
Response	*The temperature TMDL for Fairview Creek was established based upon a review of continuous monitoring data collected during the summer of 2002 that showed violations of State temperature criteria.*
Comment 44.	Page 5-54, Figure 3.6: The caption on this figure incorrectly refers the reader to codes described in Table 3.7. The codes are actually in Table 3.8. (6)
Response	*The title of the appropriate figure was corrected.*
Comment 45.	Page 5-56, Table 3.8: This table displays current and potential ("System Potential") land cover for the basin. Most of the System Potential descriptions appear reasonable, except for the ones associated with what should be considered established infrastructure. Specifically the current land uses of Barren/Developed, Barren/Road/RR tracks, Development/Industrial, and Development/Residential are not likely to become vegetated with mixed conifer/hardwood. Though there undoubtedly is a potential for this to occur, the DEQ should point out that there is a low probability of this occurring. There may be a greater probability of the land cover described as "active channel bottom" becoming vegetated, simply because there may be more chance of significant stream migration than removal of residential developments. It would be more realistic to model the current land cover described above as having no change, or at least something less than complete coverage with mixed conifers/hardwoods. We realize that this would not have a dramatic impact on the modeled output for stream temperature, but it would provide a more realistic way to look at the basin. (6)
Response	*ODEQ agrees that there is a low likelihood of achieving system potential effective shade for developed areas. The purpose of the analysis was to quantify system potential shading, which includes the removal of anthropogenic influence.*
Comment 46.	Page 5-76, "Halsey Station Apartments": The description of this facilities' backwash system sounds like it violates Federal rules governing underground injection control. ODEQ should amend this description if it really is a permitted method for wastewater disposal. (6)
Response	*The general NPDES permit issued to the Halsey Station Apartments is no longer active. References to the permit were removed from the TMDL document. DEQ staff in ODEQ's UIC section was made aware of the situation and will follow-up accordingly.*
Comment 47.	Page 5-93, Table 3.18: This table displays the same expectations for lands in infrastructure as in Table 3.8. (6)
Response	*Noted. See response to Comment #45.*
Comment 48.	Page 5-97, Figure 3.37 and Page 5-100, Figure 3.41: In the past, TMDLs developed by DEQ have discussed using forward-looking infrared radar (FLIR) data to map surface temperature of streams. This is the second TMDL where TIR is discussed instead of FLIR. From the description of TIR,

	it sounds like a different trade name for the same process used in FLIR. If this is true you may want to point this out in the discussion. Otherwise, you should include a section comparing TIR to FLIR. This figure uses the term TIR in its header, but FLIR in the legend. (6)
Response	*All references to FLIR were removed from the document. ODEQ now uses the term Thermal Infrared Radiometry (TIR) to describe the technology used to collect surface water temperature data via remote sensing.*
Comment 49.	Page 5-144, Figure 4.15 "Nonpoint Sources of Bacteria": The inclusion of a mobile home park along with three CAFOs in Figure 4.15 may be viewed by some people as being inappropriate. (6)
Response	*The Happy Valley Mobile Home Park and CAFOs were included in the section describing potential point sources of bacteria because both types of discharge are subject to requirements under the NPDES permitting program.*
Comment 50.	Under the discussion of nonpoint sources it should be noted that allowing livestock access to a stream for drinking is acceptable, but livestock should be restrained from lingering in waters of the state. We would appreciate DEQ informing us of areas where they have witnessed such activity. Anyone with a complaint of damage resulting from unrestricted livestock access to streams should contact the Oregon Department of Agriculture. (6)
Response	*ODA was informed in August, 2002 that cattle were being allowed unencumbered access to Johnson Creek in the vicinity of Palmblad Road. The picture shown on page 5-145 of the TMDL document was also sent to ODA.*
Comment 51.	Page 5-194, last paragraph: The phrasing of this paragraph is unclear. How does the last sentence fit with the first one? What "approach" is being referred to? Please re-structure this paragraph to clarify the intent of these statements. (6)
Response	*The approach being referred to is the methodology for determining load and wasteload allocations. As explained in the TMDL document, a surrogate measure of TSS was developed for nonpoint sources but not for point sources. Nonpoint source allocations can be expressed as either a 94 % reduction of DDT or a TSS target of 15 mg/l. Point source allocations are expressed solely as a 77 % reduction of DDT.*
Comment 52.	The City of Portland, Bureau of Water Works has been issued NPDES permit # 101617, which covers discharges relating to the operation and maintenance its water supply system. The following comments apply primarily to this permit and are separate from other comments submitted by the City of Portland. • Maximum Effluent Temperature Equation, Page 5-46 – The temperature terms are defined in degrees Fahrenheit. However, all the discussion in this Point Source Methodology section is in degrees Celsius. The equation itself can be used to determine the maximum effluent temperature in either degrees Fahrenheit or degrees Celsius without modification. We would suggest amending the definitions of the terms to include references to both degrees Fahrenheit and degrees Celsius. (46)
Response	*Clarification made. Celsius references were added to the equation*

Comment 53.	Heat Load Equation, Page 5-46 – The equation contains the conversion from degrees Fahrenheit to degrees Celsius (5/9), yet the term "delta T" is defined as "allowable increase (0.3 ^{o}C)". In order to avoid confusion either the conversion should be deleted from the equation or "delta T" should be defined in terms of degrees Fahrenheit. (46)
Response	*Clarification made. Change in temperature, Delta T, was redefined using degrees Fahrenheit.*
Comment 54.	Page 5-76 – There are a number of references to hydropower generation in the first paragraph of the description of the permit. "Power Generation with Potable Water" was deleted from the permit when the permit was renewed in June 2004. Please remove all references to hydropower and electrical power generation from the discussion of NPDES permit # 101617. (46)
Response	*References to hydropower and electrical power generation were removed.*
Comment 55.	Page 5-76 – The number of wells that were cited in the third sentence of the first paragraph is incorrect. Please revise the sentence to read as follows: "The purpose of the facility is to collect groundwater produced from 27 wells and pump it to the Powell Butte Reservoir for delivery to the water distribution system." (46)
Response	*The number of wells was updated and suggested language was added.*
Comment 56.	Page 5-77 – In addition to the wellfield, Powell Butte Reservoir, and the conduit inter-ties; NPDES permit # 101617 also covers discharges from various points along the three water supply conduits that extend from the Bull Run to the conduit inter-ties on NE 162nd Ave. These discharge points are outside of the Columbia Slough drainage and are not relevant to this TMDL document. Discharges to the Columbia Slough are generated primarily from wellfield testing and UV validation activities. For the most part, these discharges are non-chlorinated groundwater. Any chlorinated groundwater is dechlorinated using sodium thiosulfate prior to discharge. (46)
Response	*The document was modified to include the suggested language.*
Comment 57.	Page 5-77 and Table 3.14, Page 5-73 – The waste load allocation calculations are based on an incorrect flow rate. Monthly Discharge Monitoring Reports (DMR) require that the average and maximum total daily volume be reported. This is different than a flow rate. Our discharges to the Columbia Slough are intermittent and are generally of short duration. The November 2002 DMR reported a maximum total daily volume of 9190 m3. This volume was converted to an average flow of 3.76 cfs based on the incorrect assumption that the duration of the discharge was a full 24 hours. The duration of this discharge was actually about nine hours, making the average rate of flow about 10 cfs. The outfall structure at the Ground Water Pump Station was designed for a maximum flow rate of 100 million gallons per day. If the objective were to use the maximum allowable flow rate as a basis for the waste load allocation calculations, then we would recommend assigning a flow rate of 155 cfs (100 mgd). Our calculations using this flow rate are as follows: Maximum Effluent Temperature = 65.0 ^{o}F / 18.3 ^{o}C Waste Load Allocation = 1.18 x 108 kcal/day (46)

Response	*Effluent temperature and heat loading limits, expressed as Waste Load Allocations (WLAs) in the TMDL document, are intended to be flow-based. The effluent limits included in the TMDL are essentially a worse-case scenario where instream flows are low (7Q10 low flow) and effluent flow and temperatures are high (eg. Facility design flow, permit limit or maximum reported value). Compliance with effluent limitations may be expressed either as compliance with the stringent WLAs in the TMDL document or by demonstrating that water quality standards are maintained. This can be demonstrated by using the flow-based equations provided in the TMDL document.* *ODEQ assumes that the discharge of 155 cfs to the Columbia Slough, while technically possible, is highly unlikely. Therefore the WLA was modified using the suggested 10 cfs (maximum reported discharge) as an effluent flow assumption. The result yields a maximum effluent temperature of 65.0 ^{o}F / 18.3 ^{o}C and a heat load of 11.2 x 10^{6} kcal/day.* *Additional language was added to the TMDL document clarifying that the equations used are intended to be the basis for flow-based effluent limitations.*
Comment 58.	Page 5-104 – As stated in the comments above, NPDES permit # 101617 also covers discharges to Johnson Creek from the Powell Butte Reservoir. This permit is absent from those listed NPDES permitted facilities in the Johnson Creek Watershed. The outfall is located at Johnson Creek and Circle Ave. at approximately River Mile 10. Powell Butte Reservoir should be included in the discussion of NPDES permits pertaining to Johnson Creek and an appropriate waste load allocation calculated for this facility. (46)
Response	*After reviewing NPDES permit #101617, ODEQ determined that there is no reasonable potential for this discharge to negatively impact receiving water stream temperatures. Therefore, ODEQ will not assign a wasteload allocation for this permit. The City will be allowed to discharge to Johnson Creek from Powell Butte Reservoir according to the conditions in the NPDES permit and those outlined in the permit evaluation report.*
Comment 59.	Page 5-6 “ODEQ will revise the instream and/or urban stormwater TSS surrogate measures when sufficient monitoring data have been collected and submitted for review.” No urban stormwater TSS surrogate was established in this TMDL. Please change the statement to reflect this fact. The percent reduction target should also be revised if warranted. (46)
Response	*The sentence was changed to read “ODEQ may revise the instream and/or urban stormwater TSS reductions when sufficient monitoring data have been collected and submitted for review.”*
Comment 60.	Page 5-9, Figure 2.1*:* Lake Oswego is neither listed in the text nor on the Figure. Please add. (46)
Response	*Lake Oswego was listed in Table 1.1, shown in Figure 2.1 and included in the textual discussion of political jurisdictions in the TMDL document released for public comment.*
Comment 61.	Page. 5-11, Table 2.1 / Page. 5-12 Change table heading to reflect that only parameters, which were discussed in this TMDL document (even if no TMDL was established) are listed,. Add

	a footnote that explains that more parameters are on the 2002 303(d) list and that a TMDL may be established at a later date. Also explain that even though Johnson Creek was delisted for temperature a TMDL was still established. You also may want to explain why Johnson Creek was delisted for temperature. (46)
Response	*A discussion of 303(d) listed parameters and an explanation for ODEQ's approach to TMDL development is provided in the introduction section of Chapter 5. The following language is included in the introduction section of Chapter 5: " It should be noted that this document only addresses parameters listed on the 1998 303(d) list and that ODEQ published an updated 303(d) list in 2002. ODEQ is not proposing TMDLs at this time for parameters added to the 303(d) list in 2002 and did not complete TMDLs for parameters removed from the list between 1998 and 2002." Tables, figures and other references to 303(d)listed parameters throughout Chapter 5 refer to the 1998 listings in order to avoid confusion.*
Comment 62.	Page. 5-21 "Average OWQI scores for Johnson Creek are very poor throughout the year, with an average summer score of 26 and an average winter score of 31." An explanation should be added that no water quality criterion has to be exceeded in order for a stream to be classified as having poor or very poor water quality. Thus, while the Oregon Water Quality Index is a good tool to compare streams, it is of lesser use to indicate whether water quality criteria are met. "Johnson Creek is impacted by consistently very high concentrations of nitrate nitrogen and high concentrations of total phosphorus, fecal coliform, total solids and biochemical oxygen demand." This statement is misleading and must be qualified to indicate that except for the bacteria criteria none other parameters listed exceed their respective water quality criteria. (46)
Response	*The statement is included as background information for the paragraph discussing the Oregon Water Quality Index scores for Johnson Creek, some of the worst of the monitored sites in Oregon. An explanation of what the OWQI is and what it does is included, with no references to water quality standards exceedances. In fact, Oregon does not have numeric standards for nutrients, total solids or biochemical oxygen demand. Water quality standards and exceedances are discussed elsewhere in the document.*
Comment 63.	Page. 5-23, Figure 2.9 shows the Crystal Springs stream flow monitoring station as being operated by USGS, whereas the text and Table 2.3 show OWRD as the operator. (46)
Response	*The legend of the appropriate figure was corrected.*
Comment 64.	Page. 5-37 "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)." By the same token, other alterations such as flood control structures and other urban infrastructure cannot be reversed. Thus, they should be excluded when calculating system potential shade, i.e. not shade-producing vegetation can be planted where these structures are present. (46)
Response	*ODEQ agrees it is not reasonable to expect that shade-producing vegetation be planted in some areas at present. However, riparian vegetation can be considered if and when future modifications are made to infrastructure.*

Comment 65.	Page 5-44, Table 3.4 : Add a footnote indicating that salmonid spawning is limited to certain tributaries and only portions of the Tualatin and Clackamas rivers. Clearly indicate that the Columbia Slough is not listed as a spawning stream. The reference to Figures 3.1 and 3.2 on P. 5-43 is not sufficient to avoid misconceptions. (46)
Response	*Chapter 5 does not include a discussion of the Tualatin or Clackamas Rivers because they are outside the watershed boundary. ODEQ believes that the spawning use and timing map in Figure 3.2 clearly shows that salmonid spawning does not occur in the Columbia Slough.*
Comment 66.	Page. 5-51, Figure 3.3 : The range of salmonid migration in middle and upper Slough is highly unlikely due to presence of physical barriers. Please acknowledge the questionable nature of this fact in the text to avoid misconceptions. (46)
Response	*As discussed on page 5-39, ODEQ primarily relied on the Oregon Department of Fish and Wildlife (ODFW) for information on fish distribution and life stage timing. ODEQ makes no further distinction with respect to salmonid presence when applying water quality standards.*
Comment 67.	Page. 5-52, Figure 3.4: Data shown is for the middle Slough, where no salmonids are present due to access barriers and therefore the 18°C criterion does not apply. Furthermore, temperature in the middle Slough is not necessarily an indication of the temperature in the lower Slough as is indicated in the text. (46)
Response	*See above. ODEQ was unable to locate text in this section that made reference to the relationship between middle and upper Slough water temperatures.*
Comment 68.	Page 5-56 “A total of 18 vegetation samples are taken at each stream distance node. These data were then given to Portland State University for incorporation into the CE-QUAL-W2 temperature model developed for the Columbia Slough as part of this TMDL effort. “ A different model than in Johnson Creek and other tributaries was used. Please explain and discuss how comparable the outputs from these two models are? (46)
Response	*ODEQ has not attempted to compare the Heat Source and CE-QUAL-W2 models. As stated on page 5-57, “the model was a modified version of CE-QUAL-W2 that had been applied to the Columbia Slough by Portland State University (PSU)for the City of Portland Bureau of Environmental Services. Extensive information on the setup, calibration and verification of the model is available through PSU (Berger 2000, Berger and Wells 1999, Wells and Berger 1995).”*
Comment 69.	Page. 5-57, Table 3.8: ODEQ Code 500 vs 550: Density is 25% in 550 and 75% in 500, yet no change is proposed for either code. Check density assumption of code 550. (46)
Response	*ODEQ left codes 550 and 555, large hardwood stands with lower densities, as-is during system potential model runs. These codes account for approximately 6% of the riparian land cover and were left as-is in an attempt to incorporate some level of natural riparian stand variation.*
Comment 70.	Page. 5-63 –5-65, Figures 3.10 – 3.12 In all three graphs, scenario 2 shows lower modeled temperatures than scenario 3 (system potential) at the upper of end of the modeled reach. This is not possible given the assumption of both scenarios. This seems to indicate a model instability at the upper boundary and should be explained. (46)

Response	*There is a short segment where predicted stream temperatures under scenario 3 are warmer than the other scenarios (~ RM 17.2 to 18). This is most likely caused by shallow water conditions due to the altered hydrology assumptions of scenario 3, which allows larger diurnal temperature swings.*
Comment 71.	Page. 5-70, Figure 3.20: Provide to the DMAs the information that was used to create this figure to assist with site specific planning of tree plantings. (46)
Response	*All relevant riparian vegetation data and products of our analyses were delivered to the City of Portland Bureau of Environmental Services on compact disk in August, 2004. All information was offered to DMAs during presentations to the Columbia Slough watershed council and contact information is provided in the document for specific data requests.*
Comment 72.	Page. 5-73, Table 3.14: Why list 'City of Portland (STP)' and others for which no information is available? (46)
Response	*ODEQ listed all NPDES permitted sources that have the potential to discharge to the Slough. The nature and likelihood of individual discharges dictate their treatment with respect to Waste Load Allocations during TMDL development.*
Comment 73.	Page 5-78 "ODEQ used the methodology described in the Point Source Methodology section to determine appropriate waste load allocations for point sources discharging in the Johnson Creek watershed." Change 'Johnson Creek' to Columbia Slough'. (46)
Response	*The error was corrected.*
Comment 74.	Page 5-96 "TIR represents the most accurate and preferred tool for analyzing temperature in streams of sufficient size." This statement is only correct if the stream is completely mixed, which is rarely the case for larger streams. For smaller streams, vegetation coverage will prevent getting continuous spatial coverage with TIR. TIR is not appropriate for setting TMDLs, which are based on thermal loads and not temperature. Please add this clarification. (46)
Response	*ODEQ only uses TIR data in well-mixed streams. CE-QUAL-W2 was chosen to model stream temperature in the Columbia Slough where thermal stratification is a concern. A discussion of potential limitations of TIR with respect to conditions found in Johnson Creek is provided on page 5-96 of the TMDL document and includes the following: "Some portions of Johnson Creek exhibited narrow stream widths (relative to the pixel size of the images) and the stream surface was often masked by riparian vegetation. Radian stream temperatures were sampled in areas where the surface of the stream was clearly visible in the imagery. This resulted in intermittent data on some stream reaches, especially in the upper portions of the watershed."*
Comment 75.	Page 5-97 "It appears that an instream pond, constructed to improve habitat conditions, is located at RM 8.6 of this reach. The design and construction of this feature did not incorporate a low-flow channel so summertime low flow conditions result in ponding, increased residence time and a subsequent increase in heating from exposure to direct solar radiation." This discussion is speculative and incorrect. The Brookside wetland pond is off-channel during low flow conditions and thus, does not influence the temperature in Johnson Creek during the critical summer period. The Johnson Creek gradient decreases in the Lents area and the increased residence time is more likely to be the major reason for the observed heating

	observed in this area. (46)
Response	*The discussion was based upon conditions ODEQ observed while viewing aerial photography of Johnson Creek (Metro RLIS imagery taken in September, 1997). ODEQ called the City of Portland Bureau of Environmental Services and was informed that the ponding apparent in the imagery was the "Brookside Embayment" and that the embayment was connected to Johnson Creek year-round. The City provided ODEQ with the results of continuous temperature monitoring that was conducted in the embayment during the summers of 2000 and 2001. ODEQ requests resolution on whether or not the Brookside Embayment is physically connected to Johnson Creek during the summer months.*
Comment 76.	Page 5-101, Figure 3.41: A legend needs to be added to the Figure. The TIR measurements show a substantial variance from the instream measurements. Therefore, TIR is not an appropriate tool for establishing TMDLs, especially since it is only based on temperature and not thermal loads. (46)
Response	*This figure was updated to clearly identify TIR, measured and simulated temperatures. TIR is not used for establishing TMDLs or determining thermal loads. Its main use with respect to the Johnson Creek TMDL was as a tool to help calibrate the Heat Source model and to identify areas of cold water refugia.*
Comment 77.	Page. 5-106 / Page. 5-107 "However, all tributaries within the Columbia Slough watershed …" Change 'Columbia Slough' to 'Johnson Creek'. 'Effective Shade Curves' paragraph is duplicated on P. 5-107. (46)
Response	*The errors were corrected.*
Comment 78.	Page 5-120 - 5-121, Figures 3.52 to 3.55 USGS indicated that due to an error in the Heat Source model, these shade curves may overpredict the amount of shade that the ecoregion-specific vegetation can create (see USGS comments dated Jan. 10, 2005). Please review these shade curves and correct as appropriate. (46)
Response	*The concern raised in the comment is regarding the method used to calculate partial stream shade. Heat Source always assumes that the wetted stream channel runs down the center of the active channel and vegetation positions are determined based upon the active channel edges. In reality, streams migrate all over the channel, and may run along one bank in some reaches. This is one of several factors that add uncertainty to partial shade calculations on a stream especially on larger streams where shadows may not reach across the entire active channel. Furthermore, ODEQ calibrated each Heat Source model to ground level measurements of temperature, flow and effective shade. That said, ODEQ is always working to improve our assessment and simulation abilities and improvements have been incorporated into recent versions of Heat Source. Outputs from these simulations were not used in the mainstem model and were not used for waste load allocations*
Comment 79.	Page 5-123 Table 3.26: Correct table number. Height and, in some instances, density of system potential vegetation is greater than for modeled streams in same ecoregion. That means that streams for which no vegetation analysis and modeling was done, will have a higher shade target to meet. Further, it seems to indicate that the assumptions that went into the ecoregion system potential vegetation may need to be reviewed and reevaluated. (46)

Response	*Appropriate table number corrected.* *The assumptions for system potential tree heights in the Johnson Creek and Columbia Slough watersheds were modified (reduced from those that would have been derived using ecoregional shade curves) based upon field observations conducted by ODEQ. This was not done for Fairview Creek because it was not modeled for stream temperature, therefore receiving fewer ODEQ resources. The general ecoregional shade curves apply. Stream widths in the Fairview Creek Watershed are narrow, typically 1-2 meters and shade targets would be met long before riparian plants reach their maximum height. It is up to individual municipalities to determine the heights, widths and densities of riparian stands necessary to meet the shade targets. ODEQ stands behind the ecoregional shade curves as appropriately conservative (protective) for use in watersheds where ODEQ did not conduct additional field observations.*
Comment 80.	Page 5-124 Table 4.1: It is misleading to identify urban stormwater as a source of E. coli. The source clearly is warm-blooded animals including humans. Stormwater is only a conveyance as is soil erosion or overland flow. (46)
Response	*ODEQ does not agree that calling urban stormwater a source of bacteria is misleading. Urban stormwater is known to contain high levels of a number of pollutants and its general reference as a "source" is ubiquitous. More specific sources are described later in the chapter.*
Comment 81.	Page 5-125 Table 4.2: To avoid misconceptions, either delete all beneficial uses that are not impacted by bacteria or add a footnote to indicate that only water contact recreation is affected by bacteria. (46)
Response	*ODEQ "bolded" the following sentence in the text describing the appropriate table: "Water contact recreation, highlighted in grey below, is the most sensitive beneficial use related to bacteria in the Lower Willamette Subbasin."*
Comment 82.	Page 5-126 Table 4.3: Table heading implies that this bacteria standard only applies to the Lower Willamette Subbasin. This is incorrect. Please change Table heading to avoid misconceptions. (46)
Response	*This table lists the portion of the bacteria water quality standards that are applicable to the Lower Willamette Subbasin. ODEQ did not feel it was necessary to list all of the standards because shellfish standards do not apply in the Lower Willamette Subbasin. The word "applicable" was added to the title.*
Comment 83.	Page 5-128 "ODEQ assumes that sanitary sewer upsets periodically impact virtually every urban stream in the Lower Willamette Subbasin." This statement is generalized and speculative and therefore not very informative. Please delete. (46)
Response	*Sanitary sewer upsets in urban environments are well documented by ODEQ and others. For clarity ODEQ added "that are subject to their discharge" to the sentence.*
Comment 84.	Page 5-128 "Cesspools, which provide very little treatment of waste, are also present in the subbasin and may be located in close proximity to streams." Very few cesspools remain in any of the subbasins in the City of Portland; they are prohibited. Please clarify this statement. (46)

Response	*ODEQ does not contend that cesspools are present in high or low numbers in the subbasin, only that they are present, may be located in close proximity to streams and are a potential source of bacteria. The statement applies basin-wide, not just within the City of Portland.*
Comment 85.	Page 5-130 "… BST techniques may provide an important tool for Designated Management Agencies to utilize in future implementation planning efforts." A recent study by USGS questions the accuracy of some of the BST methods; the study is published in ES&T, 2004; 38(22). Even considering the potential inaccuracies of some of these techniques, a number of studies have shown that the human-derived bacteria load is rather small (often < 10%) and that wildlife (birds, rodents) makes up over 50% of the bacteria load. These studies conducted in urban settings appear quite applicable to the City of Portland setting. Considering the high cost of BST studies, it might be sensible to use available information instead studying every single watershed. Knowing the precise composition of the bacteria load will make little difference in the management strategies the City will employ. (46)
Response	*The discussion on BST techniques is intended to be informational. ODEQ encourages DMAs to explore BST techniques where appropriate.*
Comment 86.	Page. 5-146 -. 5-148, Figure 4.17 - 4.21: Please use the same approach to compute load reductions as was used for Fairview Creek and Springbrook Creek, including using a 75% confidence interval (CI) and averaging reductions calculated by flow level. (46)
Response	*Johnson Creek was the first stream to be evaluated for bacteria using the Load Duration Curve approach. While different software was used to develop the load duration curves for Johnson Creek, both techniques are valid and ODEQ sees no benefit from redoing the analysis of Johnson Creek.*
Comment 87.	Page. 5-149 Table 4.8: It is unclear how load capacities by flow level presented in Table 4.8 and the load reductions shown in Figures 4.17 – 4.21 are connected. Load reductions were established by regression across all flow levels and not by flow level as was done in Fairview Creek. Add some explanation to show how this table fits in the context, e.g. by adding current loads for each flow exceedance probability shown in table. (46)
Response	*Table 4.8 shows the bacteria loads necessary to meet the 126 cfu/100ml criterion and a number of flow intervals, from low-flow conditions to high-flow conditions. This information is also presented graphically in Figures 4.17 - 4.21. A load reduction percentage was established by averaging all percent reductions necessary to bring current loads into compliance.*
Comment 88.	Page. 5-150 "The percent reduction, determined conservatively by using the 90th confidence interval of the mean of the measured samples …" Compared to the 75% upper confidence interval used for Fairview Creek (P. 5-163) and Springbrook Creek (P. 5-176), this CI is not conservative but much more stringent. Please correct this apparent error and provide the bacteria load reduction based on a 75% CI. (46)
Response	*ODEQ assumes that where uncertainty exists, using targets that are more protective ("stringent") is conservative. Further, the 90% confidence interval was not used in error. ODEQ evaluated the loading reductions necessary to achieve the 126 cfu/100ml geometric mean criterion as well as the "do not exceed" criterion of 406 cfu/100ml. Where a reduction based upon the 75% confidence interval was not adequate to protect both criteria, as was the case for Johnson Creek, the more stringent 90th confidence interval was used to determine necessary reductions.*

Comment 89.	Page. 5-162 Figure 4.32: Discuss why a 75% confidence interval was chosen to determine load reduction percentages and why load reductions were calculated linearly by flow level instead of via regression across the entire flow regime as was done in Johnson Creek. (46)
Response	*Where a reduction based upon the 75% confidence interval was not adequate to protect both criteria, as was the case for Johnson Creek, the more stringent 90th confidence interval was used to determine necessary reductions.*
Comment 90.	Page. 5-174 Table 4.14: Information in this table does not match information in Figure 4.40. Dry and wet weather bacteria data appear switched. (46)
Response	*The appropriate table was corrected.*
Comment 91.	Page. 5-174 "As seen in Figures 4.39 through 4.42, significant water quality standards violations occur during runoff events. This, coupled with the facts that much of the Springbrook Creek watershed is urbanized and that urban stormwater is known to contain high bacteria concentrations, points to urban runoff as a significant source of bacteria in Springbrook Creek." This line of reasoning is circumstantial and is not supported by the available data. The single monitoring location close to the mouth does not allow for a differentiation among land uses and potential sources. (46)
Response	*Language was changed to read "potentially significant source…"*
Comment 92.	Page. 5-176 "While it may be possible to tailor load and wasteload allocations in some watersheds based upon dominant sources, urban watersheds such as Springbrook Creek do not tend to lend themselves to this type of approach due to the presence of multiple bacteria sources." "ODEQ chose to calculate the percent reduction necessary to achieve the 126 cfu/ 100 ml criterion and applied this reduction to both point source (wasteload) and nonpoint source (load) allocations." These statements cannot be supported by only reviewing data from a single monitoring location. Unless, at a minimum, data from a second monitoring location are reviewed, you cannot say with any degree of certainty what the source of the bacteria load is. At a minimum, a statement should be included that there is a great degree of uncertainty and that future monitoring will be conducted to better understand the sources of the bacteria load. Reductions should be targets and not firm TMDLs until more monitoring data has been collected and reviewed. (46)
Response	*ODEQ understands the limitations of using data from a single monitoring location and, as stated above, did not delineate specific reductions between point and nonpoint sources.*
Comment 93.	Page. 5-176: "In addition to the watershed-specific allocations described previously, all streams in the Lower Willamette Subbasin receive a load and wasteload allocation. ODEQ chose to apply the 78% reduction calculated for the Johnson Creek watershed to all other tributaries in the Lower Willamette Subbasin." "The Johnson Creek percent reductions were applied to all other streams in the subbasin because the watershed represents both agricultural and urban land uses." This blanket load and waste load allocation is not supported by any data review and therefore, is unacceptable. Even though data from some of these tributaries is available, no effort was made to review this data. Many of these streams do not have the same land uses as Johnson Creek. Even

	streams that do have urban and agricultural land uses have bacteria loads that greatly differ from the loads found in Johnson Creek. Establishing a TMDL without data or a review of the available data is counter to the intent of TMDLs as a scientific process and is counterproductive because of the controversy it creates among subjected jurisdictions. Further, this process of establishing a TMDL does not comply with OAR 340-042 and violates a number of provisions under this rule, including public participation. (46)
Response	*See "Bacteria Planning Targets for the Willamette Basin", in Chapter 2 for an explanation of the rationale behind this approach.*
Comment 94.	Page. 5-178 Table 5.1: It is misleading to identify urban stormwater as a source of DDT and dieldrin. Soil erosion would be a more appropriate source to be listed. Stormwater is only a conveyance (46)
Response	*The section titled "Sources of Toxic Pollutants" includes the following language "…since much of the lower watershed is heavily urbanized, the contribution of pesticide-laden sediments via urban stormwater was identified as a potential source to Johnson Creek". ODEQ does not agree that calling urban stormwater a source of DDT and/or dieldrin is misleading as its general reference as a "source" is ubiquitous.*
Comment 95.	Page. 5-179 "The chronic fresh water criterion is protective of resident aquatic species and is evaluated based upon a 24-hour average. " Typically, chronic toxicity tests are conducted over a 96-hour period (see OAR 340-41, Table 33A and 33B). Please revise. (46)
Response	*The chronic freshwater DDT and dieldrin criteria were developed based upon a 24-hour exposure and should be evaluated as such. Additional information on the criteria can be found at the following web addresses:* http://www.epa.gov/waterscience/pc/ambientwqc/aldrindieldrin.pdf http://www.epa.gov/waterscience/pc/ambientwqc/ddt80.pdf
Comment 96.	Page. 5-179 "Fish Tissue Screening Value (mg/kg) = Table 20 Criteria for Protection of Human Health (ng/l) * BCF (1/kg) * (mg/106 ng)". (46)
Response	*Error corrected.*
Comment 97.	Page. 5-180 "It is quite possible that resident fish in the Yakima River basin are exposed to elevated water column DDT levels for a much longer period of time over the course of their lives than resident fish in Johnson Creek, resulting in generally higher concentrations in fish tissue. " Further, the amount of DDT-laden fine sediment could be much lower in Johnson Creek than it is in the Yakima River. (46)
Response	*Noted.*
Comment 98.	Page. 5-180 "Future monitoring and/or modeling efforts will be needed to confirm that the load reductions are adequate to achieve the Table 20 criteria for water and fish ingestion." Is that a mandate or just a or a voluntary effort? If it is a mandate, who will be required to conduct future monitoring and/or modeling? (46)
Response	*Future monitoring may include voluntary efforts by local stakeholders, required by NPDES permits or conducted by ODEQ.*
Comment 99.	Page. 5-181 "Since the aquatic life criterion for dieldrin is nearly twice that of DDT, ODEQ assumes that allocations and/or surrogate measures developed to meet the DDT criterion will also be protective of the dieldrin criterion."

	Add a note: "This assumes the same mechanism drives the concentrations of dieldrin and DDT." This may not be the case as has been indicated by the lack of a correlation between TSS and dieldrin in the data collected in Johnson Creek and Columbia Slough. (46)
Response	*The sentence above was modified to say "Since the aquatic life criterion for dieldrin is nearly twice that of DDT and their chemical behaviors are quite similar, ODEQ assumes that allocations and/or surrogate measures developed to meet the DDT criterion will also be protective of the dieldrin criterion."*
Comment 100.	Page. 5-181 "As discussed above, DDT and dieldrin have a strong affinity for sediment and degrade at some rate over time." Degradation may not be the process responsible for the reduction in instream concentrations. Rather, there is a limited supply of DDT and as more is exported via erosion, the concentration in freshly exposed soils is bound to decrease. (46)
Response	*Noted. Whether observed reductions in DDT and dieldrin concentrations from historical levels is a result of chemical degradation, improved management practices, or the erosion and export of contaminated sediments is unclear. However, the statement that DDT and dieldrin have an affinity for sediments and chemically degrade over time is well documented.*
Comment 101.	Page. 5-183 "By normalizing the data for TSS the reduction of DDT and dieldrin becomes evident." Did you assume a linear relationship between TSS and DDT or dieldrin to normalize the data? Add a statement how the normalization was accomplished. (46)
Response	*Data are typically normalized by a parameter, in this case TSS, simply by dividing by the parameter of interest. Current and historical DDT concentrations were divided by TSS and a linear relationship was assumed.*
Comment 102.	Page. 5-183 "DDT is highly persistent in soils, with a reported half life of 2-15 years, and there are clear indications that its breakdown can take much longer than originally anticipated (Hitch and Day, 1992)." The fact that the DDT concentrations were reduced by 74% over less than 15 years appears to indicate that degradation of DDT is not the main process of DDT reduction. Rather, it seems to support the removal of a limited amount of DDT via soil erosion. Further, the fact that the majority of total DDT is still in the form of DDT and not DDD or DDE seems to indicate that degradation indeed is a much slower process than originally anticipated. If soil erosion is in fact the main removal process of DDT export, then it seems to be much more reasonable to expect a similar reduction of DDT over the next decade, assuming soil erosion rates remain fairly constant. (46)
Response	*Noted. Whether observed reductions in DDT and dieldrin concentrations from historical levels is a result of chemical degradation, improved management practices, or the erosion and export of contaminated sediments is unclear.*
Comment 103.	Page. 5-186: A regression on 10 data points, 6 of which were non-detects, is statistically invalid. Also, one of the 4 detects, appears to exert undue influence on the regression, i.e. it pulls the regression to a steeper slope (see P 5-188, Figure 5.8). Regressions are very susceptible to outliers especially if few other data points are available. (46)

Response	*The discussion of the procedure applied to the 10 stormwater samples is provided to illustrate why a TSS surrogate was not established for stormwater. See response below.*
Comment 104.	Page. 5-186 "The TSS target identified for stormwater was 20 mg/l." Calling this value a target is misleading and inappropriate even in light of the explanation that ODEQ chose not to assign a TSS surrogate for urban stormwater at this time. (46)
Response	*ODEQ made clear in text, tables and allocations that a TSS target was not established for urban stormwater. The purpose of including the discussion of analysis that resulted in the 20mg/l TSS target was to explain how the analytical technique used to establish the 15 mg/l instream TSS target is inappropriate for urban stormwater. ODEQ believes that it is appropriate to explain why an analytical technique that resulted in an instream TSS target was not appropriate for urban stormwater. ODEQ is obligated to explain analytical techniques and results used in TMDL development.*
Comment 105.	Page. 5-186 "The project will begin in 2004." This project began in 2003 and sampling was completed in June 2004. (46)
Response	*The timeline was updated.*
Comment 106.	Page 5-188, Figure 5.8: As discussed above, a regression on four detected data points is statistically invalid. Please remove this figure and any reference to calculation of a TSS target for urban stormwater. (46)
Response	*See response to Comment 104.*
Comment 107.	Page. 5-189 "Lastly, the contribution of pesticide-laden sediments via urban stormwater was identified as a potential source in Johnson Creek since much of the lower watershed is heavily urbanized." The statement provides incorrect logic. Change sentence structure to: "Lastly, the contribution of pesticide-laden sediments via urban stormwater was identified as a potential source in Johnson Creek. Since much of the lower watershed is heavily urbanized, the amount of pesticides contributed could potentially be significant." (46)
Response	*While the logic of the statement remains unchanged, the sentence structure was changed to read: "Lastly, since much of the lower watershed is heavily urbanized, the contribution of pesticide-laden sediments via urban stormwater was identified as a potential source to Johnson Creek."*
Comment 108.	Page. 5-190 "This decrease may be explained by the fact that the gradient of Johnson Creek also decreases below the Palmblad Road site, slowing the water and increasing the potential for in-channel deposition of organochlorine pesticide-laden sediments (Figure 5.13)." Even though it is correct that the gradient decrease about two miles below Palmblad Road, it may not explain the decrease in pesticide load. The gradient is probably still steep enough and flow velocities are high enough to transport the particle sizes which most likely carry the majority of the pesticide loads. Even if deposition were to occur, there is limited capacity in these deposition sites. Over time, the quality of deposited sediments should improve as sources of these organochlorine sediments are being reduced or eliminated. (46)
Response	*Noted. There are a number of potential explanations for the decrease observed and additional study would be required to make a definitive statement (stronger than "may be explained").*

Comment 109.	Page. 5-191, Figure 5.11; page. 5-187, Figure 5.6 It is counterintuitive to have a constant instream TSS target of 15 mg/L throughout Johnson Creek in light of the fact that the DDT concentrations decrease dramatically downstream while TSS concentrations do not decrease. An analysis of the regression data in Figure 5.6 indicates that the TSS/DDT ratio is much greater from Sycamore gage downstream than it is above Sycamore gage, indicating that a single TSS-DDT regression for the entire watershed may not be appropriate. Furthermore, using the 15 mg/L TSS target in areas of the Johnson Creek which are dominated by urban stormwater in essence establishes such a target for urban stormwater as well. (46)
Response	*The U.S. Geological Survey (USGS) performed an analysis of the same data set and reported the results in "Organochlorine Pesticides in the Johnson Creek Basin, Oregon, 1988-2002". Three geographically distinct data sets, corresponding to Johnson Creek at river miles (RM) 17.2, 10.2 and 0.3, were analyzed to determine the TSS concentrations necessary to achieve Oregon's instream chronic DDT criterion. The USGS determined that TSS concentrations of 8, 18 and 15 mg/l were necessary at RM 17.2, 10.2 and 0.3, respectively. The USGS also noted that the DDT/TSS relationship was relatively poor at the RM 0.3 sampling location. ODEQ's analysis used all of the available Johnson Creek data, which showed a good DDT/TSS relationship (R^2 = 0.76) and resulted in an overall instream TSS target of 15 mg/l. Reach-specific instream TSS targets are not appropriate from an implementation standpoint nor are they necessarily supported by available monitoring data.*
Comment 110.	Page. 5-192 "Load duration curves showing the surrogate measure of TSS relative to flow and rainfall conditions were used to describe the seasonal variation and loading capacity of Johnson Creek." Using the surrogate TSS instead of DDT introduces an unacceptable amount of error in the assessment of load reductions required to meet the DDT criterion. Figures 5.6 and 5.7 clearly show that there is tremendous variability in the TSS vs. DDT regression. "Note that the blue line shown in Figures 5.14 through 5.17 represents the load necessary to achieve the instream target of 15 mg/l TSS, which ensures that the DDT freshwater chronic criterion is achieved." As stated above, using the 15 mg/L TSS target is not appropriate for areas dominated by urban stormwater. Comparing Figures 5.14 (17th Ave.) and 5.16 (Palmbald Rd) seems to indicate that the same reduction of TSS loads is required at both locations to meet the DDT criterion. This is not the case and is an artifact of using the TSS surrogate instead of DDT in the load duration curve approach. As Figure 5.11 clearly shows, DDT concentrations at the 17th Ave site are much lower than at the Palmblad Road site, thus requiring less of a reduction to meet the criterion. The load duration curves should be created using DDT loads instead of TSS loads. (46)
Response	*Load duration curves were not used to determine the TSS surrogate measure for Johnson Creek, but are included to illustrate current TSS loading relative to the 15 mg/l instream target. The TSS target of 15 mg/l was established using a regression analysis. Wet versus Dry data are included to illustrate that the target is generally met during dry conditions. ODEQ acknowledges the variability in the regression and encourages additional monitoring and evaluation of the relationship between TSS, DDT and dieldrin. Figures 5.14 through 5.17 are intended to address the surrogate measure of TSS.*

Comment 111.	Page. 5-195 "The percent reduction in DDT concentration, determined conservatively by using the 90th percentile of the measured stormwater and instream samples, is 77% for urban stormwater and 94% for nonpoint sources (Table 5.6)." Using the 90% Confidence Interval is not a conservative but a fairly stringent measure. It is unclear how these reduction percentages were established. Please add the regression lines and upper 90% CI to the load duration curves (Figures 5.14 to 5.17). Since no urban stormwater load duration curve was established, this reduction percentage requires additional explanation. (46)
Response	*ODEQ assumes that where uncertainty exists, using targets that are more protective ("stringent") is conservative. The percent reduction for urban stormwater was determined using available monitoring data and should not be confused with the load duration curve analysis used to illustrate compliance with the instream TSS surrogate measure.*
Comment 112.	On pages 5-104 (temperature) and 5-144 (bacteria), the TMDL document refers to the privately owned wastewater treatment plant that serves the Happy Valley Mobile Home Park. The TMDL states that the anticipated project completion date (to decommission the plant and connect the park's wastewater discharge lines to WES' wastewater collection system via a pump station) is 2004. Please change this date to 2005. On pages 5-104 (temperature), the TMDL document refers to the privately owned wastewater treatment plant that serves the Happy Valley Mobile Home Park. The TMDL states that Mitchell Creek's summer-season, low flow condition isn't known, so the Department conservatively estimated it to be 0.5 CFS. One of WES' engineers, John Cramer, the construction project manager for the above noted project (i.e., to decommission the plant and connect the park's wastewater discharge lines to WES' wastewater collection system via a pump station) stated on 1/21/05 that Mitchell Creek's summer-season, low flow condition in the vicinity of the Park's outfall is far less than 0.5 CFS. He believed that the proper figure should either be zero or slightly more than zero CFS. (37)
Response	*The Happy Valley Mobile Home Park was connected to WES' wastewater collection system in March, 2005. The outfall to Mitchell Creek is no longer in use and ODEQ is in the process of canceling the NPDES permit for this facility. The TMDL document was updated with this information and wasteload allocations for the facility were removed.*
Comment 113.	On page 5-186, the Johnson Creek Inter-jurisdictional Committee (IJC) is referenced. Instead of stating "The (additional pesticide monitoring) project will begin in 2004," please state "The project began in 2003". Also, please list the IJC members' names here, for the IJC is an informal group and it isn't a legally recognized entity. The IJC's members are: The Johnson Creek Watershed Council, The Cities of Gresham, Happy Valley, Milwaukie and Portland, Clackamas County WES, Multnomah County, and the Oregon Department of Agriculture. (37)
Response	*The reference to the IJC was changed to "local stakeholders" and the timeline was updated to reflect when the sampling began and concluded.*
Comment 114.	On page 5-190, the following statement is present: "This decrease (in DDT concentration below Palmblad Road) may be explained by the fact that the gradient of Johnson Creek also decreases below the Palmblad Road site, slowing the water and increasing the potential for in-channel deposition of

	organochlorine pesticide-laden sediments (Figure 5.13)." While it appears to be true that the creek's gradient does diminish in that reach, it appears to be far more likely that the best explanation for the documented decrease in DDT below Palmblad Road is due to decreased loading of DDT from storm sewer outfalls and tributaries into Johnson Creek below Palmblad Road. Please include this likely explanation in the TMDL. (37)
Response	*The following sentence was added to this section: "The decrease may also be explained by dilution from stormwater and/or lower tributaries."*
Comment 115.	On page 5-6, the following statement is present: "A surrogate measure of 15 mg/l TSS may also be used to express compliance with in stream DDT concentrations." We believe this standard is not appropriate for urban storm water discharges. (37)
Response	*A TSS surrogate was not developed for urban stormwater. The words " for nonpoint sources" was added to the beginning of the sentence for clarity.*
Comment 116.	On page 5-6, the following statement is present: "ODEQ will revise the in stream and/or urban storm water TSS surrogate measures when sufficient monitoring data have been collected and submitted for review." We believe this approach is not appropriate in that it establishes a monitoring criterion while at the same time appearing to recognize potential scientific invalidity. We request the Department provide a scientifically valid basis for any criteria adopted. (37)
Response	*ODEQ intends to review and revise TMDLs on a routine basis and will use the best data and analysis available at the time. Conservative assumptions – those most protective of water quality - are made where uncertainty exists.*
Comment 117.	On page 5-180, the following statement is present: "Future monitoring and/or modeling efforts will be needed to confirm that the load reductions are adequate to achieve the Table 20 criteria for water and fish ingestion." It is unclear from this statement how the State intends to conduct any future monitoring and/or modeling. (37)
Response	*Future monitoring may be voluntary efforts by local stakeholders, required by NPDES permits or conducted by ODEQ.*
Comment 118.	On page 5-186, the following statement is present: "The same procedure was applied to the 10 samples collected from storm water pipes during the March 2002 storm event in order to evaluate whether a TSS surrogate measure for urban storm water is appropriate." A regression on these 10 data points, 6 of which were non-detects, appears statistically invalid. Also, one of those four detections appears to exert undue influence on the regression (i.e., it results in an increased slope…see p.188, Figure 5.8). (37)
Response	*The discussion of the procedure applied to the 10 stormwater samples is provided to illustrate **why** a TSS surrogate was not established for stormwater. ODEQ made clear in text, tables and allocations that a TSS target was **not** established for urban stormwater. The purpose of including the discussion of analysis that resulted in the 20mg/l TSS target was to explain how the analytical technique used to establish the 15 mg/l instream TSS target is inappropriate for urban stormwater. ODEQ believes that it is appropriate to explain why an analytical technique that resulted in an instream TSS target was not appropriate for urban stormwater.*
Comment 119.	Page 5-191's Figure 5.11 and page 5-187's Figure 5.6: An in-stream TSS target of 15 mg/L applies to non-point sources throughout the Johnson Creek watershed. It is counterintuitive to have a constant in-stream TSS target of 15 mg/L throughout Johnson Creek in light of the fact that the DDT concentrations decrease dramatically downstream while TSS concentrations

	do not decrease. An analysis of the regression data in Figure 5.6 indicates that the TSS/DDT ratio is much greater from Sycamore gage downstream than is the case above Sycamore gage, indicating that the TSS-DDT regression may not be appropriate. (37)
Response	*The U.S. Geological Survey (USGS) performed an analysis of the same data set and reported the results in "Organochlorine Pesticides in the Johnson Creek Basin, Oregon, 1988-2002". Three geographically distinct data sets, corresponding to Johnson Creek at river miles (RM) 17.2, 10.2 and 0.3, were analyzed to determine the TSS concentrations necessary to achieve Oregon's instream chronic DDT criterion. The USGS determined that TSS concentrations of 8, 18 and 15 mg/l were necessary at river miles 17.2, 10.2 and 0.3, respectively. The USGS also noted that the DDT/TSS relationship was relatively poor at the RM 0.3 sampling location. ODEQ's analysis used all of the available Johnson Creek data, which showed a good DDT/TSS relationship (R^2 = 0.76) and resulted in an overall instream TSS target of 15 mg/l. Reach-specific instream TSS targets are not appropriate from an implementation standpoint nor are they necessarily supported by available monitoring data.*
Comment 120.	On page 5-192, the following statement is present: "Note that the blue line shown in Figures 5.14 through 5.17 represents the load necessary to achieve the in-stream target of 15 mg/l TSS, which ensures that the DDT freshwater chronic criterion is achieved." Comparing Figures 5.14 (17th Avenue) and 5.16 (Palmblad Road) seems to indicate that the same reduction of TSS loads is required at both locations to meet the DDT criterion. This cannot be the case, given the higher DDT concentrations that have been detected at Palmblad Road. These figures appear to be using TSS instead of DDT in the load duration curve approach. As Figure 5.11 clearly shows, DDT concentrations at the 17th Avenue site are much lower than at the Palmblad Road site, thus requiring less of a reduction to meet the criterion. New load duration curves should be created using DDT instead of TSS. (37)
Response	*The discussion of Figures 5.14 - 5.17 indicates that they are indeed TSS load duration curves. The Figure titles were changed to clarify that they are based upon TSS. Figures 5.14 and 5.17 may appear similar due to the relatively large scale being used, which is why the data are also presented just below in Table 5.5. As shown in Table 5.5, the TSS loads necessary to meet the DDT criterion are much less for the Palmblad Road location than the 17th Avenue location downstream (96 versus 1205lbs/day, respectively, at the 90% flow exceedance probability).*
Comment 121.	On page 5-195, the following statement is present: "The percent reduction in DDT concentration, determined conservatively by using the 90th percentile of the measured storm water and in-stream samples, is 77% for urban storm water and 94% for non-point sources (Table 5.6)." It is unclear how these reduction percentages were established. Please add the regression lines and upper 90% confidence interval to these load duration curves: Figures 5.14 to 5.17. Since an urban storm water load duration curve was not established, this reduction percentage requires additional explanation. (37)
Response	*The percent reduction allocations were not based upon TSS load duration curves. Rather, they were simply calculated by taking the 90th percentile of the observed stormwater and instream monitoring results and determining the percent reduction necessary to achieve the DDT criterion.*
Comment 122.	Page 5-207, 2 paragraphs at top of page: Low permeability overbank flood deposits underlie the wetlands, though they

	are only a few feet thick under one area of [Note regarding suggested edit: at other places under the lakes the deposits are much thicker] Bybee Lake (Fishman, 1987). These silts contact either Pleistocene sands (under Smith Lake) or gravels (under Bybee Lake). In general, groundwater discharges at the Columbia River, though groundwater mounding creates smaller scale and complex gradients under the St. John's Landfill and Rivergate industrial area (Fishman, 1987; DEQ Consent Order to Metro, 2003). [Note regarding suggested edit: the semiannual monitoring is only of groundwater, the other monitoring is less frequent] (54)
Response	*Suggested changes were made to the TMDL document.*
Comment 123.	Page 5-214, first full paragraph on page: [Note regarding suggested edit: The 1997 plan was never approved by DEQ and is no longer applicable or relevant.] (54)
Response	*Suggested change was made to the TMDL document.*
Comment 124.	Page 5-68, Loading Capacity – This section provides a good overview of the loading capacity but does not define the specific numeric loading capacity (in kcal/day or degrees Celsius) for the TMDLs being established. Please provide this information. This comment is also applicable to the "loading capacity" sections in other subbasin temperature TMDLs. (65)
Response	*Numeric loading capacity in kcal/day for nonpoint source loading is provided on a watershed-specific basis. In Chapter 5, ODEQ determined the numeric loading capacity for the Columbia Slough and Johnson Creek watersheds, but not for the Tryon Creek Watershed (see p. 5-113). Numeric nonpoint source loading capacities are provided for the Slough and Johnson Creek.*
Comment 125.	Page 5-71, 2nd paragraph - We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. "As outlined in the section entitled 'Point Source Methodology', all other facilities in the subbasin were found to not be a significant contributor of heat to Columbia Slough. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load." A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*The suggested language was added.*
Comment 126.	Page 5-72, Table 3.14 – No period of application is indicated in this table. Unless specifically stated, these allocations will apply year-round. Please clarify if you have different intentions. Similar clarifications are suggested for WLAs in other subbasin temperature TMDLs. (65)
Response	*Language indicating that temperature waste load allocations apply year-round was added to the last paragraph of the section entitled "TMDL components applicable to the Lower Willamette Subbasin".*
Comment 127.	Page 5-5, Temperature, 1st paragraph – As this document established the TMDL, as opposed to proposing it, we recommend the first sentence be modified to read "ODEQ is establishing a TMDL for …" A similar comment applies to the Toxics section on page 5-6. (65)
Response	*Suggested edits were made to the TMDL document.*

Comment 128.	Page 5-5, Temperature, 1st paragraph – It is our understanding that this TMDL is establishing TMDLs for all perennial streams in the Lower Willamette Subbasin except for the mainstem Willamette River. However, this is not what is indicated in this paragraph. (65)
Response	*Correct. Clarifying language was added to the TMDL document.*
Comment 129.	Page 5-6, Toxics, last paragraph – This summary discusses allocations for DDT but has no mention of how dieldrin is being addressed. (65)
Response	*Since measured DDT and dieldrin concentrations in Johnson Creek are not statistically different, allocations for DDT also apply to dieldrin. A discussion of the data analysis is provided on page 5-180.*
Comment 130.	Page 5-8, Table 1.1, Designated Management Agencies – All of the Counties and Cities which are listed on p. 5-9 are not listed within this table. Is this accurate? (65)
Response	*Yes. Not all political jurisdictions were identified as DMAs.*
Comment 131.	Page 5-11, Table 2.1 – This table does not contain all of the listed waterbodies in the Lower Willamette Subbasin as suggested by its title. (65)
Response	*The title of the appropriate table was clarified.*
Comment 132.	Page 5-12, 303(d) Listed Parameters Not Addressed by this TMDL – Are records note that the iron and manganese listings in Columbia Slough and the PCB and PAH listings in Johnson Creek are also listed and not addressed by this TMDL. (65)
Response	*Response: The following language is included in the introduction section of Chapter 5:* ***" It should be noted that this document only addresses parameters listed on the 1998 303(d) list and that ODEQ published an updated 303(d) list in 2002. ODEQ is not proposing TMDLs at this time for parameters added to the 303(d) list in 2002 and did not complete TMDLs for parameters removed from the list between 1998 and 2002."*** *Tables, figures and other references to 303d listed parameters throughout Chapter 5 refer to the 1998 listings in order to avoid confusion.*
Comment 133.	Page 5-13, Columbia Slough Watershed, Introduction, 5th paragraph – Our records indicate that lead and bacteria TMDLs were also developed for Columbia Slough. (65)
Response	*A reference to elevated bacteria and lead concentrations was added.*
Comment 134.	Page 5-13, Columbia Slough Watershed, Introduction, 6th paragraph – It would be helpful for future reference if it were noted that the allocations established in the 1998 TMDL continue to remain in effect. Also, this section should note the other impairments in Columbia Slough which are either being addressed by this TMDL (temperature) or not addressed at this time (iron, manganese). (65)
Response	*Clarifying language was added.*
Comment 135.	Page 5-37, Temperature TMDLs - It would be helpful to include an introductory paragraph which explains the outline of this Temperature TMDL section, explaining what is addressed in the "TMDL Components Applicable to Lower Willamette Subbasin" subsection and what is presented in the sections pertaining to specific TMDLs. (65)

Response	*A brief description of the organizational structure of the document was added to the beginning of the temperature TMDL section.*
Comment 136.	Page 5-33, Temperature TMDLs, Scope of Action – Table 3.1 notes that these TMDLs are being developed to address all perennial and/or fish bearing streams in the Lower Willamette Subbasin. The document appears to only develop allocations for four watersheds, leaving a portion of the subbasin for which no TMDL elements have been developed. Please clarify. (65)
Response	*The TMDL applies basin-wide. ODEQ addressed subbasins with 303d listings individually but developed allocations for the entire basin.*
Comment 137.	Page 5-39, Water Quality Standard and Target Identification, last paragraph - It would be helpful to identify that this last portion of the standards is the one which most directly impacts the loading capacity and allocations established in these TMDLs. (65)
Response	*Suggested language was added.*
Comment 138.	Page 5-45, 4th paragraph – As the TMDL is establishing regulatory limits, it would be more accurate to say the equations were used to determine allowable loads as opposed to acceptable loads. (65)
Response	*The term "acceptable" was changed to "allowable".*
Comment 139.	Page 5-45, Maximum Effluent Temperature, equation input - While the rest of the TMDL addresses temperature in units of Celsius, the factors in this equation are stated in Fahrenheit units. This should be changed. (65)
Response	*Reference to Celsius was added to the equation.*
Comment 140.	Page 5-50, Figure 3.3 – We note that these illustrate the distributions according to ODFW, not those indicated on the recently adopted fish use maps. The TMDL should be written to the later maps, thus protecting for migration throughout the entire Slough. Other fish use maps in this chapter should also be reviewed for consistency with the new fish use designations. (65)
Response	*Agreed. Figure 3.3 was removed and references to salmonid presence and timing were removed from the Johnson Creek and Tryon Creek discussions.*
Comment 141.	Page 5-65, Water Level Predictions and Macrophyte Growth – Please review this section to ensure that the information utilized is consistent with that presented as part of the allocation for the 1998 phosphorus/aquatic growth TMDL for Columbia Slough. (65)
Response	*We have done so.*
Comment 142.	Page 5-69, Table 3.12 - It appears that the term "Background" in the title and "system potential" in the column titles represent the same thing. One term should be used consistently throughout the table, headings and the text. This comment also applies to similar tables for other watersheds within this subbasin. (65)
Response	*The term "System Potential" was substituted for "background" in titles and figures.*
Comment 143.	Page 5-71, NPDES Permits – Given the level of detail relative to the allocations for each facility which is provided in this section, it may be prudent to move some of this information into the Wasteload Allocation section. (65)
Response	*Noted.*

Comment 144.	Page 5-71, 1st paragraph, 2nd sentence – As allocations have been developed for other pollutants, we recommend that this sentence specify that this section is only addressing the temperature allocations. A suggested modification would be "ODEQ did not develop temperature waste load …". (65)
Response	*Suggested language was added.*
Comment 145.	Page 5-71, 2nd paragraph - We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. "As outlined in the section entitled "Point Source Methodology", all other facilities in the subbasin were found to not be a significant contributor of heat to Columbia Slough. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load." A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. We would recommend that you add a paragraph to the end of this section which specifies how new sources should be addressed. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*Since the treatment of new sources will be consistent throughout the subbasin, the following language was added to the "Point Source Methodology" section on p. 5-45: Existing and future thermal point sources in the subbasin may be permitted to discharge under the following conditions:* *1) They do not cause more than a 0.3°C increase in stream temperature above the applicable criteria after mixing with 25 percent of the stream flow or at the edge of a defined mixing zone, whichever is more restrictive.* *2) The sum of waste load and load allocations result in an increase in stream temperature of no greater than 0.3°C above the applicable criteria after complete mixing and at the point of maximum impact.* *Pollutant trading opportunities may be available to new or existing point sources in order to offset temperature impacts.*
Comment 146.	Page 5-106, Effective Shade Curves, 2nd sentence – We believe your intent was to addresses the Johnson Creek tributaries instead of those in the Columbia Slough watershed. (65)
Response	*Correct. The sentence was corrected.*
Comment 147.	Page 5-106, Effective Shade Curves, last two sentences – It is not clear where the information is presented to determine effective shade targets for reaches not specifically addressed in Figure 3.45. (65)
Response	*A reference was added for clarity.*
Comment 148.	Page 5-117, Figure 3.51 – The figure title suggests that the three identified watersheds are the only ones in which TMDLs apply. This is inconsistent with the scope of the TMDL as discussed in Table 3.1. (65)
Response	*The title to the appropriate figure was changed so as not to infer that the TMDL applies only to the watersheds shown in the figure. Individual watersheds were shown in the figure simply to provide spatial orientation for the reader.*

Comment 149.	Page 5-161, Fairview Creek Allocations - The wasteload and load allocations are established at 66%, an average of all flow conditions in the load duration curve. However, Figure 4.32 indicates a 91% reduction is necessary to address bacteria problems during high and wet flow regimes. This is not the method used in Upper Willamette subbasin TMDLs where the most conservative flow-regime reductions were applied. It is unclear as to why the more conservative approach was not used here. Please explain how this approach will meet the water quality criteria. The allocations for Johnson Creek and Springbrook Creek are also calculated by averaging the percent reductions of all flow regimes. However, this approach may be more appropriate in cases where the % reductions are similar across all flow regimes. Johnson Creek percent reductions range from 72-82% and the average is 78%; Springbrook Creek percent reductions range from 71-89% and the average is 80%. In Fairview Creek, percent reductions range from 42-91%, and the average is 66%. (65)
Response	*The bacteria load reductions for the Lower Willamette subbasin were established to ensure that the water quality criterion of 126 cfu/100ml as a geometric mean is met. The geometric mean of the Fairview Creek data is 239 cfu/100ml, which would require a 47% reduction. A more conservative reduction of 66% was established by using the 75th percentile of the population to calculate the necessary reduction.*
Comment 150.	Page 5-162. The Fairview TMDL states that the reductions have been applied to both point and non point sources, but previously (p. 5-160) it was stated that no point sources are present which are believed to exceed the standard. This should be clarified. If point sources are already discharging below the water quality criteria, would they be required to reduce by the target percentages? (65)
Response	*The following language was added for clarification and consistency: "Stormwater discharged to Springbrook Creek via the municipal separate storm sewer systems (MS4) is the only known NPDES-permitted discharge in the watershed that has the potential to discharge significant bacteria loads."*
Comment 151.	Page 5-176 – The TMDL should include a listing of the listed waterbodies addressed by the TMDL. (65)
Response	*Only the mainstem of Johnson Creek is on the 303(d) list for toxics, but the TMDL allocations apply to all streams in the watershed. Additional language was added to the introduction section of the toxics TMDL to add clarity.*
Comment 152.	Page 5-177, Table 5.1 - The later half of the table only addresses the components of the DDT TMDL. Elements of the dieldrin TMDL should also be included. (65)
Response	*Measured instream concentrations of DDT and dieldrin show them to be effectively equal, while the allowable dieldrin concentration is nearly double that of DDT. Since a good relationship (R^2 = 0.81) exists between instream DDT and dieldrin concentrations, ODEQ believes that achieving DDT criteria will also result in the attainment of dieldrin criteria. Dieldrin was not detected in stormwater samples, so the required DDT reduction of 77% is quite conservative in ensuring that the dieldrin criterion will be achieved in stormwater. This language was added to the appropriate table.*
Comment 153.	Page 5-178, Water Quality Standards and Pollutant Identification, 1st paragraph and Table 5.2 – As identified in Table 5.2, Oregon has three water column criteria for DDT and dieldrin, all of which are applicable in

	Johnson Creek. As such, the TMDL should be written to the most stringent of the criteria, thereby ensuring that all of the criteria are attained through the attainment of the allocations. (65)
Response	*ODEQ clarified the language in the TMDL document and included an estimation of when the most stringent criteria will be achieved. ODEQ set allocations to achieve the chronic criteria and expects the human health criteria to be achieved in time based upon the degradation rate observed in the watershed over an approximately 10 year period of time. Continued monitoring will be necessary to track progress toward achieving the allocations as well as tracking long-term attenuation of legacy pesticides.*
Comment 154.	Page 5-178, Water Quality Standards and Pollutant Identification, 3rd paragraph – Please cite the location in your water quality standards which specifies that the chronic criterion should be evaluated based upon a 24-hour average. (65)
Response	*The chronic freshwater DDT and dieldrin criteria were developed based upon a 24-hour exposure. Additional information on the criteria can be found at the following web addresses:* *http://www.epa.gov/waterscience/pc/ambientwqc/aldrindieldrin.pdf* *http://www.epa.gov/waterscience/pc/ambientwqc/ddt80.pdf*
Comment 155.	Page 5-194, Table 5.5 - This table only addresses the loading capacity for DDT. Loading capacities for dieldrin should also be provided either numerically, through a written explanation or adding dieldrin to the current table headers and title. Allocations – Allocations should also be provided for dieldrin. (65)
Response	*ODEQ provides the following rationale for using DDT only in the loading capacity and allocation discussions (p. 5-180): Based upon an evaluation of the data presented in Figure 5.1, ODEQ determined that concentrations of dieldrin and DDT observed during the 2001-03 sampling period were NOT significantly different at the 95 percent confidence interval using both the t-test (following log transformation and assuming unequal variances) and the Mann-Whitney "U" test. In other words, the concentrations of DDT and dieldrin observed in Johnson Creek are effectively equal. Since the aquatic life criterion for dieldrin is nearly twice that of DDT and their chemical behaviors are quite similar, ODEQ assumes that allocations and/or surrogate measures developed to meet the DDT criterion will also be protective of the dieldrin criterion. Some analyses presented in subsequent sections of this document and the allocations assigned to sources will largely focus on DDT and, where appropriate, the surrogate measure of Total Suspended Solids.*
Comment 156.	Page 5-195, Margin of Safety – This TMDL contains no description of the Margin of Safety. Please add. (65)
Response	*ODEQ provides a brief MOS evaluation in Table 5.1.*
Comment 157.	Page 5-7, MCDD1, City of Portland and US Army Corps of Engineers 1135 Project, 12th line – Should be "… riparian vegetation will be established …". Page 5-8, Table 1.1 – City of Wood Village (list of DMAs), "v" in Village should be capitalized. Page 5-119, Figure 3.52 – Title should read "Applicable in Coast Range Volcanics and Willapa Hills".

	Page 5-181, 3rd paragraph, second sentence/line – “and” should be “an” (65)
Response	*Suggested corrections were made to the TMDL document.*

Comments on Chapter 6: Clackamas Subbasin	
Comment 1.	Correct name of Clear Creek Rainbow Ranch, Inc. (13)
Response	*Correction was made.*
Comment 2.	Any additional requirements on our business at this time will be a hardship. (13)
Response	*Clear Creek Rainbow Ranch, Inc. received an individual waste discharge permit effective February 1, 2004. At this time, the facility is only required to comply with the permit limits, including the best management practice of installing shade netting over raceways and the lagoon once operations restart. The permit may be modified when renewed to reflect allocations in the TMDL.*
Comment 3.	The Department is inconsistent in not assigning a temperature waste load allocation (WLA) to the Estacada sewage treatment plant (STP) (p. 6-33). The Department did assign a temperature WLA to the Hoodland STP in the Sandy TMDL. Both STPs discharge above the 303(d) listed section of their respective receiving streams and neither had the potential to increase the river's temperature more than 0.3C with 25% of the in-stream flow allowed for mixing. (37)
Response	*The County observes correctly that ODEQ assigned an allocation to the Hoodland facility and did not assign an allocation to the Estacada facility. Two factors entered into our decision. First, the Hoodland facility's discharge, while not raising stream temperature more than 0.3º C when mixed into one-quarter of the 7Q10 streamflow of the Sandy River, has greater potential to significantly raise stream temperature. The Hoodland dry weather design flow discharge (1.5 cfs) is approximately twice that of the Estacada dry weather design flow (0.84 cfs) and the Sandy River 7Q10 flow (139 cfs) is approximately one-quarter of the 7Q10 flow of the Clackamas River (595 cfs). Our calculations show that the Hoodland facility has the potential to raise stream temperature by 0.2º C and the Estacada facility has the potential to raise stream temperature 0.08º C, in both cases when effluent is mixed in to one-quarter of the respective 7Q10 flows.* *Second, the Estacada facility's permit was renewed in September 2003 and already includes a thermal load limit (51,341,040 BTU/day). That limit is based on 1.5 times the average dry weather design flow (0.81 million gallons/day) and estimated weekly (7-day average) maximum effluent temperature (71.6 ºF, 22 ºC). The thermal load limit in the permit is sufficiently protective and ODEQ does not see a need at this time to assign a waste load allocation.*
Comment 4.	WES recommends that the statement, "Metro is currently considering extending the UGB to encompass Boring (p. 6-29)," be removed or rephrased to state that the UGB is approximately one mile away (from the edge of the Boring STP service area) at this time (37). Also on page 6-29, the Department states that one solution to the perceived temperature issue would be, "…pumping the (Boring STP) effluent to the Kellogg Creek system," Is the Department suggesting that WES pump the Boring STP effluent into the creek system itself or into the collection system served by the Kellogg Creek WPCF? It is inappropriate for the Department to suggest means and methods of sanitary sewer service provision in a regulatory document (37). On page 6-29, under the Boring STP heading, the Department mentions

	two solutions that were contained within the October 2002 Temperature Management Plan. Add two other potential solutions that WES is considering: 1) on-site disposal of some treated effluent with a WPCF-permitted system, and 2.) transfer some wastewater in truck tankers to another WES-operated STP.
Response	*ODEQ's reference to options for changing the management of the Boring STP effluent was an attempt to paraphrase the conclusions in the Temperature Management Plan that Clackamas County WES submitted to ODEQ in October 2002. ODEQ did not intend to suggest means and methods of sanitary sewer service. ODEQ rephrased the paragraph to make clear the potential solutions come from the Temperature Management Plan, and are not ODEQ suggestions; we added the two additional potential solutions that WES is considering, and deleted the reference to the Urban Growth Boundary.*
Comment 5.	On page 6-34, the Department states that, "Clackamas County reports the estimated Deep Creek 7Q10 flow (0.65 cfs)…" This flow figure was reported for the North Fork of Deep Creek, not the mainstem. (37)
Response	*ODEQ made the correction, changing the reference from "Deep Creek," to "North Fork Deep Creek."*
Comment 6.	On page 6-63, the Department states, "The subbasin percent reductions are based on the percent reductions applied in the Johnson Creek watershed." An assumption of similar conditions in these watersheds is inappropriate and generalizations are unsupported. The Department should perform separate reduction calculations for the Clackamas River. (37)
Response	*ODEQ based its comparison of land use in the lower Clackamas and Johnson Creek on a geographic information systems representation of 1992 U.S. Geological Survey aerial photography. ODEQ understands that compared to the Lower Clackamas watershed, the Johnson Creek watershed has a higher percentage of residential and industrial land (43%) compared to agriculture (24%) and forestry (27%). Lower Clackamas watershed land use breaks down to 40% forestry, 48% agriculture, and only 10% residential and industrial.* *The similarities between the watersheds that ODEQ considered significant to bacterial loading were the close to equal percentage contribution from both agricultural and forestry land uses (within each watershed), and transition from forestry and agriculture to urban land use in the lower watersheds. ODEQ conducted extensive monitoring throughout the Johnson Creek watershed to generate specific load duration curves for multiple sites, and found that similar reductions were necessary in both agricultural and urban land uses to meet water quality standards. Although ODEQ collected and analyzed more data from the Johnson Creek watershed than from the Clackamas watershed, our analysis of seasonal bacteria and flow data showed another similarity between the watersheds: in both cases year-round violations occurred under various flow conditions, indicating multiple sources causing the violations.* *ODEQ acknowledges that the Clackamas watershed received less data collection and analysis than other Willamette watersheds based on the severity of water quality violations and available resources. ODEQ recognizes that its proposed bacteria reduction in the Clackamas watershed is conservative because of the uncertainty associated with a small data set and limited flow data. ODEQ encourages Designated*

	Management Agencies to collect data that will help identify bacteria sources and quantify how management strategies reduce bacterial contamination. ODEQ will consider such information in TMDL implementation as well as revisions.
Comment 7.	On page 6-42, mention pets as a source of bacterial contamination. (37)
Response	*ODEQ would expect pet waste to be a component of "urban runoff," as mentioned in the list of potential bacteria sources, but modified the document to add "pet waste" specifically in this section.*
Comment 8.	In table 6.11 on page 6-42: • Cow Creek isn't listed. • Sieben Drainage Ditch should be called Sieben Creek. • The listing criterion for Deep Creek, North Fork Deep Creek, and Tickle Creek is inconsistent with the E. coli standard and appears to be the fecal coliform standard. (37)
Response	*ODEQ has incorporated each of these three corrections into Table 6.11. ODEQ kept parenthetical reference to Sieben Drainage Ditch here and throughout the document because Sieben Drainage Ditch is the reference for 303(d) listing.*
Comment 9.	Page 6-52: The current dominant land use in the Sieben Creek watershed is urban residential, rather than rural residential. (37)
Response	*ODEQ modified the document to include this more accurate information.*
Comment 10.	Does the Department have evidence to support the statement (p. 6-42), "The sources of bacteria violations may include…sewage treatment plants." (37)
Response	*While we intended this statement to be a general statement of possible sources that may all contribute to bacteria standard violations, yes the Department does have evidence in discharge monitoring reports that sewage treatment plants on occasion contribute bacterial contamination to streams in the Clackamas watershed.*
Comment 11.	WES requests inspection information for the Clackamas River watershed's six CAFO permit holders including frequency of inspection and any noted violations. (37)
Response	*WES should call Sarah Harshberger (503) 986 – 4780, the ODA CAFO inspector in Region 2, which includes the Clackamas watershed, for this information.*
Comment 12.	Why does the Clackamas Subbasin chapter (as well as the Johnson Creek and Tryon Creek chapters) not contain a statement of DEQ's expectations for DMAs achieving shade targets, as DEQ stated for the Columbia Slough on page 5-83. (37, 28)
Response	*The omission of this statement in the Clackamas Subbasin chapter does not imply that ODEQ does not expect DMAs in the Clackamas Subbasin to work toward achieving shade targets. ODEQ expects all DMAs to submit implementation plans that describe how they will address pollutant sources and how they will measure progress and success of their program.*
Comment 13.	Flow chart outlining process for developing WLAs: EPA has two comments regarding this flow chart. 1) The term "Pre-TMDL Limits" is used in the first decision box. It is unclear whether this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote

	may be helpful. 2) In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*ODEQ has modified the appropriate flow chart. ODEQ has deleted the heading "Pre-TMDL limits and reworded the question to read, "Does the point source discharge warm the river less than 0.3°C above numeric criterion given 25% of 7Q10 flow? ODEQ will adopt EPA recommended language that a determination of No Reasonable potential results in discharge being allowed at the current level.*
Comment 14.	Page 4-9, Target Identification. As these TMDLs rely heavily on the Human Use Allowance, paragraph 12(b) should be cited in this section. (65)
Response	*ODEQ has added a reference to 340-41-0028 12(b) to Table 6.3, Loading Capacity Allocations.*
Comment 15.	Page 4-17, Waterbodies Listed for Temperature. Tables in Appendix 4.1, 4.2 and each subbasin chapter should specify the chapter in which the segment is addressed so that allocations can be easily correlated with individual listed segments (some of the subbasin chapters include the mainstem listings (addressed in Chapter 4) and some do not). One way to do this may be to subdivide tables into "segments addressed in chapter 4" and "segments addressed in subbasin TMDL". (65)
Response	*ODEQ has modified Table 6.1 to describe the chapters in which the various reaches are addressed.*
Comment 16.	Page 4-102, Wasteload Allocations - Season of Applicability. As currently written, neither the waste load allocation framework nor the numeric allocations for the mainstem and the various subbasins discuss the period of the year during which waste load allocations will apply. While it is implied that where monthly allocations are provided, that no limits are needed during certain months but nothing stipulates how the permits are to interpret the presence of no allocation (WLA = 0 kcal/day or current loading?). Furthermore, there is nothing which specifies whether the narrative for small sources must be implemented year-round, only during certain months, or only during the months where the analysis shows it has a potential to impact stream temperatures. This should be clarified so that the period of applicability is clear to the permittees and the permit writer. Page 5-72, Table 3.14 – No period of application is indicated in this table. Unless specifically stated, these allocations will apply year-round. Please clarify if you have different intentions. Similar clarifications are suggested for WLAs in other subbasin temperature TMDLs. (65)
Response	*Table 6.8 assigns allocations in the Clackamas Subbasin. There are allocations for each of the two criteria that apply during Core Cold Water periods and Salmon and Steelhead Spawning periods (Table 6.7). ODEQ's intent is that permits will be modified to comply with waste load allocations applicable to each beneficial use period. This provides allocations year-round.*

Comment 17.	Page 5-68, Loading Capacity – This section provides a good overview of the loading capacity but does not define the specific numeric loading capacity (in kcal/day or degrees Celsius) for the TMDLs being established. Please provide this information. This comment is also applicable to the "loading capacity" sections in other subbasin temperature TMDLs. (65)
Response	*ODEQ did not calculate a loading capacity for the Clackamas Subbasin. Load capacity is defined in Table 6.3 as the heat load that corresponds to the applicable numeric criteria plus the small increase in temperature of 0.3°C provided with the human use allowance.*
Comment 18.	Page. 5-71, 2nd paragraph - We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. "As outlined in the section entitled 'Point Source Methodology', all other facilities in the subbasin were found to not be a significant contributor of heat to Columbia Slough. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load." A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has modified the document to include this statement.*
Comment 19.	Page 5-71. We would recommend that you add a paragraph to the end of this section which specifies how new sources should be addressed. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has modified the document to include the following statement:* *Existing and future thermal point sources in the subbasin may be permitted to discharge under the following conditions:* *1) They do not cause more than a 0.3°C increase in stream temperature above the applicable criteria after mixing with 25 percent of the stream flow or at the edge of a defined mixing zone, whichever is more restrictive.* *2) The sum of waste load and load allocations result in an increase in stream temperature of no greater than 0.3°C above the applicable criteria after complete mixing and at the point of maximum impact.* *Pollutant trading opportunities may be available to new or existing point sources in order to offset temperature impacts.*
Comment 20.	Page 6-40, Implicit Margins of Safety – While methodologies applied in the various subbasin TMDLs are quite similar, some descriptions of the margin of safety are much abbreviated in comparison to others. We recommend that, where applicable, all conservative assumptions applied in each subbasin be fully described. (65)
Response	*ODEQ has modified the document to include a more comprehensive description of the Margin of Safety.*
Comment 21.	Wasteload Allocations – It would be helpful if each subbasin chapter provided the results of the preliminary screening which has been conducted. This would provide the reader with some understanding of what might be expected of each source and their potential impact. (65)

Response	*ODEQ has modified the document to include a table that shows the calculated temperature increase potentially caused by each point source.*
Comment 22.	The Clackamas River from the mouth to river mile 15.0 is on the 303(d) list for E. coli for June 1 to September 30. WES believes that the section of the Clackamas River that is at and above Carver (roughly river mile 8.0) should not have been placed on the 303(d) list. WES has collected data from the Clackamas River's main stem that appears to show that the main stem meets water quality standards for E. coli between (roughly) river miles 15 and 8. This surface water quality data was submitted by WES to the Department via email on February 15, 2002 (for the period from December 1995 to January 2002), and via email on May 19, 2003 (for the period from February 2002 to April 2003). Eighteen samples were collected on a monthly basis from the Clackamas River from the bridge in Carver in June, July, August and September in 1998, 1999, 2000, 2001 and 2002. One of these eighteen samples (collected in June 1998) exceed the 406 colonies/100ml standard. In table 6.16 on page 6-49, the Carver bridge monitoring site is listed as exceeding the 406 colonies/100ml standard only 7% of the time, which is less than the 10% minimum needed for placement on the 303(d) list. Because these samples were collected on a monthly basis, the other listing standard (i.e., 30 day log mean of 126 colonies/100ml) does not appear to apply, for it requires at least 5 samples in a 30-day period. When this matter was brought to the Department's attention by WES in December 2002, Ms. Marilyn Fonseca notified WES that the entire lower 15 miles of river would need to stay on the 303(d) list because the public comment period had expired, but she encouraged WES to address this issue during the public comment portion of the TMDL development phase. WES requests that the E. coli TMDL for the main stem of the Clackamas River be adjusted to reflect the fact that the River at and above Carver was erroneously placed on the 2002 303(d) list. (37)
Response	*ODEQ understands WES's concern. As a reminder, once USEPA approves the Willamette TMDL, the Clackamas River and tributary reaches listed for temperature and bacteria violations will all be removed from the 303(d) list. Also, the Clackamas TMDL allocations and reductions will apply to the entire subbasin (not just the listed stream segments). ODEQ appreciates the data WES shared during Clackamas TMDL development and the efforts made to meet ODEQ quality assurance standards. We agree with WES's comment that the data collected from the Carver Bridge site indicates that at that location the mainstem Clackamas does not violate water quality standards more than 10% of the time. However, ODEQ does not agree that the data from the Carver Bridge site, on its own, warrants delisting seven miles upstream.* *Where data indicate a water quality violation, ODEQ typically lists the stream to a natural division (such as the headwaters or a major tributary), a distinct land use change, a designated beneficial use change, or to a major point source. Goose Creek enters the Clackamas River at river mile 15; this is the first tributary upstream of Deep Creek (entering the mainstem at approximately river mile 13). The Deep Creek watershed encompasses two tributaries that accept treated waste water and is also listed for bacteria standard violations. ODEQ considers the bacteria listing upstream of river mile 8 to be appropriate given inflow from a similarly listed tributary.*

Comments on Chapter 7: Middle Willamette Subbasin	
Comment 1.	Page 7-1 The page numbers need to be corrected both in the Table of Contents and on the individual pages themselves. The comments that follow will cite the page numbers as they currently chronologically appear in the document. (63)
Response	*ODEQ has corrected the problem both in the Table of Contents and the actual page numbers.*
Comment 2.	Page 7-4 Tables containing name and location of listed waterbodies, it would be helpful if these tables were separated into those segments for which TMDLs have been developed in their respective chapters, those segments which are addressed in a separate chapter (i.e. Chapter 4, mainstem temperature) and those segments which are not being addressed at this time. If all listed segments are not included in the table, the title should be changed to reflect what is included. (65)
Response	*ODEQ has added a "TMDL" column to the table identifying in which chapter the TMDL is found or if it was not completed (indicated by a 'no').*
Comment 3.	Page 7-4 Water Quality Parameters Not Addressed - We recommend that another paragraph be added to this section which identifies the TMDLs which were previously established. Our records indicate that DEQ established TMDLs for ammonia and BOD in Rickreall Creek in 1994. We recommend that it be noted that these TMDLs were not reviewed or changed as part of this TMDL and thus the allocations established in 1994 remain in effect. Such a paragraph would help provide the reader with a more comprehensive picture of water quality and TMDLs in this subbasin. (65)
Response	*ODEQ has added this information.*
Comment 4.	Page 7-6. The list of political jurisdictions is missing Stayton and Turner, both of which discharge stormwater into the Mill Creek watershed. (63)
Response	*ODEQ has added this information.*
Comment 5.	Page 7-7 For clarification, the Santiam Water Control District (SWCD) has multiple points of return from its system into the Mill Creek system. The SWCD also has another point of diversion (just south of Kuebler Boulevard) that eventually discharges into the Middle Pringle/East Pringle system. Regarding Turner, that City is not included in Salem's MS4 permit, the latter being a Phase I permit, not Phase II. Also, Marion County will be a DMA for the Mill Creek system, and they are also designated a Phase II MS4. For accuracy purposes, Shelton Ditch may have been constructed to minimize the effects of flooding, but the Mill Race has its historical roots as the water supply for Mission Mill and the Boise Cascade pulp and paper mill (and its predecessors). It is not for flood control. (63)
Response	*ODEQ has added this information.*
Comment 6.	Page 7-7, 50, 53 Salem's permit does not include Turner. Also, Salem's urbanized area includes Turner, Keizer, Marion County, and Polk County, all of which are designated MS4 Phase II jurisdictions. Page 7-28, first paragraph requires similar correction. (63)
Response	*ODEQ has added this information.*
Comment 7.	Page 7-8, 81 We do not believe that Chiquita Processed Foods has an NPDES permit for Pringle Creek (unless its their now closed warehouse plant at 14th and Oxford Streets SE). (63)

Response	*ODEQ has verified this information. Chiquita Process Foods NPDES permit 101785, is no longer in operation. However, they want to keep the permit for future needs. ODEQ currently has a renewal application for the facility.*
Comment 8.	Page 7-8 implies that flow in Rickreall Creek is controlled by Aaron Mercer Reservoir to maintain a minimum stream flow of ten cubic feet per second (cfs). Storage capacity in Aaron Mercer Reservoir is very small in comparison to the annual quantity of flow in Rickreall Creek. The reservoir typically completely fills during the first few rainfall events in the fall. Once the reservoir fills it no longer provides flow control capability until flow coming into the reservoir drops in late spring or early summer. Water flows uncontrolled over the spillway until flow entering the reservoir falls below approximately eight to ten cfs, which is the flow typically released through the reservoir low elevation discharge structure. As such, the City has relatively little control over flow in Rickreall Creek when the Reservoir is full, typically from mid fall through early summer. The City does have some control over flow in Rickreall Creek below the reservoir, via control of the discharge structure, when flow over the reservoir spillway is not occurring. Water released through the discharge structure during the dry weather season (approximately eight to ten cfs) flows approximately six miles downstream to the City's water intake where a portion of the water is diverted for City use. Flow control exercised by the City can best be described as in the following paragraph: "During the dry weather low flow period, the City adjusts the release from Mercer Reservoir to, at a minimum, match flows entering the reservoir. This practice ensures that flows in the individual streams entering the reservoir in excess of the City's water right are passed through below the City's water intake. During extreme low flow periods when the flow into the reservoir is less than the City's in-stream water right, it has been the City's practice to use water stored in the reservoir to maintain minimum flows (1.5-2.5 cfs) below the water intake. This practice has prevented Rickreall Creek from "drying-up" as may have been the case prior to construction of Mercer Dam." Obviously, the City has no control over other water users that divert water from Rickreall Creek. (14)
Response	*ODEQ has added this information to clarify the operation of Aaron Mercer Reservoir in the Subbasin Overview section.*
Comment 9.	Page 7-8 The Willamette watershed also includes Gibson Creek. Also, while Chiquita Processed Foods probably still has a valid permit, we understand that it has permanently closed. (63)
Response	*ODEQ will add text regarding the inclusion of Gibson Creek. ODEQ has verified the information regarding Chiquita Processed Foods and has made the appropriate changes in the text. Chiquita Process Foods NPDES permit 101785, is no longer in operation. However, they want to keep the permit for future needs. ODEQ currently has a renewal application for the facility.*
Comment 10.	Page 7-9, Table 7.2, Reserve Capacity . The information presented here is not consistent with that provided in the main TMDL, p. 7-19. This same comment applies to the temperature TMDLs for several subbasins including the Upper Willamette. (65)
Response	*ODEQ has updated that TMDL Components Table to reflect the allocation for increases in pollutant loads for future growth from new or expanded sources. Reserve Capacity will be a percentage of the 0.3˚C Human use allowance (HUA). The HUA will be divided among various sources. When point sources are present reserve capacity will be 0.05˚C, 17% of the HUA. Where there are no point sources in a subbasin, or less than the allowed 0.2˚C is used by point source discharges, the remainder is allocated to Reserve Capacity.*

Comment 11.	Page 7-10 Without further investigation, the listed length for Pringle Creek of 6.2 miles seems too long, especially to support rearing. (63)
Response	*ODEQ does not agree. When use is not specifically designated on the fish use maps the applicable criteria for these waters are the same criteria as is applicable to the nearest downstream water body depicted on the applicable map (OAR 340-41-0028(5)).*
Comment 12.	Page 7-10 Table 7.3 indicates that the listing criteria for Rickreall Creek is "rearing". This is not consistent with the discussion on this topic provided in the paragraph above the table, on page 7-17 or in the last paragraph on page 7-30. Table 7.3 should reflect the cool water designation for the lower 10.4 miles of the creek below the City of Dallas. (14)
Response	*The listing criteria for Rickreall Creak in Table 7.3 identifies the original listing criteria under the previous Temperature Criteria. This is explained in the second paragraph on page 7-10. Rickreall Creek was listed in 1998 when the previous Temperature Criteria was in effect. ODEQ proposed new temperature standards for Rickreall Creek in 2003, but EPA did not approve the cool water species designation.*
Comment 13.	Page 7-11, it would be useful to clarify that wild fires, floods, and insect infestation affect stream temperature by affecting the presence and density of riparian vegetation. The reader might be confused if this connection is not explicitly stated. (17)
Response	*ODEQ has made the suggested clarification.* *Stream temperatures are affected by natural and human caused sources of heating. Disturbance processes such as wild fire, flood, and insect infestation influence the presence, height and density of riparian vegetation which in turn determines the amount of solar radiation reaching the stream. Such processes are recognized and incorporated as a natural condition in the TMDL. This temperature TMDL does address stream heating caused by human activities that affect characteristics of riparian vegetation in addition to point sources that discharge heat directly into surface waters in the Middle Willamette Subbasin.*
Comment 14.	Page 7-13 Map 7.4: The text in the legend for the third parameter should read "Cool Water Species" (there is a typo there). (62)
Response	*USEPA has not approved the cool water species designate use for the Willamette basin. This use was removed from tables and maps.* *The language describing the temperature criteria has been altered in the final TMDL to indicate that the reach from river mile 0 to 10.4 has no habitat use designation. USEPA has not approved the cool water standard for use in complying with the federal Clean Water Act.*
Comment 15.	Page 7-13, Table 7.5, last row - It appears the two columns in this row are reversed. (This also applies to Table 10.5) (65)
Response	*USEPA has not approved the cool water species designate use for the Willamette Basin. This use was removed from the tables and maps.* *The language describing the temperature criteria has been altered in the final TMDL to indicate that the reach from river mile 0 to 10.4 has no habitat use designation. USEPA has not approved the cool water standard for use in complying with the federal Clean Water Act.*
Comment 16.	Page 7-14 – This discussion should include the provision containing the Human Use Allowance. (65)
Response	*ODEQ has added text relating to Human Use Allowance to this section.* *Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above*

	the applicable criteria after complete mixing in the water body, and at the point of maximum impact.
Comment 17.	Page 7-15_ The discussion of Franzen Reservoir is inaccurate. It does not provide off-channel storage, but instead is a storage reservoir within Salem's municipal water system (totally unrelated to Mill Creek). Also, its previous NPDES Permit has been canceled (at the City's request); it is now covered by the City's MS4 Permit. Moreover, why is Mill Creek discussed in this section if it isn't listed for temperature? (63)
Response	*ODEQ has added text clarifying the status of Franzen Reservoir:* *Mill Creek and Franzen Reservoir are discussed in the "Existing Hear Sources" section to provide the reader with information on the types of sources of heating to a stream / reservoir system, such as land use, diversions, and reservoir operations. However, Mill Creek is a tributary to the Willamette River and may contribute thermal loading to the mainstem Willamette River. TMDL allocations are applicable to all streams in the subbasin regardless if they are listed or not.*
Comment 18.	Page 7-15 contains inaccurate information related to the City's management of Aaron Mercer Reservoir. Please refer to discussion provided under comment #1. (14)
Response	*ODEQ has added clarifying text explaining the management of the reservoir.*
Comment 19.	Page 7-17 Table 7.6 provides a permit description for the Dallas STP of "Sewage Disposal: NPDES 5 MGD or more, less than 10 MGD". The current Dallas Wastewater Treatment Facility (WWTF) has a design capacity of 2.67 Dry Weather Average Daily Flow and 18.62 Wet Weather Peak Instantaneous Flow. (14)
Response	*ODEQ will not make the stated change in Table 7.6, however the design capacity information has been added to the text. Table 7.6 simply provides a general description of the permit type issued.*
Comment 20.	Page 7-17 discusses the City of Dallas Poplar Demonstration Project. This is a limited term demonstration project involving the diversion of a portion of an industrial waste stream for polar irrigation in order to evaluate the feasibility of a future larger scale project. Any future project will require separate permitting consideration by DEQ. (14)
Response	*ODEQ has added information regarding the limited duration of the poplar demonstration project.*
Comment 21.	Page7-17 It seems strange that DEQ doesn't know the season of discharge for Norpac Plant #1. (63)
Response	*The following information has been added to the TMDL:* *Norpac Plant #1 in Stayton does discharge wastewater to a pond that is later land applied. The boiler blow down and non-contact water is discharged to Mill Creek. The permit process is currently on hold for several reasons, however the permit remains open.*
Comment 22.	Page 7-17 Table 7.8 needs to be corrected - Franzen Reservoir no longer has an NPDES permit. Also, does Norpac Plant #1 really discharge wastewater? The City's understanding is that their discharge to the Mill Creek system consists of non-contact cooling water and boiler blowdown. Table 7.16 (Page 7-24) needs similar correction. (63)
Response	*ODEQ has added the following information to the TMDL:* *Franzen Reservoir NPDES permit 101382, has been terminated.* *Norpac Plant #1 in Stayton does discharge wastewater to a pond that is later land applied. The boiler blow down and non-contact water is discharged to Mill Creek.*

	The permit process is currently on hold for several reasons, however the permit remains open.
Comment 23.	Page 7-17 contains information related to the City's compliance schedule and tasks contained in the schedule. The schedule has changed from what is presented in the TMDL Report and the task descriptions are not entirely accurate. The current schedule and submittal descriptions are contained in Attachment #1 to these comments. Phase II tasks involve developing and implementing alternatives to address heavy metals and ammonia associated with industrial discharge to the WWTF (diversion of industrial waste to poplars is one of a number of alternatives under evaluation). Phase III tasks involve developing and implementing alternatives (determined based on performance of the Phase II improvements) that will result in the discharge complying with all water quality standards (this may or may not include filters). (14)
Response	*ODEQ has updated the TMDL to include this information.*
Comment 24.	Page 7-19 introduces the Heat Source model as a tool for assessing stream water temperature. That text includes a subsection entitled "Limitations of Stream Temperature TMDL Approach" that purports to enlighten the reader as to the limitations of using Heat Source in a TMDL context. This section is an inadequate description of the limitations of the Heat Source model as a tool to assess stream water temperature. The text would be more accurate if this section were expanded to clearly and more completely assess the limitations (and advantages) of the Heat Source model. Instead of trying to list any limitations, the reader could be referred to the Subbasin Temperature Analysis Summary in Appendix C. Alternatively, this very short section of text could be eliminated; it doesn't state anything substantive in its current formulation. (17)
Response	*ODEQ has made the suggested changes, deleted the section and referred the reader to Appendix C for further information.*
Comment 25.	Page 7-19 "The determination of system potential vegetation characteristics leads to an estimation of shade values for each riparian community. These shade values are often referred to as effective shade or system potential shade when associated with an area free of human disturbance. Effective shade for the purposes of TMDL development is the percent of incoming solar radiation that reaches the stream. Solar radiation is a function of regional and local characteristics and is a factor in determining water temperature in the absence of significant point source influences." This sentence seems incorrect ("shade" is NOT the amount of radiation that reaches the stream). Effective shade is defined as the fraction of incoming solar shortwave radiation above the vegetation and topography that is blocked from reaching the surface of the stream. (62)
Response	*ODEQ has made the suggested changes.*
Comment 26.	Page 7-20 Why is Mill Creek cited when it is not listed for temperature and not discussed or charted in the seasonal variation section? This also relates to Page 7-5, second paragraph. (63)
Response	*Mill Creek illustrates seasonal variation in maximum daily temperatures and is useful because so little annual temperature information is available for small low elevation streams. However, Mill Creek is a tributary to the Willamette River and may contribute thermal loading to the mainstem Willamette River. TMDL allocations are applicable to all streams in the subbasin regardless if they are listed or not.*

Comment 27.	Page 7-20 "Summer stream temperature data collected by local agencies and watershed councils indicates that the 18.0ºC (64.4ºF) migration and rearing criterion was exceeded in ~~Pringle~~ Rickreall, Mill, Patterson, and Pringle creeks (Figure 7.1)." Pringle Creek is listed twice and Rickreall Creek is not listed, though it is included in Figure 7.1. (62)
Response	*ODEQ has changed the text to reflect the comment.*
Comment 28.	Pg 7-22 indicates that Rickreall Creek is currently classified as a cool water stream downstream of Mercer Reservoir. As stated elsewhere in the TMDL Report, the cool water designation applies downstream of the City of Dallas. Some reasonably good spawning and rearing habitat exists upstream of the City as far as the Aaron Mercer Dam; primarily between the City's water intake and the dam. (14)
Response	*ODEQ has incorporated this information into the TMDL.* *However, please note that USEPA did not approve the cool water criteria for temperature.*
Comment 29.	Page 7-22 indicates that Rickreall Creek supports steelhead spawning and salmon rearing and migration upstream of Aaron Mercer Reservoir. Mercer Dam is an effective barrier to salmonid migration. As such, no steelhead or salmon migration, spawning or rearing is currently occurring upstream of the dam. (14)
Response	*Under the current Temperature Criteria the designated fish use for Rickreall Creek upstream of Aaron Mercer Reservoir is Salmon and Trout Rearing and Migration. This designation provides for a numeric criteria of 18.0C. The temperature criteria is designed to protect the most sensitive beneficial use even though the use may not be currently occurring if the potential for the use to occur in the future is still there. Use designations were based on ODFW recommendations and may include nonanadromous species.*
Comment 30.	Page 7-23 Figure 7.3 presents stream temperature data (1999-2001) for Rickreall Creek upstream of the City of Dallas WWTF that indicates that summertime daily stream temperatures are typically below 20°C. The paragraph on page 7-22 states that a 1993 Water Quality Report "shows typical afternoon temperatures exceeding 20°C (68°F) for several months during the summer". Given these contradictions, the City contracted with CH2M-Hill to review and evaluate existing temperature data for Rickreall Creek in the vicinity of the WWTF, review recent temperature guidance and policy decisions, review the Draft TMDL document and make any necessary recommendations. In response to the City's request, CH2M-Hill prepared the two Technical Memoranda attached to this comment letter as Attachment #2 and Attachment #3. The City fully supports the findings presented and recommendations made in the CH2M-Hill memoranda. (14)
Response	*ODEQ appreciates the submittal of this data, however this data was unavailable to ODEQ during the development of this TMDL. ODEQ did request data from the City of Dallas during the drafting of this document, however no data was submitted. ODEQ has clarified the text referenced in the comment.*
Comment 31.	Page 7-24 What are the implications of the first paragraph that states : "While not the same methodology that ODEQ uses to derive effective shade values". This entire chapter has very significant implications for the City of Salem and warrants the highest possible quality assurance/quality control. City staff have some knowledge of how the watershed assessment was developed (it was not done by City staff - see page 7-6 Excess Load for a similar clarification need), and the use of their shade indices is very troubling if the methodology is different than that used by DEQ in all other watersheds of the Willamette system. Consistency is essential. (63)

Response	*The data presented on Page 7-24 regarding the riparian condition of the Pringle Creek Watershed was assessed using a process that involves aerial photo interpretation. This process is similar to the process used by ODEQ when compiling a Heat Source Temperature Model. The text and data presented on page 7-24 simply illustrates the variability in riparian conditions in the Pringle Creek Watershed. ODEQ agrees that consistency is essential in developing effective shade targets, but the text on page 7-24 simply discusses the current variable riparian conditions in the watershed and does not identify the prescribed system potential effective shade targets that determine the load allocation.*
Comment 32.	Page 7-25 discussion of Patterson Creek: ODA included this stream in our riparian landscape monitoring of the Molalla/Pudding Basin, and so we have high-resolution air photos taken in August, 2004. This stream and several others in the Molalla/Pudding (including Case Creek and West Fork Champoeg Creek) are used as irrigation conveyances. The August air photos show a few miles of this stream to be nearly bank full. This flow condition undoubtedly has an influence on growth of macrophytes and algae. Water retention structures are used on Patterson Creek and other streams in the basin during irrigation season, and this practice is very likely to influence water temperature. DEQ should address the affect on temperature of streams used for irrigation conveyance, because this practice alters what riparian vegetation can grow in addition to how much water is being heated/cooled. (6)
Response	*ODEQ has added text identifying Patterson Creek as an agricultural irrigation conveyance stream with retention structures. However, the goal of the TMDL is to reduce both point and non-point sources of anthropogenic heating to the receiving stream to protect designated beneficial uses. Irrigation is one of several designated uses, but currently salmon and trout rearing is the most sensitive designated use. Implementation of the TMDL requires DMAs and individual landowners to protect and restore riparian vegetation along Patterson Creek and all other tributaries in the Middle Willamette Subbasin.*
Comment 33.	Page 7-26 Loading Capacity Section – page numbering is reinitiated on this page (7-2 instead of 7-26). (65)
Response	*ODEQ has made the needed corrections.*
Comment 34.	Page 7-27 Loading Capacity – This section provides a good overview of the loading capacity but does not define the specific numeric loading capacity (in kcal/day or degrees Celsius) for the TMDLs being established. Please provide this information. This comment is also applicable to the “loading capacity” sections in other subbasin temperature TMDLs. (65)
Response	*When load capacity is at or above the biological criterion the load capacity of the river is limited to the human allowance of 0.3°C. However, load capacity in the small Middle Willamette Subbasin stream is defined as system potential effective shade plus a small allocation for individual point sources as described on pages 7-28 and 7-29.*
Comment 35.	Page 7-28 We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. “As outlined in the section entitled ‘Point Source Methodology’, all other facilities in the subbasin were found to not be a significant contributor of heat to Columbia Slough. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load.” A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this text.*

Comment 36.	Page 7-28 We would recommend that you add a paragraph to the end of this section which specifies how new sources should be addressed. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this information to the TMDL.* *Existing and future thermal point sources in the subbasin may be permitted to discharge under the following conditions:* *The sum of waste load and load allocations result in an increase in stream temperature of no greater than 0.3°C above the applicable criteria after complete mixing and at the point of maximum impact.* *Pollutant trading opportunities may be available to new or existing point sources in order to offset temperature impacts.*
Comment 37.	Page 7-28 Wasteload Allocations – It would be helpful if each subbasin chapter provided the results of the preliminary screening which has been conducted. This would provide the reader with some understanding of what might be expected of each source and their potential impact. (65)
Response	*No preliminary screening of individual point sources was conducted in the Middle Willamette Subbasin. However, the text specifies that the individual sources in the non-mainstem streams in the subbasin do not discharge during the summer, thus no Waste Load Allocation (WLA) is needed. The sources with general permits are not considered to be significant contributors of heat. Therefore, no WLAs are calculated.*
Comment 38.	Page 7-29 Flow chart outlining process for developing WLAs: EPA has two comments regarding this flow chart. 1) The term “Pre-TMDL Limits” is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful. 2) In the box displaying the result of “Determination of No Reasonable Potential ...”, instead of “Therefore, No Allocation” we would recommend “Therefore, discharge at current level” so that “no” will not be mistakenly interpreted as “0". (65)
Response	*ODEQ defines the term “Pre-TMDL Limits” as current permit limits for existing point sources at current discharge limits, specifically for temperature NPDES holders. ODEQ will make the suggested clarification as noted for “Determination of No Reasonable Potential…”.*
Comment 39.	Page 7-30 This notes that wasteload allocations are not necessary if the source does not discharge into a listed stream. However, Table 8.2 states that the TMDL applies to all waterbodies in the subbasin and earlier text implies that allocations are needed for all sources in order to meet the downstream criteria. This is further noted in the mainstem TMDL. Therefore, all sources should be evaluated, whether or not the specific stream into which they discharge has been listed. If the discharge is shown to have an insignificant impact and thus no reasonable potential to cause an increase, no WLA would be required. (65)
Response	*Due to the numerous point sources in the Subbasin and due to time constraints, only 303(d) listed streams point sources were evaluated for waste load allocations. Waste load allocations will be developed for all sources that discharge heated waste water to receiving waters using Equations 1(page 7-29) and 2 (page 7-30).*
Comment 40.	Page 7-30 The last paragraph on page 7-30 should be modified to fully state the temperature policy for streams with a cool water designation. The policy is correctly stated in Table 7.5 on page 7-13 (… unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life.) (14)

Response	*USEPA has not approved the cool water species designate use for the Willamette Basin. This use was removed from tables and maps.* *The language describing the temperature criteria has been altered in the final TMDL to indicate that the reach from river mile 0 to 10.4 has no habitat use designation. USEPA has not approved the cool water standard for use in complying with the federal Clean Water Act.*
Comment 41.	Page 7-30 Summary from CH2MHill Tech memo: The analysis presented in the document justifying the conclusion that a temperature WLA is not required for the City of Dallas is flawed for several reasons. However, an alternate analysis using actual creek and effluent temperatures and flows to calculate the thermal impact of the effluent discharge would be expected to show an increase of less than 0.3°C for most of the critical period. For most of the summer the effluent is cooler than the actual Creek temperature. In September the effluent is slightly warmer than the Creek temperature, and at these times the increase may be more than the allowable 0.3°C above ambient temperature – however, at these times the Creek temperature is also lowering to below 20°C. (See Figures 5 and 6 in Technical Memorandum *"Summary of Rickreall Creek Temperature Monitoring Program: 1999 –2004".)* Also, the cool water criterion in the Oregon water quality standards contains the provision that an increase above 0.3°C can be allowed if it "*would not reasonably be expected to adversely affect fish or other aquatic life."* The short periods of potential increase above 0.3°C in September would fit this provision. In addition, the actual data from up- and down-stream temperature monitoring shows a similar result (cooling of stream by effluent in summer when Creek temperatures are elevated, except slight warming in September when Creek temperatures are dropping). So for the current state of the regulations and temperature-related beneficial uses in Rickreall Creek, the conclusion that a temperature WLA is not required at this time is justified. The draft TMDL document suggests that the beneficial use for lower Rickreall Creek may be changed in the future to salmonid migration corridor, with an applicable temperature criterion of 20°C. On November 21, 1997 the Environmental Quality Commission (EQC) granted an exception to the temperature standard for Rickreall Creek. The minutes of that meeting contains the following statement: "In the event that conditions in Rickreall Creek improve so the City's discharge becomes a significant adverse factor, then ODEQ will work with the City to explore ways to reduce or eliminate the adverse impact." The condition of Rickreall Creak has not changed significantly since the EQC made this finding. We request that ODEQ include this language in the TMDL document. The City of Dallas supports the conclusion in the draft TMDL that a wasteload allocation for temperature is not justified. (14)
Response	*Upon consultation with USEPA, ODEQ has determined it is appropriate to delay development of wasteload allocations for the wastewater discharge by the City of Dallas to Rickreall Creek. ODEQ submitted a package of rules regarding temperature to USEPA for approval. This package included a narrative cool water standard, upon which USEPA took no action. As a result, Oregon currently has no cool water standard approved by USEPA for compliance with the federal Clean Water Act. Therefore, the basis for setting a WLA for the City of Dallas is incomplete. The present TMDL will not include WLAs to be included in NPDES permits for discharge to this reach of Rickreall Creek. Future revisions to rules, the TMDL, or habitat designation of Rickreall Creek may result in the need for temperature permit limits for the City's discharge.*

Comment 42.	Page 7-31 "Additional measures may also be taken to improve summer temperatures. For example, water conservation measures that improve summer stream flows will benefit stream temperatures through an increase in load capacity. Stream restoration efforts that ~~result in~~ restore narrow stream channel widths will improve the effectiveness of existing vegetation to shade the stream surface." This sentence should be reworded to avoid implying the stream restoration means narrowing stream channels and thereby improving stream temperatures. Many channels would be restored by channel widening (to restore floodplain access, the creation of side channels, and the enhancement of meanders). (62)
Response	*ODEQ has clarified this statement and made the recommended changes.*
Comment 43.	Page 7-32 The BLM appreciates all the good work that went into deriving this analysis. We have some questions about the way this analysis depicts the derivation of the "effective shade" target for the geomorphic groups and how this is being used in the TMDL. We are particularly concerned with what appears to be a jurisdictional line depicting what is termed as the "Upland Forested Mountainous Area" (page 3). This covers a significant portion of our land and represents a significant variation in shade curve results from the adjoining "process based" geomorphic groups. Our lands often occur on either side of this line. It is hard to envision different "effective shade curve" targets on the basis of this non process based line. (62)
Response	*The same process based geomorphic unit system potential vegetation calculations were applied to the development of the upland forest classification. Geomorphic unit shade curves that are adjacent to upland forest are generally consistent with the tree height and density defined for the upland forest category.*
Comment 44.	Page 7-32 In the Potential Near-Stream Land Cover section of Appendix C (and elsewhere), the term "geomorphic unit" is often used when the correct term is "geologic unit." (17)
Response	*ODEQ will define the term "geomorphic unit", and continue the use of the term in the TMDL.* *The term "geomorphic units" are defined as surficial deposits as mapped by O'Conner, et al 2001.*
Comment 45.	Page 7-33 How to Use a Shade Curve, #4, last sentence – The proper terminology here should be that "This is the non-point source load allocation …". Load allocation applies to sources while loading capacity refers to the capacity of the waterbody as a whole. (This same comment applies to all subbasin chapters which include this explanation of shade curves.) (65)
Response	*ODEQ has made the appropriate changes to the text.*
Comment 46.	Page 7-36 Why is the Mill Creek geomorphologic map shown when it isn't listed for temperature; and where is the similar map for Pringle Creek (which is listed)? (63)
Response	*The geomorphic maps are shown on a subbasin and watershed scale. The Pringle Creek geomorphic map is found in Map 7.11 on page 7-37. It is part of the Willamette River / Chehalem Creek Watershed. The nonpoint source effective shade surrogate measure is applicable to all streams in the Middle Willamette Subbasin, not to only those currently listed for temperature on the 303(d) list. TMDL allocations are applicable to all streams in the subbasin regardless if they are listed or not.*
Comment 47.	Page 7-43 Bacteria Standard Review. DEQ should consider reviewing the bacteria standard in the future to determine whether a better proxy exists for human pathogens than E. coli strains that might come from any warm-blooded animal. (63)

Response	*ODEQ typically undergoes a tri-annual review of the standards. The current bacteria standard has been approved by USEPA and does follow the current USEPA guidance. ODEQ suggests that the commenter submit public comments regarding the feasibility of using E. coli as an indicator of human pathogens during the next bacteria standard review process.*
Comment 48.	Page 7-48 Bacteria from sources other than municipal wastewater treatment facilities are comprised of multiple generic types contributed by wildlife, pets, and domesticated animals. The health threat posed by these different types of bacteria varies greatly, and should be addressed in the development of bacteria WLAs. This is especially important for urban stormwater, for which the TMDL must incorporate some assessment of the background (natural) bacterial load in the urban watershed. (63)
Response	*ODEQ typically undergoes a tri-annual review of the standards. The current bacteria standard has been approved by USEPA and does follow the current USEPA guidance. ODEQ suggests that the commenter submit public comments regarding the feasibility of using E. coli as an indicator of human pathogens during the next bacteria standard review process.*
Comment 49.	Page 7-53 Battle Creek is not entirely agricultural or rural. It is urbanized (Salem) from I-5 upstream to west of Sunnyside Road SE (correct Tables 7.17 and 7.18 as well). (63)
Response	*ODEQ purposefully identified the major land use category in the TMDL, rather than the sub-categories of land use designations such rural or suburban, because these sub-category land use designations are subject to change at a greater frequency. Tables 7.17 and 7.18 land use designation of Battle Creek will not change because the land use designation in these tables identifies the major land use adjacent to the stream identified. ODEQ will include language in the bacteria TMDL stating that the major land use is identified in the E. coli concentration tables provided. The land use coverage used was the USGS Land Use Land Cover spatial coverage developed in 1980. A comparison of the land use identified from the USGS coverage was compared against the Land Use / Land Cover released December 15, 1999 from the PNWERC at OSU with little to no major land use changes identified.*
Comment 50.	Page 7-55, Table 7.18: Please revise land use descriptions on this table. The land use along Battle Creek at Commercial Street SE is definitely suburban. (6)
Response	*ODEQ does not agree. The land use designation in the document for Battle Creek will not change because the land use designation in these tables identifies the major land use adjacent to the stream identified. ODEQ will include language in the bacteria TMDL stating that the major land use is identified in the E. coli concentration tables provided, rather than a sub-category of the land use such as rural or suburban.*
Comment 51.	Page 7-63 Mill Creek does not receive any CSOs (Salem doesn't have a combined sewer system). In addition, in accordance with the City's MAO with DEQ, all SSOs to tributary streams have been eliminated in accordance with ODEQ's bacteria standard. (63)
Response	*ODEQ has made the appropriate changes to the TMDL to reflect the information provided in this comment.*
Comment 52.	Page7-63 There is no “Pringle Ditch”. We believe this refers to the entire Pringle Creek system which actually consists of West, Middle and East Pringle Creeks, plus some smaller (generally seasonal) tributaries. This also applies to Table 7.29 (Page 7-59) and Table 7.31 (page 7-60). (63)
Response	*ODEQ used the hydrologic unit code streams GIS coverage from the States GIS Center to identify the stream names in the subbasin. ODEQ will make note in the text that Pringle Ditch is also referred to as East Pringle Creek, however no changes*

	will be made to the maps or tables regarding the name.
Comment 53.	Page 7-63 Map 7.14 and the discussion are incorrect. Croisan Creek and Pettijohn Creek flow into Willamette Slough, and are not part of the Pringle Creek watershed. Also, at the bottom of the page, Radcliff Drive @ should read Ratcliff Drive @. (63)
Response	*ODEQ does not agree. Croisan Creek and Pettijohn Creek are actually in the Pringle Creek watershed as defined in Map 7.14. The Pringle Creek watershed is a subwatershed of the Willamette River / Chehalem Creek Watershed in the Middle Willamette Subbasin. It is a 6th field USGS hydrologic unit.* *Text changes were made in the TMDL from 'Radcliff" to "Ratcliff".*
Comment 54.	Pg 7-65, in Table 7.20, why are the entries for Pringle Creek R.M. 0.4 and Shelton Ditch R.M. 0.02 different? They're the same water. (63)
Response	*The river miles in the tables reflect the river mile in which the sample was taken and at what river mile the tributary comes in contact with the mainstem. For example, in Table 7.20 Pringle Creek at river mile 0.4, Shelton Ditch at church street flows into Pringle Creek at River mile 0.4 (0.4 miles from the mouth of Pringle Creek), but the actual sample was taken in Shelton Ditch at a distance 0.02 miles from the beginning of the ditch (mouth).*
Comment 55.	Page 7-66 Cannery Park should read Kroger Park.@ (63)
Response	*ODEQ has made the change to the text.*
Comment 56.	Page 7-69. Delete reference to Croisan Creek. and correct Figures 7.25 and 7.26. (63)
Response	*ODEQ will not delete Figures 7.25 and 7.26, bacteria box plots for Croisan Creek. ODEQ included these box-plots because the data was available and provided a longitudinal view of the bacteria concentration in the creek. TMDL allocations are applicable to all streams in the subbasin regardless if they are listed or not.*
Comment 57.	Page 7-74 The TMDL places the burden of bacteria removal on the designated management agencies (DMAs) with enforceable wastewater or stormwater permits. However, the source of bacteria in the Willamette and its tributaries is not well understood and background bacteria levels need to be considered when setting wasteload allocations. Numerous "sources" can contribute fecal coliform and E. coli to an MS4 or receiving water body and designated management agencies may have little or no control over many of them. A designated management agency cannot be expected to decrease bacteria loading 47 to 94 percent, as indicated in Tables 2.7, 7-24, and 7-25 of the Willamette TMDL, when the DMA contribution is relatively insignificant and much of the tributary watershed is beyond the DMA's jurisdiction. We suggest that the TMDL include a statement that DEQ will review the feasibility of meeting the allocations at a future date, and conduct a Use Attainability Analysis or set a site-specific standard if appropriate. Feasibility of Meeting Allocations. The TMDL places the burden of bacteria removal on the designated management agencies (DMAs) with enforceable wastewater or stormwater permits. However, the source of bacteria in the Willamette and its tributaries is not well understood and background bacteria levels need to be considered when setting wasteload allocations. Numerous species can contribute fecal coliform E. coli to an MS4 or receiving water body and designated management agencies may have little or no control over many of the sources. Data from a bacteria source tracking study done on the Boise River (Idaho) indicated that at an urban site, avian and dog sources represented 29 percent each of the bacteria pollution, followed by human sources at 9.6 percent. Other sources such as cats, rodents, and unknown comprised the rest. In Washington's Puyallup River, 12 sampling events over a 15-month period during wet and dry conditions showed that

	significant portions of background levels are attributable to birds and rodents. A DMA cannot be expected to decrease bacteria loading 47 to 94 percent, as indicated in Tables 2.7, 7.24, and 7.25 of the Willamette TMDL, when the DMA contribution is relatively insignificant and much of the tributary watershed is beyond the DMA's jurisdiction. We suggest that the TMDL include a statement that DEQ will review the feasibility of meeting the allocations at a future date, and conduct a Use Attainability Analysis or set a site-specific standard if appropriate. (63)
Response	*ODEQ does not agree with the comment requesting a review of the feasibility of meeting the allocations at a future date, and conducting a Use Attainability Analysis or setting a site-specific standard for bacteria in the Salem area. There are many implementation pathways to reduce bacteria that are well within the DMAs jurisdiction that include education, reduction of pet waste disposal into streams, identifying and disconnecting elicit discharges, and control storm water bacteria concentrations, etc… ODEQ believes that the DMAs are capable of achieving a 94% reduction in bacteria loads with proper guidance and implementation of source reduction plans.* *There have been multiple comments suggesting that allocations for stormwater, applicable to both MS4 and non-MS4 systems are inappropriate or even unlawful. These commenters argue that the basis of pollution control for these systems is the application of control technologies that reduce pollutant loads to the "maximum extent practicable," or "MEP." ODEQ acknowledges that MEP technologies are appropriate for pollution control and for meeting the allocations presented for these sources in the TMDLs. However, the allocations provide the degree to which these technologies must reduce pollutant loads to meet the ultimate goal of eliminating violations of water quality standards.* *There is nothing inconsistent between setting allocations that reduce loads significantly below current conditions and the application of best management practices. As part of stormwater management plans for MS4 designated management agencies (collectively, "DMAs"), the expected efforts of the DMAs over the lifetime of a permit will be described as a feature in the stormwater management plan developed for the permit. These plans will detail the types of technologies, their efficacy at removing pollutants (e.g., fecal bacteria) from stormwater prior to discharge, and estimates of reductions that may occur from implementation. The plans will also present monitoring and reporting elements that will allow the DMAs and ODEQ to determine whether allocations or interim targets are being met into the future. These results will be reviewed during the permit renewal process, with updates to plans reflecting success or failure in making significant progress toward meeting allocations.* *Through implementation of stormwater plans as required by permits and other authority, improvements in runoff water will be documented by the DMAs. This information, along with data collected in receiving waters to assess ongoing water quality, will be the basis of future changes to stormwater plans, permits, and for revisions of TMDLs during the normal review process. As improvements are made, technologies that have been effective under various circumstances will be identified and applied as appropriate.*
Comment 58.	Page 7-74 of the Willamette TMDL addresses the middle Willamette tributaries, and sets out a load allocation, in terms of percent reduction required in bacteria, of 79 percent to 94 percent for Salem's listed urban streams. Portions of these watersheds lie within the boundaries of the City of Salem's stormwater program, and the TMDL requirements for the contributions from urban stormwater sources should be addressed within the NPDES stormwater permit, and according to the regulatory standard of "maximum extent practicable," using best management methods. (63)

Response	*ODEQ acknowledges that "maximum extent practicable" (MEP) technologies are appropriate for pollution control and for meeting the allocations presented for these sources in the TMDLs. However, the allocations provide the degree to which these technologies must reduce pollutant loads to meet the ultimate goal of eliminating violations of water quality standards.* *There is nothing inconsistent between setting allocations that reduce loads significantly below current conditions and the application of best management practices. As part of stormwater management plans for MS4 designated management agencies (collectively, "DMAs"), the expected efforts of the DMAs over the lifetime of a permit will be described as a feature in the stormwater management plan developed for the permit. These plans will detail the types of technologies, their efficacy at removing pollutants (e.g., fecal bacteria) from stormwater prior to discharge, and estimates of reductions that may occur from implementation. The plans will also present monitoring and reporting elements that will allow the DMAs and ODEQ to determine whether allocations or interim targets are being met into the future. These results will be reviewed during the permit renewal process, with updates to plans reflecting success or failure in making significant progress toward meeting allocations.* *Through implementation of stormwater plans as required by permits and other authority, improvements in runoff water will be documented by the DMAs. This information, along with data collected in receiving waters to assess ongoing water quality, will be the basis of future changes to stormwater plans, permits, and for revisions of TMDLs during the normal review process. As improvements are made, technologies that have been effective under various circumstances will be identified and applied as appropriate.*
Comment 59.	Page 7-74 For each of the TMDLs it is stated that MS4s and other point sources are present in the basin and subject to reductions. These dischargers should be identified and given explicit WLAs (reductions), not just generally mentioned as existing and therefore subject to reductions. (65)
Response	*ODEQ has not made a detailed assessment of the loads discharged by each of the MS4 operators. Rather, we have estimated the total loading that all nonpoint sources contribute to the excess loading in the Willamette river and its tributaries. We have included MS4 and other stormwater dischargers in this category of loading, but have a discrete reduction as the surrogate wasteload allocation for urban areas, distinct from nonpoint source runoff. The estimate of loading allowed by all runoff sources (nonpoint and stormwater combined) is presented in the Allocation table (Table 2.8, Chapter 2). The implementation of the wasteload allocations for stormwater in general, will be through several different mechanisms, from MS4 permits for large entities, to stormwater management plans for smaller cities that are not included in Phase II stormwater planning requirements. The allocations will be applied through each of these mechanisms as appropriate, but the allocation will be the same throughout.*
Comment 60.	Page 7-74, Table 7.23. Delete the last column. The wasteload allocation for POTWs is the existing numeric effluent limit (126/406). (63)
Response	*Wasteload allocations for treatment plants are variable depending on effluent and river flow. Regardless of the actual load discharged by the treatment plants, they are required to meet water quality standards at the end of the pipe (prior to discharge). We have included an estimate of the potential loading based on a measure of flow from the treatment plants. This is only an estimate and not a regulatory limit. The estimate serves to demonstrate that loads from WWTPs are small relative to the loading we see from non-point sources, and if controlled at the*

	end of the pipe will not contribute to violations of water quality standards. We have made this clear in the Final TMDL.
Comment 61.	Page 7-75 For existing point sources and new sources discharging below the criteria it should be stated whether discharges are allowed up to the WQ criteria without requiring an explicit WLA. (65)
Response	*The total estimate of loading assumes all of the point sources discharge at the criterion for protection of human health. Each of these point sources and any future facilities have a flow based allocation that allows discharge of bacteria at this concentration or lower. This method of allocation ensures water quality standards are met by definition and a more explicit WLA is unnecessary.*
Comment 62.	Page 7-75 There is no discussion or demonstration that the reductions identified for each waterbody will explicitly meet the water quality criteria. Is it assumed that this is presented in the load duration curve construct? (65)
Response	*The reductions for the various land uses were based on an analysis of the existing data, and calculation of a reduction necessary for the 75th percentile value to meet the log-mean criterion for protection of body-contact use. This was a very conservative approach that will result in a log-mean concentration well below the criterion. Since the reductions are derived using the criterion, and the reductions conservatively meet the criterion, we expect water quality standards to be met. There is not a demonstration of the change in the distribution of bacteria samples other than the conservative statistic (75th percentile) will be lower than the criterion.*
Comment 63.	Page 7-76, Table 7.24 The Mill Creek and Pringle Creek locations need to be corrected. Both sites, as currently listed, are in reality two separate sites. The Mill Creek site should be at the Front Street Bridge. The West Pringle site at Madrona. (63)
Response	*ODEQ agrees that Mill Creek at Front Street Bridge and West Pringle at Madrona are two separate sites. The Table 7.24 does show that these are in actuality two sites. No change is needed in the TMDL.*
Comment 64.	Page 7-77, Tables 7.26 and 7.27_ ODEQ cannot justify making such allocations to the otherwise non-allocated streams, based on the fact that the Willamette is very close to meeting standards and these other streams are not specifically listed. (63)
Response	*ODEQ does not agree. The bacteria TMDL, like the temperature TMDL, is applicable to all streams in the subbasin. Streams with similar land uses generally have similar bacteria loads. These streams do not have the dilution provided by large tributaries such as the Santiam River which greatly increase the load capacity of the Willamette. ODEQ will continue to base subbasin load allocations on existing information within the subbasin, based on land use. ODEQ supports the application of percent reductions as a planning target to be applied on a land use basis as presented in Tables 7.26 and 7.27.*
Comment 65.	Page 7-79, 85 We concur with ODEQ's findings not to develop a dieldrin TMDL at this time. We agree that additional data collection is warranted, but considering the specialty of this particular parameter, believe this responsibility rests with DEQ. (63)
Response	*ODEQ does not agree that the responsibility of collecting dieldrin data falls entirely on ODEQ. The respective DMAs also have a responsibility to collect dieldrin samples, and to control the release of dieldrin into the environment. ODEQ is able to participate and guide data collection efforts, and provide guidance on dieldrin control and removal.*
Comment 66.	Page 7-80 no mention had been made as to how new sources will be treated in the TMDL. Please add the appropriate language. (65)

Response	*The Reserve Capacity section has been updated with the following text:* *"Reserve Capacity for the Middle Willamette Subbasin was set at 1/10th of the Loading Capacity. This allows for future growth and expansion overall, though it is not provided to increase loading for point source discharges. Point source discharges are currently limited to meeting bacterial water quality criteria prior to discharge. In this way, point sources do not decrease loading capacity of the stream. Increased and existing point source discharges will also be required to meet these criteria prior to discharge to the Middle Willamette Subbasin streams."*
Comment 67.	Page 7-80 The references to Croisan and Pettijohn Creeks should also be deleted from Map 7.16 and the discussion. (63)
Response	*ODEQ does not agree. Croisan Creek and Pettijohn Creek are identified in the USGS hydrologic unit code streams coverage, and are identified to provide a reference for the reader as to the geographic location of the adjacent streams and rivers.*
Comment 68.	Page 7-85 Dieldrin, last sentence. What does "protecting and restoring stream system potential vegetation" have to do with dieldrin control? Doesn't this phrase principally relate to temperature? (63)
Response	*Dieldrin typically binds to the soil. In order to prevent slumping or erosion of upland and bank soils into the stream, ODEQ recommends the restoration of riparian vegetation to act as a mechanism to control soil slumping and erosion. The commenter is correct however, system potential vegetation is applied under the temperature TMDL. In addition, the implementation of system potential vegetation as a surrogate measure for temperature under the Temperature TMDL for the Middle Willamette Subbasin will aid in both temperature and dieldrin control.*

Comments on Chapter 8: North Santiam Subbasin	
Comment 1.	Page 8-1: Blow Out should be one word, "Blowout". This would need to be changed throughout document. (11)
Response	*ODEQ corrected the error throughout the text of the subbasin document.*
Comment 2.	Page 8-3 Tables containing name and location of listed waterbodies - It would be helpful if these tables were separated into those segments for which TMDLs have been developed in their respective chapters, those segments which are addressed in a separate chapter (i.e. Chapter 4, mainstem temperature) and those segments which are not being addressed at this time. If all listed segments are not included in the table, the title should be changed to reflect what is included. (65)
Response	*ODEQ has added a "TMDL" column to the table identifying in which chapter the TMDL is found or if it was not completed (indicated by a 'no').*
Comment 3.	Page 8-3,– please note the river miles for the section of the North Santiam addressed by the mainstem TMDL (RM 0 to ?). (65)
Response	*ODEQ has added the North Santiam River miles that included in the mainstem temperature model in Chapter 4, RM 0 to 49.*
Comment 4.	Page 8-3, Water Quality Parameters Not Addressed, Dissolved Oxygen – Most of the other discussions of parameters not addressed in the TMDLs include a short discussion on what interim measures may be put in effect to address the problem prior to the development of the TMDL. We recommend that such a discussion be added here. (65)
Response	*ODEQ has added text that will identify management activities to control dissolved oxygen levels in the Santiam River, RM 0 to 12. ODEQ will re-evaluate the data in light of changes to water quality standards since the update of the 303(d) list in 2002. Designated use periods for spawning have changed in the mainstem Santiam river. Management efforts to restore riparian vegetation will also benefit other water quality issues that are driven by elevated periphyton productivity.*
Comment 5.	Page 8-3: Table 8.1 lists an Unnamed tributary to Marion Creek. This unnamed tributary is shown on map 8.2. It drains Lake Ann and is totally within the Mt Jefferson Wilderness area. No anthropogenic changes have occurred. We don't understand why this stream shows up as being listed. Marion Creek is well below the state standards for temperature. (11)
Response	*The listing for the unnamed tributary to Marion Creek was initially placed on the 303(d) list in 2002. The data submitted for the 2004 303(d) list also show that this stream exceeds the applicable criterion (18 degrees) based on the LASAR station on this LLID, so it will remain on the 303(d) list. ODEQ requests that USFS document that stream temperatures reflect natural conditions and are unaffected by legacy or current anthropogenic effects.*
Comment 6.	Page 8-3: under Dissolved Oxygen. Has the listing period been inverted? The document stated the listing period is for the period of September 15th to June 30th. This seems counter intuitive to the flow regime of that time period. Should it read "June 30th to September 15th?" (11)
Response	*The listing for the Santiam River was not inverted; http://www.deq.state.or.us/wq/WQLData/RecordID02.asp?recordidreq=6164 However, Table 8.1 will be updated to include the dissolved oxygen listing for the Santiam River.*
Comment 7.	Page 8-4: Who helped us. USDA Forest Service is not listed. (11)

Response	*ODEQ has added USDA Forest Service to the list.*
Comment 8.	Page 8-5, Map 8.2 - This map indicates that a small portion of the subbasin lies within the boundaries of the Warm Spring Reservation. As these are Tribal waters and not State waters, the TMDL should specify that it only applies to State waters. (65)
Response	*ODEQ agrees and has added clarifying text.*
Comment 9.	Page 8-5: Marion, Stayton, Sublimity, and Mehama should be listed as cities included. From Downstream to upstream list should read: Jefferson, Marion, Stayton, Sublimity, Lyons, Mehama, Mill City, Gates, Detroit, and Idanaha. (11)
Response	*ODEQ has made the suggested updates.*
Comment 10.	Page 8-6, 8-7 - The TMDL does not have up-to-date information on the existence, location, or real-time nature of USGS streamflow gages. For example: . • Text on page 8-5 states that there are no USGS real-time streamflow gages in the Detroit Reservoir / Blowout Divide Creek watershed. Actually, there are two: Blowout Creek near Detroit, OR (station 14180300), and French Creek near Detroit, OR (station 14179100). . • Text on page 8-6 states that there are no USGS real-time streamflow gages in the Middle North Santiam River watershed. Actually, the upper end of that region has a USGS real-time flow gage at Niagara (station 14181500). . • Text on page 8-7 states that there are no real-time USGS flow gages in the North Fork Breitenbush River watershed. Actually, there is one on the Breitenbush River above French Creek (station 14179000). (17)
Response	*ODEQ has added text identifying the specified USGS real-time gages as identified.*
Comment 11.	Page 8-6: Para 1: The watershed is found on the west slope of the Cascade Range, not the east. This should be changed for all watershed summaries. Para 2: CAFO stands for Concentrated Animal Feeding Operations. Para 3; "There are three major tributaries that flow into the reservoir." Actually there are six (6): French Creek, Breitenbush River, North Santiam River, Blowout Creek, Box Canyon Creek, and Kinney Creek. "The watershed is habitat for winter steelhead and Bull trout." This is above the Detroit Dam and does not have Winter Steelhead or Bull trout. "There are no USGS real-time flow gauges in the watershed." There are two USGS gauges within the watershed, one on Blowout creek #14180300 (real-time) and one on French Creek #14179100. Para 4: Tourism/recreation should be added to land use. Para 6: "The watershed has three major tributaries." Major tributaries include Big Creek, Battle Ax Creek, Opal Creek, Cedar Creek, and Elkhorn Creek. Typo last sentence exclude "are". Para 7: Include Stayton, Sublimity, Marion, and Mehama Para 9: Include resident cutthroat, rainbow trout, Oregon Chub (State T & E). (11)
Response	*ODEQ has made the suggested updates, except for the addition of the tourism/recreation as a land use category. Tourism/recreation is not a standard major land use category as used by planning districts; however water contact recreation is a designated use and is one of the beneficial use categories in OAR*

	340-042-0040(4). Because the Detroit Reservoir / Blowout Divide Creek watershed includes streams downstream of Detroit Reservoir the citation to winter steelhead habitat was not deleted.
Comment 12.	Page 8-7: North Fork Breitenbush River Watershed should be Breitenbush River Watershed (HUC 170900502). Para. 3: No bull trout exist in this watershed. Para 4: Watershed is not entirely owned by the federal ownership, 160 acres belong to private ownership. Para 6: Add: Humbug Creek and Devils Creek to list of creeks supplementing flows. No winter steelhead present due to dam. One real-time USGS flow gauge is present # 14179000. Para 8: NPDES permitted facility discharges to Horn Creek not Marion Creek. Para 9: No Bull trout have been found in the watershed. Potential habitat exists but no identified populations currently. (11)
Response	*ODEQ has made the suggested updates, except for changing North Fork Breitenbush River Watershed to Breitenbush River Watershed. Using the USGS watershed boundary GIS coverage the referenced HUC 170900502 is actually called North Fork Breitenbush River Watershed.*
Comment 13.	Page 8-8, Table 8.2, Reserve Capacity. The information presented here is not consistent with that provided in the main TMDL, p. 7-19. This same comment applies to the temperature TMDLs for several subbasins including the Upper Willamette. (65)
Response	*Allocation for increases in pollutant loads for future growth from new or expanded sources will be added to the table. Reserve Capacity will be a percentage of the 0.3˚C Human use allowance (HUA). The HUA will be divided among various sources. When point sources are present reserve capacity will be 0.05˚C, 17% of the HUA. Where there are no point sources in a subbasin, or less than the allowed 0.2˚C is used by point source discharges, the remainder is allocated to Reserve Capacity.*
Comment 14.	Page 8-8: Under Beneficial Uses OAR 340-042-0040(4)(c) Coast Fork Willamette Sub basin should be North Santiam Sub basin. (11)
Response	*ODEQ has made the suggested updates.*
Comment 15.	Page 8-9: Unnamed tributary to Marion Creek is solely located in the Jefferson Wilderness. No management induced temperature modifications. Statement in paragraph 1 on page 8-13 supports de-listing this portion of stream. “A stream that is free from anthropogenic influence is considered to be a natural thermal potential”. (11)
Response	*ODEQ does not agree. Wilderness area designations do not completely eliminate anthropogenic uses in the area. These areas may have been open to mining or forest harvesting activities. In addition the forest roads in the area may be lending themselves to increased stream temperatures. Additional stream temperature monitoring and modeling will be needed to assess the “natural thermal potential” of the river.*
Comment 16.	On pages 8-10 and 9-9 and elsewhere, it would be useful to clarify that wildfires, floods, and insect infestation affect stream temperature by affecting the presence and density of riparian vegetation. The reader might be confused if this connection is not explicitly stated. (17)
Response	*ODEQ has made the suggested clarification.* *Stream temperatures are affected by natural and human caused sources of heating. Disturbance processes such as wildfire, flood, and insect infestation influence the presence, height and density of riparian vegetation which in turn determines the amount of solar radiation reaching the stream. Such processes are recognized and*

	incorporated as a natural condition in the TMDL. This temperature TMDL does address stream heating caused by human activities that affect characteristics of riparian vegetation in addition to point sources that discharge heat directly into surface waters in the North Santiam Subbasin.
Comment 17.	Page 8-12: Map 8-4 is not historically accurate. Headwaters would have been core coldwater habitats prior to the installation of the dam. (11)
Response	*This is not a historical map but rather a map showing the fish use distribution of anadromous salmonids as it relates to the current temperature standard. Core cold water habitats are located downstream of Detroit Reservoir. Oregon Department of Fish and Wildlife staff provided fish use designation information.*
Comment 18.	Page 8-13 – This discussion should include the provision containing the Human Use Allowance. (65)
Response	*ODEQ has added text relating to the Human Use Allowance to this section. Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.*
Comment 19.	Page 8-13,pp 1 :BLM and the USFS has data in Elkhorn Creek which we believe reflects natural thermal potential which is **warmer** than the biologically based numeric criteria during the summer period. (See attachment for seven day average max temperatures for Elkhorn Creek over a 5 year period). It exceeds the core cold water habitat criterion as depicted in Map 8.4. With the USFS we have determined that perennial channels in this system are at "system potential" largely due to the exclusion of most timber harvest on federal lands. Much of the solar influx is due to the steep rock slopes which produce less shade than the actual topography. This is not unusual for many of the tributaries in the Little North Santiam. Elkhorn Creek has a "Wild River" designation under the Wild and Scenic Rivers Act, which validates our premise of no anthropogenic impacts to perennial channels. It is tributaries such as this that bring question to extensive application of the shade curves such as in the Upland Forest types. We advocate a DMA determined modifier based on specific reach conditions where accounting can be provided for natural conditions. (62)
Response	*ODEQ will work with USFS and BLM to document those streams with natural condition temperatures. This can occur through the TMDL implementation process. Other streams that are not at system potential condition will be removed from the 303(d) list after the TMDL is approved by USEPA. Unlike streams identified at natural condition these streams with elevated stream temperatures will continue to be considered impaired until natural condition or biological criteria temperatures are attained.*
Comment 20.	Page 8-14: Para 3: Need to discuss the loss of heat and the reduction of temperature as a result of the dams. Para 4 does not apply, due to the depth of Detroit and the depth of the outflow. Para 5: There are two reservoirs in the North Santiam Sub basin. Big Cliff and Detroit Reservoirs. (11)
Response	*ODEQ has added Big Cliff Reservoir to the text. No text modifications will be made in reference to the "loss of heat" and "depth of Detroit" comment. For a detailed discussion of the effects of dams on water quality please see Chapter 4.*
Comment 21.	Page 8-15: Non-point sources being limited to, 0.05 C (0.09 F) change is difficult to measure. Detection capabilities available in the field do not exist that would allow this type of accuracy, nor are spatial or temporal variance considered. (11)
Response	*ODEQ agrees that measurement accuracy of less than 0.2°C is difficult with most field equipment. The heat load allocation framework follows that established for the mainstem Willamette where such changes can be modeled if not actually measured. This is explained in Chapter 4. No explicit load allocations are actually provided in the TMDL and ODEQ expects land managers to target system potential conditions*

	while acknowledging that natural disturbance processes will occur in the subbasin.
Comment 22.	Page 8-16: It is not clear what a "point of maximum impact" means or is. This may be in the earlier part of the document; did not see definition in this chapter. Para 3: 0.3 C is a critical level. Why? What makes ½ degree F change critical? Diurnal changes account for larger swings than ½ degree F. In utilization of DEQ approved 7-day averages for max daily water temperatures, these ½ degree swings fall out. (11)
Response	*The human use allowance of 0.3°C is provided to anthropogenic sources of heat when river temperatures are at or above the applicable biological criterion (e.g. 16°C for core cold water habitats). This 0.3°C is the sum of all human impact and should not be exceeded at the point of maximum impact. Extensive modeling in the mainstem Willamette allows for simulation and tracking of cumulative heat loads to determine precisely where the point of maximum impact occurs. Analysis in small subbasin systems lacks the resolution to quantify nonpoint source and point source loads or identify the point of maximum impact. Instead conservative approaches were taken in the waste load and load allocation process.*
Comment 23.	Page 8–16, pp 8 :As in other comments provided in this review, BLM agrees with the inclusion of disturbance in determining load allocation. As you have stated, OAR 340-041-0002(34) lists natural conditions that includes floods but in many references in the document concerning the allocation for disturbance you mention other disturbance mechanisms but not **floods**. After experiencing the floods of 1964, 1978, 1988, 1996 to mention only a few of the many our district has experienced, it is recognized that on a watershed basis floods can have a significant effect on channel exposure resulting from loss of riparian vegetation. Your illustration of disturbance effect on Figure 8.6 is good. The question is, would an average provide a higher disturbance signature and would this have an effect on allocation? (62)
Response	*The reference on page 8-16, paragraph describing OAR 340-041-0002(34) already references floods. As discussed in Appendix C, potential near stream vegetation characteristics were intended to reflect effects of natural disturbance and successional pathways on effective shade. The inclusion of disturbance does have an effect on allocations.*
Comment 24.	SHADE CALCULATIONS— In November of 2003, ODEQ staff were notified that a bug in the Heat Source model had been found by USGS staff. That bug affected the model's calculation of vegetative shading when such shadows only partially covered the river's water surface. USGS staff pointed out the bug, explained its impact, offered two examples showing the effect, and provided a solution in the form of new lines of computer code to replace the faulty code. This "partial shading" bug affected not only Heat Source but also the "Shadalator" program used to generate the shade curves used throughout the Willamette Basin Temperature TMDL. It appears that the shade curves provided in the TMDL were generated with the flawed code, and one or more of the Heat Source models of the small tributaries (e.g., the Little North Santiam River) also used the flawed code. This is not a criticism of ODEQ staff. Most or all of this work probably was completed prior to the discovery of the bug in November of 2003, and a decision may have been made that the increase in accuracy provided by the bug fix was not sufficient to justify the expenditure of time that would be required to redo the work. The magnitude of the error introduced by this bug depends on the size of the stream and several other factors. In very wide streams where shading is not an overriding factor in the stream's heat budget, the effect of the bug will be small. Similarly, in very small streams where vegetative shade typically covers the entire stream, thus minimizing the occurrence of partial shading, the effect of the bug also will be

	minimized. In streams where shade is important and the vegetation's shadow typically covers only part of the river surface, however, the effect may be significant. This is problematic, particularly because the bug results in a systematic overestimate of vegetative shading. To illustrate this effect, two versions of ODEQ's shade calculator (the "Shadalator") were used to generate example shade curves for comparison. One version of the calculator contained the partial shading bug; the other version used the USGS code that solves the problem. The results are shown in figure 3 for the Qalc surficial geology group and in figure 4 for the Qff1 surficial geology group. Calculations were performed for several stream aspects to replicate the shade curves in the TMDL. Figure 3. Calculated shade curves for the Qalc surficial geology group, using 26.9-meter high trees with a 3.2-meter canopy overhang and a 71% canopy density. Dashed lines (labelled "Bug") were generated with the old version of the "Shadalator." Solid lines (labelled "Fixed") were generated with the revised version of the Shadalator. These shade curve comparisons show that the partial shading bug in the Shadalator causes the amount of vegetative shade to be overestimated in the flawed version of the program. The bias varies as a function of stream width and vegetation characteristics. In these examples, the bias is calculated to be as high as 12 percent (absolute error). Errors of that magnitude can be significant in the heat budget of a stream. This error in the shading calculations will not change any of the general conclusions in the temperature TMDL, such as the fact that most streams will still require additional shading to reduce anthropogenic nonpoint-source heat loading. The error is problematic, however, because the shade curves in the TMDL overestimate the amount of shading that land managers might be able to achieve. Because vegetative shade is the surrogate measure used to make heat load allocations in the TMDL, land managers need to be given accurate shade curves for planning and monitoring purposes. The shade curves given in this TMDL are not accurate. It would be helpful to land managers and city planners, Figure 4. Calculated shade curves for the Qff1 surficial geology group, using 40.7-meter high trees with a 4.9-meter canopy overhang and a 70% canopy density. Dashed lines (labelled "Bug") were generated with the old version of the "Shadalator." Solid lines (labelled "Fixed") were generated with the revised version of the Shadalator. therefore, if the shade curves were updated to remove the errors caused by this bug in Heat Source and the Shadalator. (17)
Response	*ODEQ does not agree and will not be re-modeling Heat Source modeled streams. The developer wrote the code using an intentional assumption regarding a partially shaded stream surface. ODEQ does not believe that this assumption is in invalid.* *Water quality modeling inherently contains many assumptions or generalizations. Following are some examples that contribute to modeling imprecision.* • *Stream side vegetation inputs (heights, densities, overhang) are averaged for each 50-meter stream reach, and assigned based on general categorizations. "Large Conifers" along a stream may be assigned the same height value, based on a certain number of ground level measurements. So all large conifers digitized from aerial photographs may be assigned the same height value, when in fact their actual heights may fall within a 10-meter range. The same applies to overhang and density values. These averaged vegetation inputs mask some of the actual variability in stream side vegetation.*

	• *Solar position cannot be precisely predicted. There is an error of 10-15% associated with such calculations. This means that it is difficult to precisely calculate the length of a shadow, and hence difficult to precisely calculate a value for partial shade on the stream surface.* • *Heat Source always assumes that the wetted stream channel runs down the center of the active channel. Vegetation positions are determined based upon the active channel edges. In reality, streams migrate all over the channel, and may run along one bank in some reaches. This factor adds uncertainty to partial shade calculations on a stream.* • *10-meter DEMs are used to assign elevations, stream gradients, and hill slopes within Heat Source. DEMs inaccuracies that should also be recognized.* *The "fix" proposed by USGS is an alternate valid assumption that could be incorporated into future Heat Source versions. However, the modeling results may not necessarily be more precise or valid due to the combined effects of all the other assumptions, generalizations, and potential sources of error (some of which are bulleted above).* *In summary, modeling requires several assumptions about natural systems, which result in imprecision. It is impossible to account for every detail in a natural system, so some model inputs and calculations use assumptions that simplify the natural world. Incorporating USGS proposed "fix" would not result in better modeling results because it would still be masked by all the other assumptions that go into modeling, and it is still subject to the sources of error bulleted above. ODEQ believes the assumptions used in Heat Source 6 are valid.* *Heat Source results are always validated using ground-level effective shade measurements.* *Heat Source 7 is the current version used by ODEQ. This version of the model has removed the assumption regarding partial shading of a stream.* *ODEQ explored the methods suggested by USGS, and came to the conclusion that both the current Heat Source 7 methodology and the USGS suggested methods are valid. In conclusion, ODEQ did not alter the Heat Source methodology used in previous versions.*
Comment 25.	Page 8-17 "The determination of system potential vegetation characteristics leads to an estimation of shade values for each riparian community. These shade values are often referred to as effective shade or system potential shade when associated with an area free of human disturbance. Effective shade for the purposes of TMDL development is the percent of incoming solar radiation that reaches the stream. Solar radiation is a function of regional and local characteristics and is a factor in determining water temperature in the absence of significant point source influences." This sentence seems incorrect ("shade" is NOT the amount of radiation that reaches the stream). Effective shade is defined as the fraction of incoming solar shortwave radiation above the vegetation and topography that is blocked from reaching the surface of the stream. (62)
Response	*ODEQ has corrected the definition of effective shade.*

Comment 26.	Text on pages 8-17. That text includes a subsection entitled "Limitations of Stream Temperature TMDL Approach" that purports to enlighten the reader as to the limitations of using Heat Source in a TMDL context. This section is an inadequate description of the limitations of the Heat Source model as a tool to assess stream water temperature. The text would be more accurate if this section were expanded to clearly and more completely assess the limitations (and advantages) of the Heat Source model. Instead of trying to list any limitations, the reader could be referred to the Subbasin Temperature Analysis Summary in Appendix C. Alternatively, this very short section of text could be eliminated; it doesn't state anything substantive in its current formulation. (17)
Response	*ODEQ has made the suggested changes, and refer the reader to Appendix C.*
Comment 27.	Page 8 -17 pp 3 "The water quality restoration strategies identified are applicable to *all streams* in the sub basin." Many headwater streams do not have surface flow during the critical period for stream heating (July- September). For streams with intermittent flow, shading the streambed is unlikely to contribute to the goal of reduced summer stream temperatures on perennial streams. We suggest that the TMDL make this distinction clear by changing this statement to read "all *perennial* streams" (62)
Response	*ODEQ does not agree. Riparian restoration and maintenance provides for stream bank stabilization, reduces runoff, and provides shade. Protection of these values in intermittent headwater streams protects movement of water, sediment, and coarse material through perennial reaches. In addition it will provide for source water protection and increase habitat for wildlife and amphibians.*
Comment 28.	Page 8-17: Para 3: *"*The water quality restoration strategies identified are applicable to all streams in the sub basin*".* This is a huge jump to go from the 303(d) listed water bodies to the sub basin. Inclusive language such as "all" needs to be used cautiously. (11)
Response	*TMDLs are subbasin water quality studies that are applicable to all streams in the subbasin. The restoration strategies are typically applicable on a land use or geomorphic unit bases. ODEQ explicitly allocates load and waste load allocations to all water bodies tributary to impaired waters in the subbasin.*
Comment 29.	Page 8-18: Para 2: The data does not support general statements like *"*Streams in the North Santiam sub basin exceed biological based rearing criteria*…"* The data are for the Lower North, Little North watersheds; does not apply to upper watershed in the system. This entire paragraph should be cleaned up to aid the reader understand the extent of the problem and the season variation. Within one paragraph, reference is made to North Santiam sub basin, Little North Santiam River, North Santiam River and Santiam River. (11)
Response	*ODEQ has clarified the statement.*
Comment 30.	Page 8-18 pp 1:The report states that thermistors were removed in August. We believe the thermistors were removed in September. (62)
Response	*ODEQ has made the change.*
Comment 31.	Page 8–19 Graph 8.1: In review of this graph , we think there are some considerations regarding tributaries and the comment provided on P 8 – 13. Note how all tributaries: Canyon Cr., Sinker Cr. and Elkhorn Cr. are quite similar in their temperatures. There are other smaller tributaries that we have monitored which have a similar signature. As stated before we conclude that Elkhorn Cr. is at system potential and is exceeding the biologic criterion. Sinker Creek and Canyon Creek (both with BLM ownership) have similar temperatures but under forest management with lower than the system potential average tree heights and density that is

	provided in the shade curves provided for the Upland Forest types. This brings into question the use of shade curves on a reach basis. (62)
Response	*Shade curves are not applied on a reach basis but rather an upland forest basis, as determined in Appendix C. ODEQ does not agree with the assessment that Elkhorn, Canyon, and Sinker Creeks are at system potential. Perhaps there are no visible anthropogenic impacts to streams such as Elkhorn, but anthropogenic impacts do occur from upland timber harvesting, camping and recreational areas, and forest service roads. Tributaries such as Elkhorn provide cooling and potentially cold-water refugia to mainstem rivers such as the Little North Santiam River.*
Comment 32.	Page 8-21, Loading Capacity – This section provides a good overview of the loading capacity but does not define the specific numeric loading capacity (in kcal/day or degrees Celsius) for the TMDLs being established. Please provide this information. This comment is also applicable to the "loading capacity" sections in other subbasin temperature TMDLs. (65)
Response	*This information is provided on page 8-27:* *"Modeling of the river with system potential riparian vegetation indicates that $5.97x10^{8}$ kcal/day heat load is attributed to system potential condition and $8.4x10^{7}$ kcal/day is due to anthropogenic sources."* *When load capacity is at or above the biological criterion the load capacity of the river is limited to the human use allowance of 0.3°C. However, load capacity in the small North Santiam Subbasin streams is defined as system potential effective shade plus a small allocation for individual point sources. Load capacity for the heat source simulations for the Little North Santiam River is in Table 8.7.*
Comment 33.	Page 8-22 - We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. "As outlined in the section entitled 'Point Source Methodology', all other facilities in the subbasin were found to not be a significant contributor of heat to Columbia Slough. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load." A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this text.*
Comment 34.	Page 8-22 Wasteload Allocations – It would be helpful if each subbasin chapter provided the results of the preliminary screening which has been conducted. This would provide the reader with some understanding of what might be expected of each source and their potential impact. (65)
Response	*No preliminary screening of individual point sources was conducted in the North Santiam Subbasin. However, the text specifies that the individual sources in the non-mainstem streams in the subbasin do not discharge during the summer, thus no Waste Load Allocation (WLA) is needed. The general sources are not significant contributors of heat. Therefore, no WLAs are calculated.*
Comment 35.	Pg 8-23 Equation 1 on pages 9-27 and 8-23 and elsewhere is hard to read. Please insert a clearer version. (17)
Response	*ODEQ has inserted a clearer version of the equation.*
Comment 36.	Page 8-23 Flow chart outlining process for developing WLAs: EPA has two comments regarding this flow chart. 1) The term "Pre-TMDL Limits" is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful.

	2) In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*ODEQ defines the term "Pre-TMDL Limits" as current permit limits for existing point sources at current discharge limits, specifically for temperature NPDES holders. ODEQ will make the suggested clarification as noted for "Determination of No Reasonable Potential…".*
Comment 37.	Page 8-24, 2nd paragraph - This notes that wasteload allocations are not necessary if the source does not discharge into a listed stream. However, Table 8.2 states that the TMDL applies to all waterbodies in the subbasin and earlier text implies that allocations are needed for all sources in order to meet the downstream criteria. This is further noted in the mainstem TMDL. Therefore, all sources should be evaluated, whether or not the specific stream into which they discharge has been listed. If the discharge is shown to have an insignificant impact and thus no reasonable potential to cause an increase, no WLA would be required. (65)
Response	*Due to the numerous point sources in the Subbasin and due to time constraints, only 303(d) listed streams point sources were evaluated for waste load allocations. No waste load allocations were developed in subbasin streams as they are unnecessary to demonstrate attainment of temperature water quality standards because current individual and general point sources do not discharge heated waste water. Waste load allocations will be developed for all new and future sources that discharge heated waste water to receiving waters using Equations 1(page 8-23) and 2 (page 8-24).*
Comment 38.	Page 8–24 Load Allocations: This section and other references in the TMDL leave the BLM unsure of our abilities to effectively conduct riparian restoration and management where small decreases in short term effective shade are inevitable in order to realize long term benefit. On page 4 – 125 of Chapter 4 it was stated that no human use allocations were provided for non-point source activities where implementation is based on surrogate shade measures. On P – 8-24 it appears that there is an allocation and it could be used for riparian activities. Regardless, the allocation of 0.05 C is not really measurable and the more appropriate "allocation" for riparian restoration activities should be for a short term reduction in the effective shade as illustrated in the shade curves provided. (62)
Response	*ODEQ does not agree with the statement, "allocation for riparian restoration activities should be for a short term reduction in the effective shade". The Shade-curves provide a target for long term effective shade allocations, not short term allocations will be included in the TMDL. Water quality standards also provide mechanisms for riparian restorations (340-41-0004(5)(a)).*
Comment 39.	Page 8-24: Load Allocations do not adequately consider the geologic variability within a watershed. Background condition based on heat loading resulting in potential vegetation does not consider the fluvial variation within the watershed. (11)
Response	*Load allocations do take into account geologic and fluvial variability. Please reference Appendix C for a full discussion, specifically the System Potential Vegetation development section.*
Comment 40.	Page 8-25. We would recommend that you add a paragraph to the end of this section which specifies how new sources should be addressed. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this information to the TMDL.* *Existing and future thermal point sources in the subbasin may be permitted to discharge under the following conditions:* *The sum of waste load and load allocations result in an increase in stream temperature of no greater than 0.3°C above the applicable criteria after complete*

	mixing and at the point of maximum impact. *Pollutant trading opportunities may be available to new or existing point sources in order to offset temperature impacts.*
Comment 41.	Page 8-25: We have a concern with statistical accuracy of running Monte Carlo simulation only once to calibrate Heat Source Model. (11)
Response	*Heat Source was not calibrated using a Monte Carlo analysis. Heat Source models for each stream were calibrated using field data collected by ODEQ and the working partners in the subbasin. System potential condition was simulated with a random distribution of vegetation types within each geomorphic unit following rules described in Appendix C, Potential Near Stream Land Cover.*
Comment 42.	Page 8-27: Scientific notation in narrative should correspond to table 8.7 values. Para. 3: The statement: "The change between current condition stream temperatures and system potential vegetation temperatures at the point of maximum impact is 1.7 C". Where did this value come from? Only 1.1 degree change for an 8-mile segment of river, and still having the temperature be above state standards prompts a "so what?" question. Other methods do not take into account the natural loading of the stream or the fluvial nature of the various segments (transport or depositional). Para 5: Surrogate Measures: Include mention of the Sufficiency Analysis process that DEQ has approved. This is what most land managers will be hanging their hats upon. (11)
Response	*The scientific notation in the narrative was corrected to correspond to Table 8.7.* *The 1.7C temperature came from the Heat Source Model temperature difference between current conditions and system potential vegetation conditions at the mouth and headwaters. This is the difference between the calibrated model at current condition and a single simulation at system potential. The "so what" is illustrated in Figures 8.5 and 8.6, which suggest that cooler temperatures are likely attainable throughout the much of the Little North Santiam River. In addition, an increase of 1.1C is significant because of the cumulative nature of longitudinal temperature increases.* *Chapter 14, the Water Quality Management Plan identifies that USFS and BLM have agreements with ODEQ identifying how water quality protection will be implemented . Water Quality Restoration Plans including sufficiency analyses will be key elements of the implementation plan on federal lands.*
Comment 43.	Page 8-27 In the Potential Near-Stream Land Cover section of Appendix C (and elsewhere), the term "geomorphic unit" is often used when the correct term is "geologic unit." (17)
Response	*ODEQ has defined the term "geomorphic unit", and continue the use of the term in the TMDL.* *The term "geomorphic units" are defined as surfical deposits as mapped by O'Conner, et al 2001.*
Comment 44.	Page 8-27 The BLM appreciates all the good work that went into deriving this analysis. We have some questions about the way this analysis depicts the derivation of the "effective shade" target for the geomorphic groups and how this is being used in the TMDL. We are particularly concerned with what appears to be a jurisdictional line depicting what is termed as the "Upland Forested Mountainous Area" (page 3). This covers a

	significant portion of our land and represents a significant variation in shade curve results from the adjoining "process based" geomorphic groups. Our lands often occur on either side of this line. It is hard to envision different "effective shade curve" targets on the basis of this non process based line. (62)
Response	*The same process based method that was used to develop the riparian characteristics for the geomorphic unit system potential vegetation calculations was applied to develop the upland forest classification. Geomorphic unit shade curves that are adjacent to upland forest are generally consistent with the tree height and density defined for the upland forest category.*
Comment 45	Page 8- 27 Excess Load: This paragraph makes too broad of a statement concerning the state of shade throughout the North Santiam. BLM does not have nor has collected enough data to support this statement. (62)
Response	*The referenced section has been re-written to clarify that this statement is being made by ODEQ, rather than ODEQ and BLM jointly.*
Comment 45.	Page 8–28, pp2: The distance from vegetation expressed on each bank should not be referred to "Bankfull Width". Refer to Rosgen 1996 for the commonly used definition. (62)
Response	*ODEQ has deleted the citation to bankfull width to avoid confusion.*
Comment 46.	Page 8-29, How to Use a Shade Curve, #4, last sentence – The proper terminology here should be that "This is the non-point source load allocation …". Load allocation applies to sources while loading capacity refers to the capacity of the waterbody as a whole. (This same comment applies to all subbasin chapters which include this explanation of shade curves.) (65)
Response	*ODEQ has made the appropriate changes to the text.*
Comment 47.	Page 8–31, BLM questions the validity of these maps in application of shade curves especially involved with upland forest type. (see comments on Appendix C). (62)
Response	*The upland forest type was classified using the same methodology used to define the geomorphic units system potential vegetation, which included the expert analysis of forestry professionals from the Basin. The upland forestry delineation is consistent with the current land use distribution and land ownership in the Willamette Basin.*

Comments on Chapter 9: South Santiam Subbasin	
Comment 1.	Page 9-2, Reason for action, 2nd paragraph, 2nd sentence – Please clarify if the entire South Santiam River is addressed in the mainstem TMDL or only that portion to Foster Reservoir (RM 0 to ?). (65)
Response	*ODEQ has changed the text on page 9-2 to identify that the South Santiam River to River Mile 37.7, Foster Reservoir, is included in the mainstem TMDL.*
Comment 2.	Page 9-3: In other TMDLs, for example Table 2.1 on page 5-11 of the Lower Willamette TMDL summarizes those 303d segments that Greg has addressed in the TMDL. Please add a similar column to table 1 in your document. (65)
Response	*ODEQ has added a "TMDL" column identifying in which chapters the particular TMDL can be located.*
Comment 3.	Page 9-4: Para. 2; "The sub basin is owned almost entirely by private." Federal and State ownership account for 30-40%. (11)
Response	*ODEQ has changed the text to "the subbasin is primarily privately owned" and has added the text "Federal and State ownership accounts for 30-40% of the total land use in the Subbasin".*
Comment 4.	Page 9-5: All descriptions. Change east slope of the Cascades Range to west slopes. Para 3: Add resident fisheries. Para 4: Change city to cities. Para 7: "…Willamette National forest and is part of the Middle Santiam Wilderness area." Should read, "the Middle Santiam Wilderness is part of this watershed." " The watershed supports Spring….." Due to the dams the watershed only supports a resident fisheries. (11)
Response	*ODEQ has made the changes in the specified paragraphs. The comment regarding "Spring Chinook" will be changed to state "resident fish" and a comment will be added stating that the current designated fish use is "salmon and trout rearing and migration as designated by the new temperature criteria."*
Comment 5.	Page 9-6, South Santiam River Watershed – For consistency with the list of watersheds provided on page 9-4, we recommend that these two drainages be addressed in separate subsections. (65)
Response	*ODEQ did not separate the text to reflect the difference between the two Hydrologic Unit Codes (HUC) identified as South Santiam River Watershed. This was done in-order to avoid confusion between the two watersheds. Instead ODEQ clarified that there are two watersheds with the same HUC name and discussed them as a whole.*
Comment 6.	Page 9-6: Para 1: "….. and has a road that parallels its entire length." A road parallels approximately 19-20 miles of the total 28-mile stream. Albany mine area is the Historic Quartzville town site. Spring Chinook and Winter Steelhead are not in the system due to the dams. Resident fisheries are. *Para 2: "*The watershed is dominated by public ownership." Only 50% is in public ownership. Para 3: '…road that parallels its entire length." < 7 miles are not next to a road. No Bull trout within the system. Para 6: Add resident fisheries (11)
Response	*ODEQ has added clarifying text stating that the majority of Quartville Creek is paralleled by a road, 20 of 28 stream miles. In addition ODEQ has added and modified the text to include the above comments. The comments regarding "resident" will be changed to state "resident fish" and a comment will be added stating that the current designated fish use in Quartzville Creek watershed is "salmon and trout rearing and migration as designated by the new temperature criteria".*

Comment 7.	Page 9-6, South Santiam River Watershed, 2nd paragraph, 1st sentence – Please specify the river mile of the dam which forms Foster Reservoir. (65)
Response	*ODEQ has changed the text to identify Foster Dam at River Mile 37.7.*
Comment 8.	p. 9-8, Reserve Capacity . The information presented here is not consistent with that provided in the main TMDL, p. 7-19. This same comment applies to the temperature TMDLs for several subbasins including the Upper Willamette. (65)
Response	*The TMDL components table was updated, specifically to state reserve capacity is allocated 1/6th of the human use allowance equal to a 0.05°C increase in temperature above the applicable criteria.*
Comment 9.	Page 9-8*:* We have a concern with listing the segments of Middle and South Santiam with the data set available. (11)
Response	*ODEQ has no reason to believe that the temperature data used to list the Middle and South Santiam Rivers was not representative or unqualified. No change will be made to the document. The Middle Santiam River was listed in 2002; the South Santiam River was initially listed in 1998, RM 0 – 25.9, and in 2002 the entire South Santiam River from RM 0 to 63.4 was listed. The temperature 303(d) listings that occurred in 2002 were due to the results of a 2000 ODEQ temperature study in the subbasin using temperature monitors. The Middle Santiam River at RM 16 in 2000 recorded 58 days with a 7 Day Moving Average (DMA) > 17.8° C, the temperature criteria in 2002. The Santiam River experienced similar elevated temperatures, RM 42.3 in 2000 had 52 days with 7 DMA > 17.8° C. The temperature data collected was field audited, and the monitors underwent a quality assurance / quality control check prior to and after field collection, and independent audit data were collected in the field.*
Comment 10.	Page 9-9, it would be useful to clarify that wildfires, floods, and insect infestation affect stream temperature by affecting the presence and density of riparian vegetation. The reader might be confused if this connection is not explicitly stated. (17)
Response	*ODEQ has added clarifying text:* *Stream temperatures are affected by natural and human caused sources of heating. Disturbance processes such as wildfire, flood, and insect infestation influence the presence, height and density of riparian vegetation which in turn determines the amount of solar radiation reaching the stream. Such processes are recognized and incorporated as a natural condition in the TMDL. This temperature TMDL does address stream heating caused by human activities that affect characteristics of riparian vegetation in addition to point sources that discharge heat directly into surface waters in the South Santiam Subbasin.*
Comment 11.	Page 9-11 – blank page (65)
Response	*ODEQ has deleted the blank page.*
Comment 12.	p. 9-12 Map 9.4: Historic core cold-water habitat should represent the headwaters of the systems, as Thomas and Crabtree Creek represent. We are not sure why portions of South Santiam are listed as core cold water habitats. There appears to be mixing of historic information with the current situation. This is very confusing. (11)
Response	*Map 9.4 represents the current temperature criteria as adopted by the Environmental Quality Commission in December of 2003, and approved by USEPA in March of 2004. The core cold water habitat classification is representative of the current fish use designation, it is not limited to historic habitat classification as indicated by the comment. The core cold water numeric criteria for the headwaters of Thomas and Crabtree Creeks, and the South Santiam River (confluence of McDowell Creek up to Foster Reservoir, and the headwaters of the South Santiam River) is 16°C. Oregon Department of Fish and Wildlife staff provided fish use designation information.*

Comment 13.	Page 9-13: Under existing heat sources, dams are not adequately portrayed for this watershed. Due to the depth of reservoirs in the system and depth of outfalls, a net drop in temperature occurs over the historic flow regimes. (11)
Response	*ODEQ purposefully did not include a full description of Foster and Green Peter reservoirs in Chapter 9 because the impact of these reservoirs as existing heat sources is discussed in Chapter 4, Existing Heat Sources section. The lower South Santiam River and the two reservoirs are included in the mainstem Willamette River analysis.*
Comment 14.	Page 9-13 – This discussion should include the provision containing the Human Use Allowance. (65)
Response	*ODEQ has added text relating to Human Use Allowance to this section. Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.*
Comment 15.	Page 9-17 "The determination of system potential vegetation characteristics leads to an estimation of shade values for each riparian community. These shade values are often referred to as effective shade or system potential shade when associated with an area free of human disturbance. Effective shade for the purposes of TMDL development is the percent of incoming solar radiation that reaches the stream. Solar radiation is a function of regional and local characteristics and is a factor in determining water temperature in the absence of significant point source influences." This sentence seems incorrect ("shade" is NOT the amount of radiation that reaches the stream). Effective shade is defined as the fraction of incoming solar shortwave radiation above the vegetation and topography that is blocked from reaching the surface of the stream. (62)
Response	*ODEQ has replaced that paragraph with the following text:* *"Effective shade is the percent of daily solar radiation that is blocked by vegetation and topography. System potential vegetation characteristics are used to estimate effective shade for each riparian community. These estimated effective shade values are often referred to as system potential effective shade when in the absence of human disturbance."*
Comment 16.	Text on page 9-17 discusses the Heat Source model as a tool for assessing stream water temperature. That text includes a subsection entitled "Limitations of Stream Temperature TMDL Approach" that purports to enlighten the reader as to the limitations of using Heat Source in a TMDL context. This section is an inadequate description of the limitations of the Heat Source model as a tool to assess stream water temperature. The text would be more accurate if this section were expanded to clearly and more completely assess the limitations (and advantages) of the Heat Source model. Instead of trying to list any limitations, the reader could be referred to the Subbasin Temperature Analysis Summary in Appendix C. Alternatively, this very short section of text could be eliminated; it doesn't state anything substantive in its current formulation. (17)
Response	*ODEQ has made the suggested changes, specifically deleted the section and referred the reader to Appendix C, see 3rd paragraph on page 9-17.*
Comment 17.	Page 9 – 21: BLM has data on tributaries in the headwaters of Crabtree Creek which do not meet the core cold water criterion but are at system potential. See discussion regarding Elkhorn Creek in the Little North Santiam. Roaring River is one of the coldest tributaries on our district and represents true core cold water habitat due to the high groundwater stream interaction. This watershed is actively managed. We would expect even in a disturbance regime this stream would be cold . (62)

Response	*ODEQ will work with USFS and BLM to document those streams with natural condition temperatures. This can occur through the TMDL implementation process. Other streams that are not at system potential condition will be removed from the 303(d) list after the TMDL is approved by USEPA. Unlike streams identified at natural condition these streams with elevated stream temperatures will continue to be considered impaired until natural condition or biological criteria temperatures are attained.*
Comment 18.	Page 9-23, Figure 9.3: The photograph of Thomas Creek shows an area labeled "Riparian vegetation not at potential." The area depicted includes a large gravel bar that is clearly part of the active channel. Active bars may grow annual vegetation, but they will not produce perennial vegetation. This figure implies that the DEQ is expecting sections of active stream channel to produce riparian vegetation that will reduce heat loading. DEQ should re-label this figure to exclude areas of the active channel. (6)
Response	*ODEQ has clarified that the the left side of the photo (right bank) is not at system potential vegetation, in fact the photo shows that there is no riparian vegetation between the open field and Thomas Creek. This photo is simply an example of a location along Thomas Creek which is subject to system potential riparian vegetation implementation.*
Comment 19.	Page 9-23: The discussion and graphs of Current versus System Potential Vegetation imply that that the Monte Carlo simulations being run are allowing for too much disturbance of riparian vegetation. DEQ explains discrepancies between "current" and "potential" where the former exceeds the latter as being the result of the simulation randomly choosing disturbed areas. However, since there is a significant reach of stream where this occurs, it may be the result of programming the simulation to produce more disturbance than is reasonable. (6)
Response	*These graphs are simply one random distribution run of system potential vegetation. ODEQ believes disturbance levels are reasonable, but that additional simulations would produce a full range of possible outcomes. These outcomes would likely include stream temperatures warmer and cooler than those used in the TMDL. In any case, ODEQ believes the analysis supports load allocations based on restoration and protection of riparian vegetation.*
Comment 20.	Page 9-24, Loading Capacity – This section provides a good overview of the loading capacity but does not define the specific numeric loading capacity (in kcal/day or degrees Celsius) for the TMDLs being established. Please provide this information. This comment is also applicable to the "loading capacity" sections in other subbasin temperature TMDLs. (65)
Response	*When load capacity is at or above the biological criterion the load capacity of the river is limited to the human use allowance of 0.3°C.However, load capacity in the small South Santiam Subbasin streams are defined as system potential effective shade plus a small allocation for individual point sources. System potential for the heat source simulations of Crabtree and Thomas Creek are on Table 9.7*
Comment 21.	Page 9-25 Wasteload Allocations – It would be helpful if each subbasin chapter provided the results of the preliminary screening which has been conducted. This would provide the reader with some understanding of what might be expected of each source and their potential impact. (65)
Response	*No preliminary screening of individual point sources was conducted in the South Santiam Subbasin. However, the text specifies that the individual sources in the non-mainstem streams in the subbasin do not discharge during the summer, thus no Waste Load Allocation (WLA) is needed. The general sources are not significant contributors of heat. Therefore, no WLAs are calculated.*
Comment 22.	Page 9-25 We recommend that an additional sentence be added to clarify that non-thermal discharges are allowed to continue discharging at their current heat load. As outlined in the section entitled 'Point Source Methodology', all other facilities in the subbasin were found to not be a significant contributor of heat. Therefore, they were found to not have a reasonable potential to contribute to the temperature impairment

	and require no numeric limits in their NPDES permits. These facilities may continue to discharge at their current heat load. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this information to the TMDL on page 9-24 in the 1st paragraph in the Wasteload Allocation section.*
Comment 23.	Page 9-26 Flow chart outlining process for developing WLAs: EPA has two comments regarding this flow chart. 1) The term "Pre-TMDL Limits" is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful. 2) In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*ODEQ defines the term "Pre-TMDL Limits" as current permit limits for existing point sources at current discharge limits, specifically for temperature NPDES holders. This text was inserted into the text, 1st sentence, immediately following the flow diagram. ODEQ will make the suggested clarification as noted for "Determination of No Reasonable Potential…".*
Comment 24.	SHADE CALCULATIONS— In November of 2003, ODEQ staff were notified that a bug in the Heat Source model had been found by USGS staff. That bug affected the model's calculation of vegetative shading when such shadows only partially covered the river's water surface. USGS staff pointed out the bug, explained its impact, offered two examples showing the effect, and provided a solution in the form of new lines of computer code to replace the faulty code. This "partial shading" bug affected not only Heat Source but also the "Shadalator" program used to generate the shade curves used throughout the Willamette Basin Temperature TMDL. It appears that the shade curves provided in the TMDL were generated with the flawed code, and one or more of the Heat Source models of the small tributaries (e.g., the Little North Santiam River) also used the flawed code. This is not a criticism of ODEQ staff. Most or all of this work probably was completed prior to the discovery of the bug in November of 2003, and a decision may have been made that the increase in accuracy provided by the bug fix was not sufficient to justify the expenditure of time that would be required to redo the work. The magnitude of the error introduced by this bug depends on the size of the stream and several other factors. In very wide streams where shading is not an overriding factor in the stream's heat budget, the effect of the bug will be small. Similarly, in very small streams where vegetative shade typically covers the entire stream, thus minimizing the occurrence of partial shading, the effect of the bug also will be minimized. In streams where shade is important and the vegetation's shadow typically covers only part of the river surface, however, the effect may be significant. This is problematic, particularly because the bug results in a systematic overestimate of vegetative shading. To illustrate this effect, two versions of ODEQ's shade calculator (the "Shadalator") were used to generate example shade curves for comparison. One version of the calculator contained the partial shading bug; the other version used the USGS code that solves the problem. The results are shown in figure 3 for the Qalc surficial geology group and in figure 4 for the Qff1 surficial geology group. Calculations were performed for several stream aspects to replicate the shade curves in the TMDL. Figure 3. Calculated shade curves for the Qalc surficial geology group, using 26.9-

	meter high trees with a 3.2-meter canopy overhang and a 71% canopy density. Dashed lines (labelled "Bug") were generated with the old version of the "Shadalator." Solid lines (labelled "Fixed") were generated with the revised version of the Shadalator. These shade curve comparisons show that the partial shading bug in the Shadalator causes the amount of vegetative shade to be overestimated in the flawed version of the program. The bias varies as a function of stream width and vegetation characteristics. In these examples, the bias is calculated to be as high as 12 percent (absolute error). Errors of that magnitude can be significant in the heat budget of a stream. This error in the shading calculations will not change any of the general conclusions in the temperature TMDL, such as the fact that most streams will still require additional shading to reduce anthropogenic nonpoint-source heat loading. The error is problematic, however, because the shade curves in the TMDL overestimate the amount of shading that land managers might be able to achieve. Because vegetative shade is the surrogate measure used to make heat load allocations in the TMDL, land managers need to be given accurate shade curves for planning and monitoring purposes. The shade curves given in this TMDL are not accurate. It would be helpful to land managers and city planners, Figure 4. Calculated shade curves for the Qff1 surficial geology group, using 40.7-meter high trees with a 4.9-meter canopy overhang and a 70% canopy density. Dashed lines (labelled "Bug") were generated with the old version of the "Shadalator." Solid lines (labelled "Fixed") were generated with the revised version of the Shadalator. therefore, if the shade curves were updated to remove the errors caused by this bug in Heat Source and the Shadalator. (17)
Response	*ODEQ does not agree and will not be re-modeling Heat Source modeled streams. The developer wrote the code using an intentional assumption regarding a partially shaded stream surface. ODEQ does not believe that this assumption is invalid.* *Water quality modeling inherently contains many assumptions or generalizations. Following are some examples that contribute to modeling imprecision:* • *Stream side vegetation inputs (heights, densities, overhang) are averaged for each 50-meter stream reach, and assigned based on general categorizations. "Large Conifers" along a stream may be assigned the same height value, based on a certain number of ground level measurements. So all large conifers digitized from aerial photographs may be assigned the same height value, when in fact their actual heights may fall within a 10-meter range. The same applies to overhang and density values. These averaged vegetation inputs mask some of the actual variability in stream side vegetation.* • *Solar position cannot be precisely predicted. There is an error of 10-15% associated with such calculations. This means that it is difficult to precisely calculate the length of a shadow, and hence difficult to precisely calculate a value for partial shade on the stream surface.* • *Heat Source always assumes that the wetted stream channel runs down the center of the active channel. Vegetation positions are determined based upon the active channel edges. In reality, streams migrate all over the channel, and may run along one bank in some reaches. This factor adds uncertainty to partial shade calculations on a stream.* • *10-meter DEMs are used to assign elevations, stream gradients, and hill slopes within Heat Source. DEMs inaccuracies that should also be recognized.*

	The "fix" proposed by USGS is an alternate valid assumption that could be incorporated into future Heat Source versions. However, the modeling results may not necessarily be more precise or valid due to the combined effects of all the other assumptions, generalizations, and potential sources of error (some of which are bulleted above). *In summary, modeling requires several assumptions about natural systems, which result in imprecision. It is impossible to account for every detail in a natural system, so some model inputs and calculations use assumptions that simplify the natural world. Incorporating USGS proposed "fix" would not result in better modeling results because it would still be masked by all the other assumptions that go into modeling, and it is still subject to the sources of error bulleted above. ODEQ believes the assumptions used in Heat Source 6 are valid.* *Heat Source results are always validated using ground-level effective shade measurements.* *Heat Source 7 is the current version used by ODEQ. This version of the model has removed the assumption regarding partial shading of a stream.* *ODEQ explored the methods suggested by USGS, and came to the conclusion that both the current Heat Source 7 methodology and the USGS suggested methods are valid. In conclusion, ODEQ did not alter the Heat Source methodology used in previous versions.*
Comment 25.	Page 9-27. We would recommend that you add a paragraph to the end of this section which specifies how new sources should be addressed. A similar statement is suggested for inclusion in the other subbasin temperature TMDLs. (65)
Response	*ODEQ has added this information to the TMDL, last paragraph in the Wasteload Allocation section.* *Existing and future thermal point sources in the subbasin may be permitted to discharge under the following conditions:* *The sum of waste load and load allocations result in an increase in stream temperature of no greater than 0.3°C above the applicable criteria after complete mixing and at the point of maximum impact.* *Pollutant trading opportunities may be available to new or existing point sources in order to offset temperature impacts.*
Comment 26.	Equation 1 on pages 9-27 is hard to read. Please insert a clearer version. (17)
Response	*ODEQ has inserted a clearer version of the equation.*
Comment 27.	Page 9-27 - This notes that wasteload allocations are not necessary if the source does not discharge into a listed stream. However, Table 8.2 states that the TMDL applies to all waterbodies in the subbasin and earlier text implies that allocations are needed for all sources in order to meet the downstream criteria. This is further noted in the mainstem TMDL. Therefore, all sources should be evaluated, whether or not the specific stream into which they discharge has been listed. If the discharge is shown to have an insignificant impact and thus no reasonable potential to cause an increase, no WLA would be required. (65)
Response	*Due to the numerous point sources in the Subbasin and due to time constraints, only 303(d) listed streams point sources were evaluated for waste load allocations. No waste load allocations were developed in subbasin streams as they are unnecessary to demonstrate attainment of WQS. Waste load allocations will be developed for all sources that discharge heated waste water to receiving waters using Equations 1 and 2.*

Comment 28.	Page 9-32 In the Potential Near-Stream Land Cover section of Appendix C (and elsewhere), the term “geomorphic unit” is often used when the correct term is “geologic unit.” (17)
Response	*ODEQ has defined the term “geomorphic unit”, and continued the use of the term in the TMDL.* *The term "geomorphic units" are defined as surface deposits as mapped by O'Conner, et al 2001.*
Comment 29.	Page 9-33 The table reflects 61% (407,000 acres) of the sub-basin is covered by Upland Forest geomorphic unit. This is an expansive area to apply a 1 set of shade curves. Please see comments related to the North Santiam sub-basin. The BLM appreciates all the good work that went into deriving this analysis. We have some questions about the way this analysis depicts the derivation of the “effective shade” target for the geomorphic groups and how this is being used in the TMDL. The aquatic conservation strategy of the Northwest Forest Plan will meet shade targets. We anticipate an ongoing dialogue with BLM and USFS to implement the TMDL as key stakeholders in the basin. We are particularly concerned with what appears to be a jurisdictional line depicting what is termed as the “Upland Forested Mountainous Area” (page 3). This covers a significant portion of our land and represents a significant variation in shade curve results from the adjoining “process based” geomorphic groups. Our lands often occur on either side of this line. It is hard to envision different “effective shade curve” targets on the basis of this non process based line. (62)
Response	*Geomorphic unit shade curves that are adjacent to upland forest are generally consistent with the tree height and density defined for the upland forest category. Thus ODEQ expects similar effective targets in the upland forest and adjacent units.*
Comment 30.	Page 9-34, How to Use a Shade Curve, #4, last sentence – The proper terminology here should be that “This is the non-point source load allocation …”. Load allocation applies to sources while loading capacity refers to the capacity of the waterbody as a whole. (This same comment applies to all subbasin chapters which include this explanation of shade curves.) (65)
Response	*ODEQ has made the appropriate changes to the text.*

Comments on Chapter 10: Upper Willamette Subbasin	
Comment 1.	Page10-7, Water Quality Parameters Not Addressed, Arsenic and Lead, 2nd sentence – Was this listing made in 2002 or 2003? (65)
Response	*The A-3 drain was listed for arsenic in 1998 and lead in 2002. Amazon Creek was listed for arsenic and lead in 2002. This information has been included in the appropriate section.*
Comment 2.	Page 10-7, Water Quality Parameters Not Addressed, Arsenic and Lead – No information is provided on lead. (65)
Response	*Lead was not addressed in this TMDL for similar reasons as discussed for arsenic listing in the A-3 Drain and Amazon Creek. ODEQ has updated the Water Quality Parameters Not Addressed section to include a discussion of lead.*
Comment 3.	Page 10-13, Beneficial Use Identification - As the temperature criteria are based on the new fish use designations, these should also be included in this section. (65)
Response	*Links to the Willamette Basin fish use and spawning use maps are provided in the next section "Target Criteria Identification". ODEQ has referenced the links in the Beneficial Use Identification section as well.*
Comment 4.	Page 10-14, Target Criteria Identification – This section should also discuss the narratives, natural conditions provision and human use allowance provision which are utilized in this TMDL. It should also note that since the biological-based criteria have been found to be exceeded by natural conditions, the natural conditions provision and the estimated natural thermal potential temperatures are utilized as the targets for this TMDL. (65)
Response	*A discussion of the human use allowance provision is included on page 10-28 and has been added in the Target Criteria Identification section. An explanation of the natural conditions and determination of natural thermal potential is presented on page 10-16 and 10-17 of this section. Also in table 10.2 language has been added in the target Criteria and identification component to describe how natural conditions and human use allowance will be applied:* **OAR 340-041-0028(8)** Natural Conditions Criteria. Where the department determines that the natural thermal potential temperature for all or a portion of a water body exceeds the biologically-based criteria in section 4 the natural thermal potential temperatures supersede the biologically-based criteria and are deemed the applicable criteria for that water body. **OAR 340-041-0028(12)(b)(B** Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.
Comment 5.	Page 10-20, Point Source Approach – The information provided in this paragraph regarding the maximum allowable impact from a point source differs from that provided later on this same page in the first paragraph under "Temperature TMDL Analytical Methods Overview". This same comment applies to several other chapters including the McKenzie Subbasin TMDL. (65)
Response	*ODEQ has addressed inconsistencies in Chapter 10, Point Source Approach, regarding the maximum allowable impact from all point source as 0.2^{o}C compared to the statement in first paragraph of the "Temperature TMDL Analytical Methods Overview" section which states that "Wasteload allocations for point sources are based on a quarter of the human use allowance"(0.3^{o}C / 4 = 0.075^{o}C).* *This change has been made to other subbasin chapters in the Willamette TMDL.*

Comment 6.	Page 10-30, 2nd paragraph, 1st sentence – This statement notes that there are seven individual permits. Early statements noted that there were nine. (65)
Response	*A clarification was made to the number of sources referenced by ODEQ in the appropriate location.*
Comment 7.	Page 10-30, 2nd paragraph, 3rd sentence - Please provide further explanation of what is meant by this statement. Is this condition always met or just met under most situations (generally)? This determination does not appear to follow the flow chart provided on the previous page. Please explain. (65)
Response	*After further review, the Oregon Metallurgical facility has been removed from the point source discussion because the permit in question is a stormwater permit and as stated in the TMDL, "Stormwater sources are not considered to have reasonable potential to contribute to exceedances of numeric temperature criteria".*
Comment 8.	Page 10-30, Wasteload Allocations – As significant sources discharge to both tributaries and the mainstem, has any cumulative effects analysis been conducted to ensure that the cumulative WLAs will not exceed the HUA downstream? (65)
Response	*Sources addressed in Subbasin TMDLs are not significant sources of heat to the mainstem Willamette. These sources are addressed in the subbasin TMDL because their effects are considered localized and have no reasonable potential to affect standards attainment in the Willamette River. Because of the water quality impacts to the small receiving stream it discharges to, Wah Chang will relocate its outfall to the Willamette River. (See Chapter 4)*
Comment 9.	Page 10-90, Table 10.36, Excess Load – Instead of providing a definition this item should either state the excess loads quantified in the TMDL or note where they may be located. (65)
Response	*ODEQ will add the following sentence:* *"Excess load is114 Ly/day (page 10-144), 1.4 kg CBODu/day/km (Table 10.59) and 0.5 to 1.4 g O2/m2/day sediment oxygen demand. Also nutrients…"*
Comment 10.	Page 10-90, Table 10.36, Surrogate Measures – It would be preferable if this section noted that the surrogates are temperature, BOD and nutrients for both TMDLs. Additionally, SOD is a surrogate in Amazon Creek and ammonia is a surrogate in Coyote Creek. (65)
Response	*ODEQ has replaced the sentence in Table 10.36, Surrogate Measures with the following:* *"Pollutants which contribute to dissolved oxygen violations include BOD, ammonia, nutrients, volatile solids which settle and contribute to SOD, and excess solar radiation (which, by increasing stream temperature reduces DO concentrations). These pollutants are surrogates for DO. However, future determinations regarding compliance with the water quality standard will be based on dissolved oxygen concentrations."*
Comment 11.	Page 10-91, Table 10.36, Standard Attainment & Reasonable Assurance – Standards Attainment should be addressed in the main body of the TMDL, not the WQMP. This analysis should indicate that the attainment of the combination of allocations assessed would lead to the attainment of all elements of the DO criteria. Currently, this appears to be scattered amidst the information provided in each TMDL. (65)
Response	*Standard Attainment and Reasonable Assurance is discussed in the WQMP, Chapter 14, in accordance with OAR 340-042-0040(4)(l)(e) & (j). As described in the TMDL, modeling demonstrates that load allocations provided in the sections*

	Load Allocations – Coyote Creek and Load Allocations – Amazon Creek, if achieved, will result in attainment of all elements of the DO criteria. However, actions to insure that the load allocations are achieved are described in the WQMP, Chapter 14.
Comment 12.	Page 10.96, Amazon Creek and Diversion Channel, 1st paragraph after Table 10.39, last sentence - This sentence notes that a non-listed segment of Amazon Creek was found to be impaired for DO during the data review. Please define the reach for which the TMDL is being developed, including river miles. In addition, please include this reach in the list of waterbodies for which TMDLs have been developed. (65)
Response	*The last sentence of the first paragraph after Table 10.39 has been updated to reflect that the TMDL includes Upper Amazon Creek from headwaters (RM 21.9) to the confluence with the Amazon Creek Diversion Channel (RM 12.2) and has been included in Table 10.38.*
Comment 13.	Page 10-96, Historic Data - Map 10.14 indicates that monitoring sites were also located on Spencer Creek. However, no mention of the data collected from these sites is included in this section. We recommend that this gap be addressed and, if these data show non-attainment of the criteria, that this also be indicated. (65)
Response	*It is assumed that the commenter is referring to Map 10.19. The only applicable data for Spencer Creek was collected in 2001 and 2002, so there is no discussion of Spencer Creek data in the section Review of Historic Data. While there is some Spencer Creek data discussion in section Coyote Creek Summer 2001 Data, ODEQ agrees that additional discussion would be useful. Therefore, additional summary statistics and interpretation have been provided in section Coyote Creek Summer 2001 Data.*
Comment 14.	Page 10-141, Loading Capacity-Amazon Creek, 1st paragraph - This TMDL uses a combination of several surrogates for dissolved oxygen. The attainment of the criteria will require allocations be met for each of these surrogates. In order to make this clearer, we'd recommend a sentence be added to the end of this paragraph in which this is explicitly stated. A sample might be: "Therefore, the loading capacity is comprised of a number of surrogate measures, each of which will be attained in order for compliance with the dissolved oxygen criteria. These surrogates include solar radiation, BOD, nutrients and SOD." (65)
Response	*ODEQ has inserted the following text: "Therefore, the loading capacity is comprised of a number of surrogate measures, each of which will be attained in order for compliance with the dissolved oxygen criteria. These surrogates include solar radiation, BOD, nutrients and SOD" as suggested in Comment 14 for the Upper Willamette Subbasin.*
Comment 15.	Page 10-141, Loading Capacity-Amazon Creek, last paragraph – The loading capacity needs to be defined as a single number or percent reduction. While it is correct to state that between a 30 and 40% reduction is needed in nutrient, BOD and SOD loads, the TMDL should specify a single level to which the TMDL is being written. Therefore, in order to ensure that the DO criteria are attained at all times, we would recommend that the loading capacity be established at 40% reduction. The conservative nature of this decision could also be cited as a part of the Margin of Safety. In order to accomplish this we recommend a second sentence similar to the following be added to the last paragraph on page 10-141. "As a conservative measure, the loading capacity for this TMDL is being established at a 40% reduction in BOD, nutrients and SOD." (65)
Response	*The document has been revised such that the MOS is reflected in the Loading Capacity, in addition to the LAs, as follows:*

	Text has been added: "In order to provide for a margin of safety, the loading capacity for this TMDL is specified as a 40% reduction in BOD, nutrients and SOD." *The 3rd column of Table 10.56 and 4th column of Table 10.57 will be removed.* *Page 10-146 "The loading capacity of Amazon Creek and Diversion Channel corresponds to a 40% reduction…"* *Page 10-147 1st paragraph, 3rd sentence revised as follows: "In order to provide a margin of safety, the loading capacity and the required percent reduction in loads and SOD is set to 40%, as shown in Table 10.61."* *Page 10-147 item 4 changed as follows: "Setting the loading capacity and required load reductions to 40%, which is…"*
Comment 16.	Page 10-144, first paragraph, last sentence – This sentence should refer to the table in which the loading capacity is presented (Table 10.58). (65)
Response	*The sentence has been changed to "As shown the loading capacity for solar radiation is 421 Ly/day (see Table 10.58)."*
Comment 17.	Page 10-144, following Table 10.58 – It might be helpful to include a summary paragraph/table which presents all the loading capacities for Amazon Creek. This would include: 40% reduction in BOD and nutrients as provided in Table 10.56, 40% reduction in SOD as presented in Table 10.57 and 421.4 ly/day solar radiation loading as presented in Table 10.58. (65)
Response	*The changes above (Comment 15) should provide sufficient clarity.*
Comment 18.	Page 10-146 & 147, Load Allocations-Amazon Creek - As noted in the loading capacity section, a single number (not a range) needs to be derived for the loading capacity of Amazon Creek. This new LC should be reflected in the first and fourth paragraphs of this section. As the load allocations are already established at 40%, no change would be necessary for the allocations to be consistent with the above noted change. (65)
Response	*Changed as described in Comment 15 above.*
Comment 19.	Page 10-147, fist paragraph, last sentence - Since this sentence is establishing the official "load allocation" for the TMDL, it would be preferable if the word "allocation" or "load allocation" appeared in the sentence. (65)
Response	*ODEQ will change the sentence as follows: "In order to provide a margin of safety, the load allocation is set to a required percent reduction in loads and SOD of 40%, as shown in Table 10.61"*
Comment 20.	Page 10-147, Table 10.61 – We recommend that the parameters (BOD, nutrients, SOD) to which these reductions apply also be stated in either the table heading or the table itself. (65)
Response	*In order to provide additional clarity, ODEQ has changed "Percent Reduction Specified" in Table 10.61 to "Required Percent Reduction in BOD loads, nutrient loads, and SOD" and changed the title of the table to "Land Use Based Load Allocations for the Amazon Creek Watershed."*
Comment 21.	Page 10-147, Wasteload Allocations – The last sentence of the load allocation section notes that load allocations will apply to both point and nonpoint sources. The source assessment noted that one CAFO was included in this drainage. As CAFO permits are required to allow no discharge to the waterbody, it should be specified here that the WLA for the CAFO is zero. Also, specific WLAs should be

	developed for any point sources which are suspected to contribute to BOD or nutrient loading in Amazon Creek. (65)
Response	*ODEQ has inserted a Wasteload Allocation section that includes a WLA of zero for any specified CAFO and states that a WLA will be developed for all point sources that are suspected of contributing BOD or nutrient loading to Amazon Creek.*
Comment 22.	Page10-154, Loading Capacity-Coyote Creek - As suggested for Amazon Creek, it would be good to add an introductory paragraph to this section which provides an overview of the parameters found to be impacting dissolved oxygen in Coyote Creek and the combination of surrogates which will be utilized in establishing the loading capacity and allocations. (65)
Response	*The following introductory paragraph has been inserted immediately after the section header Coyote Creek Model, and before the header Model Calibration:* *"Modeling indicates that improving shade from current conditions to system potential conditions will significantly improve DO conditions in the stream. In addition, reductions in BOD, nutrients, and SOD causing volatile suspended solids concentrations are necessary to insure that DO standards will be met. Modeling performed to calculate the loading capacity and the required load allocations is described in the following sections."*
Comment 23.	Page 10-157, oxygen demanding pollutants, second paragraph, second sentence – The previous paragraph states that BOD loads should be reduced while this sentence states that the loading capacity is equal to the current BOD loads. The disagreement between these two statements should be rectified and further explanation provided for why the LC is equal to the current load. Further confusion is added when the load allocation section notes that a 20% reduction from current loads is required. (65)
Response	*The appropriate section has been revised to incorporate the 20% margin of safety into the loading capacity, in addition to the load allocations, as follows:* *"Modeling indicates that if shade is improved to system potential levels, standards for DO should be met without the need for additional reductions in BOD, ammonia, or sediment oxygen demand. However, in order to provide for a margin of safety to account for uncertainty the loading capacity for these pollutants is set to a 20% reduction from current levels in the lower reaches below Spencer Creek.* *"During the July 2001 survey, BOD concentrations averaged 1.2 mg/L in the upper reach and 2.0 mg/L in the lower reach. A 20% reduction in concentrations in the lower reaches equates to a BOD concentration of 1.6 mg/L. For a flow rate of 1.9 cfs, this equates to loads for BOD5 for upper and lower reaches of 12.3 and 16.4 lbs/day (5.6 and 7.4 kg/day), respectively."* *The section Excess Load for Other Pollutants has also been revised, as follows:* *"For BOD, nutrients, and volatile suspended solids, the excess load in the upper reach is zero, and in the lower reach is equal to 20% of current levels."*
Comment 24.	Page 10-158, Ammonia toxicity - The manner in which elevated ammonia concentrations affect dissolved oxygen levels should be explained here, thus explaining why it is appropriate to establish ammonia as one of the surrogates for dissolved oxygen. (65)

Response	*ODEQ has added text similar to the following to explain the affect of ammonia on dissolved oxygen: "When nitrogen in the form of ammonia is introduced to natural waters, the ammonia may "consume" dissolved oxygen as nitrifying bacteria convert the ammonia into nitrite and nitrate. To what extent this process occurs, and how much oxygen is consumed, is related to several factors, including residence time, water temperature, ammonia concentration in the water and the presence of nitrifying bacteria".*
Comment 25.	Page10-158, Ammonia toxicity - As exceedences of the ammonia criteria have been cited, the document should clarify whether this TMDL is also establishing an ammonia TMDL or merely using ammonia as one of the surrogate for dissolved oxygen. If the former, it should also be clear that attainment of the ammonia criteria is dependent upon meeting both the ammonia and the temperature allocations. (65)
Response	*The following changes have been made to clarify that a TMDL is also being established for ammonia:* *Added new sentence to end of section:* *"In order to address ammonia toxicity concerns, in addition to concerns related to impacts of ammonia on dissolved oxygen levels, a toxicity based ammonia TMDL has been established"* *Revised last two paragraphs as follows:* *"Instead, the loading capacity is set to a target ammonia concentration. In order to provide a margin of safety, the loading capacity to set 20% lower than the maximum allowable 4-d average concentration of 1.0 mg/L as N described above. Thus, the loading capacity for ammonia is 0.8 mg/L as N"* *For this flow rate the load of ammonia (as N) is 8.2 lb/day (3.7 kg/day).*
Comment 26.	Page10-160, Load Allocation for Solar Radiation - The solar radiation section in the Amazon Creek TMDL contained an explanation of why the solar load allocation for this DO TMDL differed from the allocation in the temperature TMDL. A similar statement should be included here. (65)
Response	*Unlike for Amazon Creek, for Coyote Creek the solar load allocation presented in the DO TMDL is identical to the solar load allocation in the Temperature TMDL (note that the river mile scale in Fig 10.9, from the Temperature TMDL, is reversed, but the values are the same).*
Comment 27.	Page10-161, Load Allocation for Other Pollutants – Please explain why the allocations also apply to Spencer Creek. (65)
Response	*The sentence regarding Spencer Creek has been changed as shown in the reply to Comment 28, below*
Comment 28.	Page10-161, Load Allocation for Other Pollutants, 1st paragraph, 2nd sentence – This sentence appears to differ from the information provided in the loading capacity section which states that no reduction in BOD and SOD is required. Furthermore, this discussion includes nutrients, a parameter which is not discussed under the LC section. Changes should be made to ensure consistency between these two sections. (65)
Response	*Following changes have been made:* *"…However, below Spencer Creek, where pollutant concentrations are high, the loading capacity is set to a 20% reduction in BOD, nutrients, and SOD causing volatile suspended solids. The 20% reduction in BOD, nutrients, and SOD causing*

	volatile suspended solids concentrations also applies to Spencer Creek. This is because, even though Spencer Creek is currently not included on the 303(d) list, data collected in 2001 and 2002 shows that it fails to meet DO standards and that it contributes loads of nutrients and oxygen demanding pollutants to Coyote Creek. *"The 20% reduction in nutrients applies also to ammonia, since it consumes oxygen as it is oxidized and because it provides nitrogen that can promote excessive algal growth. Ammonia is also potentially toxic and concentrations should not exceed the toxicity based loading capacity concentration of 0.8 mg/L as N. Therefore, the load allocation for ammonia is set to 80% of the toxicity based loading capacity and the 4-day average ammonia concentration should not exceed 0.8 mg/L as N.* *Regarding nutrients, in order to improve consistency, the first sentence in section Loading Capacity for Other Pollutants) has been changed as follows "… reductions in BOD, nutrients, or sediment oxygen demand."*
Comment 29.	Page 10-161, Load Allocations for Other Pollutants, third paragraph - Please clarify whether a 20% reduction in the ammonia concentration is needed to attain 0.8 mg/L as N and/or whether the 20% is merely a portion of the margin of safety. (65)
Response	*In order to clarify that an explicit MOS of 20% applies to BOD, nutrient, and volatile suspended solids, the second sentence of section Load Allocations for Other Pollutants) has been changed as follows "However, below Spencer Creek, where pollutant concentrations are high, a 20% reduction in BOD5, nutrients, and SOD causing volatile suspended solids concentrations is specified."*
Comment 30.	Page10-161, Table 10.64 – Please identify the parameters for which these reductions apply (BOD, nutrients, ammonia and volatile solids) in either the table heading or the table itself. (65)
Response	*In order to provide additional clarity, ODEQ has changed "Percent Reduction Specified" in Table 10.64 to "Required Percent Reduction in BOD loads, nutrient (including ammonia nitrogen) loads, and SOD causing volatile suspended solids loads" and changed the title of the table to "Land Use Based Load Allocations for the Coyote Creek Watershed."*
Comment 31.	Page 10-161, Wasteload allocations - No wasteload allocations have been established in this TMDL. At a minimum, a WLA of zero should be assigned to the CAFO. If there are no other point sources which contribute to the DO depression, it would be helpful to note this. If not, WLAs should be established. (65)
Response	*ODEQ has inserted a Wasteload Allocation section that includes a WLA of zero for any specified CAFO and will state that a WLA will be developed for any point sources that are suspected of contributing BOD or nutrient loading to Coyote Creek.*
Comment 32.	Page 10-162, Margin of Safety-Coyote Creek, 3 – It appears that an explicit margin of safety of 20% was only established for ammonia. Please clarify this discrepancy either here or in the allocation section. (65)
Response	*Like carbonaceous biochemical oxygen demand (BOD) and sediment oxygen demand (SOD), ammonia contributes to oxygen deficits when it is oxidized to nitrite and nitrate by bacteria. However, unlike BOD and SOD, it is also directly toxic to aquatic organisms and, therefore, a toxicity based standard applies for ammonia, in addition to the DO standard. The toxicity based loading capacity for ammonia is 1.0 mg/L as N. Application of a 20% MOS resulted in the specification that the 4-day average ammonia concentration not exceed 0.8 mg/L as N.* *It is unclear from the data what, if any, reduction in in-stream ammonia concentrations are needed to meet this, due to the limited amount of ammonia data*

	available for the stream. Regardless, a 20% reduction in ammonia (which contributes the nutrient nitrogen to the stream), as well BOD and volatile suspended solids, is specified in the TMDL.
Comment 33.	Page10-162, Seasonal Variation-Coyote Creek – Please clarify if the TMDL applies only during the season of concern (May – October) or year round. (65)
Response	*The following has been added to the section Seasonal Variation-Coyote Creek:* *"20% reductions in BOD, nutrients, and SOD are specified. The concentrations of these pollutants in the stream must be reduced 20% during the May 1 through October 31 season of concern. However, since pollutants which contribute to oxygen deficits via SOD and fluxes of BOD and nutrients from the sediment may actually enter the stream via runoff during high precipitation winter and spring periods, reductions in loads during the winter and spring, as well as in the summer, are necessary in order to achieve the specified load allocations."*
Comment 34.	Page10-90, Table 10.36, Loading Capacity, first sentence – A word appears to be missing at the end of the sentence. It appears this should read "… reduction in oxygen demanding loads." (65)
Response	*ODEQ agrees and has made changes to the aforementioned sentence to include the word "loads".*
Comment 35.	Page10-93, Table 10.37, footnotes – The reference where the 7-D and 7-Mi are defined have been left off. (65)
Response	*7-D = 7-day mean minimum as defined in OAR 340-41-006.* *7-Mi = 7-day minimum mean as defined in OAR 340-41-006.* *This correction has been made to Table 10.37.*
Comment 36.	Page 10-119, 5th paragraph, first line – NPDS should be "NPDES" (65)
Response	*ODEQ has modified the document to reflex the correction to the use of NPDES permits.*
Comment 37.	Page 10-141, last paragraph, first sentence, last phrase – It appears this should be "…40% reduction in nutrient loads and SOD." (65)
Response	*The word "loads" has been added.*
Comment 38.	Page10-6, Table 10.1 – Neither the text nor this table states what season the TMDLs will apply. It is assumed that since it is flow-based, it would apply year-round. If so, it should be stated. (65)
Response	*The 303(d) listing of the Fern Ridge Reservoir does not designate a seasonal time period associated with the turbidity listing. The listing applies year-round, however, with August identified as a particular period of concern due to high turbidities which are unsafe for swimming. The year-round designation will be noted in Table 10.1.*
Comment 39.	Page 10-182, Pollutant Identification. It appears that this TMDL is structured such that by reducing the pollutant loads from the tributaries, the water quality standards in Fern Ridge Lake, the listed waterbody, will be met. It would be worth discussing the specific linkage between the tributary TMDLs and the listed waterbody both here in the introduction and in the Load Allocations/Conclusion. While this linkage is mentioned on page 10-185, the last paragraph of 303(d) Listing, a more specific discussion should be provided. (65)
Response	*The following will be added as the third paragraph of section Scope of TMDL:* *"External sources of turbidity causing solids are storm related inflows of solids from Amazon and Coyote Creeks. Internal sources of turbidity causing solids are*

	resuspension of previously settled solids. The original source of many of these resuspended solids is likely Amazon and Coyote Creeks. In this TMDL, load allocations are provided for external solids loads which contribute to turbidity. For internal recycling, management measures are described which are intended to limit resuspension of solids."
Comment 40.	Page 10-202, Required Turbidity Reductions. The first paragraph of this section mentions U.S. Army Corp of Engineers dataset. There is no explanation of the nature of this data or the sampling locations. If this data is being relied upon to develop the TMDLs, a more detailed discussion of this data would be appropriate. (65)
Response	*In order to provide additional information regarding the USACE dataset, the first sentence of section Reductions Needed Based on USACE Data will be changed as follows: "Turbidity and suspended solids data collected by USACE during 1996 through 1999 has been used to determine turbidity reductions required to meet water quality standards (see table)"* *Also, the following table will be added.* *Stations — Location* *AA-1 — Lake station in vicinity of Amazon Diversion Channel inflow* *AA-2 — Most d/s station in Amazon Diversion Channel* *CC-1 — Lake station in vicinity of Coyote Creek inflow* *CC-2 — Most d/s station in Coyote Creek* *LT-3 — Lake station in vicinity of Long Tom R inflow* *LT-4 — Most d/s station in Long Tom R (u/s of Lake)*
Comment 41.	Source Analysis – No source analysis is presented in this TMDL. A discussion of point and non-point sources should be provided so as to specifically link reductions to sources. (65)
Response	*Discussions related to sources of turbidity are provided in the sections **Pollutant Identification**, **303(d) Listing**, and **Degradation Based Targets and Appropriate Reference Sites**. Additional discussion is also provided in section **Linkages with other TMDLs**. In addition, load allocations are presented on a land use basis, which provides a linkage to land use categories.*
Comment 42.	Page 10-223, Wasteload Allocations – No wasteload allocations have been established in this TMDL. All point sources, including CAFOs need to be identified and assigned a WLA or determined to have no reasonable potential. CAFO's are required to have a zero WLA because no discharges are allowed under State regulation. (65)
Response	*ODEQ will insert a Wasteload Allocation section on page 10-223 that includes a WLA of zero for any specified CAFO and will state that a WLA will be developed for any point sources that are suspected of contributing to turbidity issues in Fern Ridge Reservoir or its tributaries.*
Comment 43.	Page 10-225, Table 10.78, Load Allocations. ODEQ has chosen to express the percent reductions needed (LA's) relative to various flow ranges. It is unclear how this presentation will be translated to DMA's for implementation. Typically the percent reduction needed is expressed as the maximum, worst-case, and this target cited as a conservative measure in the Margin of Safety. (65)
Response	*The analysis performed by ODEQ showed that the required reductions vary, depending on flow conditions. For high flow conditions, significant reductions are needed, while at low flow conditions, no reductions are needed. ODEQ feels that it*

	can adequately convey to DMAs that solids entering the stream are runoff related and that management measures must target the specified percent reductions during runoff events. Since the allocations presented already reflect adequate margins of safety, ODEQ recommends that the load allocations remain flow dependent.
Comment 44.	Page 10-225, Load reductions to Fern Ridge Lake. It would be helpful to present an analysis of the total reduction of loading to Fern Ridge Lake based on this TMDL. This would include a loading from the Long Tom River and internal loading (if they are determined to be pollutants). This would present the linkage between the tributary TMDLs and attainment of the standard in the lake. (65)
Response	*Two major tributaries provide loads to the reservoir that exceed natural levels, Amazon and Coyote Creek. These loads contribute to high turbidity levels in the southeastern and eastern portions of the reservoir to which they flow (see Map 10.28). An analysis of the total reduction of loading due to these tributaries has been provided in the TMDL. The Long Tom River enters the southwestern portion of the reservoir (which does not experience high turbidity levels) and has not been identified as contributing to turbidities in the reservoir in excess of natural levels. Therefore, no reductions in loading due to this tributary have been specified in the TMDL.* *Internal loads are more complex and difficult to quantify than external loads. While external loads enter the reservoir but once, internal loads are the result of the cycling of solids, a portion of which enter the reservoir as external loads. Solids which enter the reservoir, settle, become resuspended due to turbulence induced by high wind velocities, low lake levels, boat traffic, etc., resettle, and later again become resuspended. Therefore, internal loads are not a fixed quantity like external loads and cannot be quantified in a similar manner. In order to provide additional clarification, references to "internal loads" will be changed in the document to "internal recycling of solids" or similar.*
Comment 45.	Page 10-225, Measures for Addressing Internal Turbidity Loads. It would be worth discussing the linkage between the tributary load reductions and attainment of the water quality standard in the listed waterbody. This is a required element of a TMDL. While TMDLs have been written for the tributaries, a necessary linkage to attainment of the standards in Fern Ridge Lake is needed. (65)
Response	*Such a linkage has been provided for Amazon and Coyote Creeks, which provide external loads of solids to the lake. As described in the TMDL document, if load allocations for these tributaries are met, and if measures described in the TMDL to limit the resuspension of sediments (internal cycling) are implemented, the water quality standard for turbidity will be attained.*
Comment 46.	Page10-37, How to Use a Shade Curve, #4, last sentence – The proper terminology here should be that "This is the non-point source load allocation …". Load allocation applies to sources while loading capacity refers to the capacity of the waterbody as a whole. (This same comment applies to all subbasin chapters which include this explanation of shade curves.) (65)
Response	*The following text will be inserted into the last sentence of statement #4 : "This is the nonpoint source load allocation …".*
Comment 47.	Page 10-10, Table 10.2, Wasteload Allocations, last sentence – We believe you intended to say "When multiple point sources discharge to a single waterbody," rather than a single source. Also the final "is" in the sentence should be deleted. (65)
Response	*ODEQ has included the following text to the Wasteload Allocations paragraph, Table 10.2: "When multiple point sources discharge to a single waterbody," and the "is" in the sentence has been deleted.*

Comment 48.	Page 10-14, 1st paragraph, 3rd line – "to" should be "in" (65)
Response	*ODEQ has made the suggested substitution.*
Comment 49.	Page 10-20, Point Source Approach, 2nd sentence – "specifics" should be "specific" (65)
Response	*ODEQ has dropped the "s" from "specifics" in the Point Source Approach.*
Comment 50.	Page 10-31, 3rd paragraph, 3rd line – Appendix D should be Appendix C (65)
Response	*The correction was made.*
Comment 51.	1) The term "Pre-TMDL Limits" is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful. (65)
Response	*ODEQ has applied the decision tree to all existing sources with and without thermal limits in their permits. To clarify ODEQ altered the text in the first decision box to the following:* *Does the point source discharge warm the river less than 0.3°C above numeric criterion given 25% of 7Q10 flow? ODEQ will remove the box header Pre-TMDL Limits from the first decision box.*
Comment 52.	2) In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*In the decision tree, ODEQ has applied the recommended changes to the box displaying the result of "Determination of No Reasonable Potential ..." to read "Therefore, discharge at current level".*
Comment 53.	The City of Eugene has an established ambient monitoring program whereby surface water samples are collected on a bimonthly basis from four locations along the Willamette River and six locations within the Amazon Drainage Basin. We request the Department review readily available data sources as pertain to bacteria loads, dissolved oxygen concentrations, and turbidity in Amazon Basin waters before finalizing these TMDLs. (48)
Response	*ODEQ is always open to additional information and has reviewed the bacteria data available on the City's web page. At this point ODEQ will incorporate new data into the implementation plan or for use in site specific targets and load allocations. However, the data did not significantly alter the bacteria reductions assigned to Amazon Creek.*
Comment 54.	Water Quality Summary: Table 10.1 includes the 303(d) turbidity listing for Fern Ridge and the Long Tom River, but does not include Coyote Creek or the Amazon Creek. However, page 10-203 has percent reduction targets for turbidity for Coyote Creek and Amazon Creek. (48)
Response	*Fern Ridge Lake fails to meet minimum water quality standards for turbidity. Amazon and Coyote Creeks, which provide water for the reservoir, contain excessive loads of suspended solids which contribute to the reservoir's turbidity problems. ODEQ has included percent reductions for Coyote and Amazon Creek because they contribute the turbidity violations in Fern Ridge Lake.*

Comment 55.	Monitoring for water quality parameters not addressed in this TMDL (Arsenic, Lead, flow, control of upland soil erosion, stream bank stability, and restoration of riparian buffers, dichloroethylenes, and tetrachlorethylene) are recommended on Page 10-7. The Department is responsible for the monitoring of ambient water quality in the state's waters, and it should not pass on this responsibility to local jurisdictions through the implementation of a TMDL. (48)
Response	*ODEQ will continue to monitor general water quality in waters of the state. Local jurisdictions will be responsible for documenting water quality compliance from sources under its control. On page 10-7 ODEQ is describing addition steps that will be required to address other parameters that were not covered in this TMDL.*
Comment 56.	On the bottom of page 10-31 the proposed TMDL states "….ideally a Monte Carlo simulation would be applied 30 times to determine an average system potential condition." However, the Monte Carlo simulation of system potential riparian vegetation was conducted only once for Coyote Creek, Luckiamute River, and the Calapooia River, therefore the output distributions of vegetation types may not be reasonable and solar radiation heat loading under the system potential scenario for these drainages may not be realistic. The Department should complete a suitable number of simulations to ensure the anthropogenic heat loads calculated using the system potential conditions and resultant effective shade targets are credible. (48)
Response	*ODEQ did not model watershed disturbance processes. ODEQ did use dynamic models to simulate stream temperature response to changes in vegetation. The Monte Carlo simulation randomly distributes system potential vegetation attributes within each geomorphic unit, but does not alter the potential vegetation at a location and would yield a range of outcomes. ODEQ simulations are based on current shade conditions and a single distribution of system potential vegetation characteristics. ODEQ would be pleased to collaborate with stakeholders interested in dynamic landscape modeling exercises.*
Comment 57.	System potential is listed as a compliance strategy for both temperature and dissolved oxygen load and wasteload allocations established under the TMDLs. Obtaining a new, updated average system potential must be part of a regular revalidation of the model in order to validate this strategy and document progress achieved. (48)
Response	*ODEQ agrees that when addition information is obtained updating system potential will be a necessary and an important part of TMDL implementation. Monitoring change in riparian and floodplain condition may be a key component of a water quality management plan.*
Comment 58.	Top of page 10-33 and Figure 10.7 and 10.8 discusses the system potential being less than current conditions for some data sets. Does this demonstrate the necessity to re-do the simulation more than once? (48)
Response	*System potential can be less than current conditions because natural disturbance was factored in to the system potential vegetation. An area that currently has large vegetation could be designated as an area of disturbance (vegetation height affected by wind throw, fire, Insect Infestation, etc.) in the modeling scenario. This would produce less vegetation height in system potential than is currently at the location.*
Comment 59.	Geomorphic Unit Substitution – In assessing the pre-flood quaternary sand and gravel unit (Qg2) as described on page 10-43, the Department used the nearest adjacent geomorphic code to model potential present day stream temperature. This has potential to result in an unrealistic system potential model, particularly if the geomorphic unit is incapable of supporting the substituted shade-producing plant species. An assessment of the substitutions should be done to determine validity. Also, the term "geomorphic" as used by the Department in the TMDL and Appendix

	is incorrect; the proper term is geologic. (48)
Response	*In addition to the explanation for the substitution given in the 3rd sentence in the final paragraph on page 10-43, the small size of the unit and the fact that it is encompassed by a single adjacent unit, limits possible choices for substitution. Areas where these substitutions occur were also outside of the closest riparian areas. Because of the unit size and location ODEQ believes there will be little effect on system potential vegetation due to the substitutions reference on page 10-43.* *ODEQ's use of the term "geomorphic units" describes a surfical deposit as mapped by the U.S. Geological Survey in Professional Paper 1620: Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon.*
Comment 60.	Equation 1 on page 10-29 is missing parentheses. (48)
Response	*ODEQ has corrected equation 1 on page 10-29 to the following:* $H_{PS} = (Q_{ZOD} + Q_{PS}) \cdot \frac{1\ ft^3}{1\ sec} \cdot \frac{1\ m^3}{35.31\ ft^3} \cdot \frac{1{,}000\ kg}{1\ m^3} \cdot \frac{86{,}000\ sec}{1\ day} \cdot \Delta T_{ZOD} \cdot c = \frac{Kcal}{day}$
Comment 61.	The equation in Appendix 4.4 page 81 should be: (48) $H_{NET} = Q_{WLA} \cdot T_{PS} \cdot k \cdot c$
Response	*The equation in Appendix 4.4 page 81 is correct. The suggested equation is also correct. It is ODEQ's opinion the two equations are just a different way of expressing the same calculation.*
Comment 62.	Page 10-52: Map 10.15 does not illustrate that the Amazon Diversion Channel is 303(d) listed. (48)
Response	*ODEQ has made the correction to the appropriate map.*
Comment 63.	The TMDL documents list year-round beneficial use of water contact recreation for the A-3 Drain, Amazon Creek and Amazon diversion canal, while the Fern Ridge reservoir, Calapooia, Long Tom, Luckiamute, and Mary's rivers are not given the same designation. The A-3 Drain, Amazon Creek and Amazon diversion canal should have a similar designation as the other waterbodies, and not listed for year-round water contact recreation. (48)
Response	*The A-3 Drain, Amazon Creek, Amazon diversion canal and Coyote Creek are listed for year round violations of the bacteria water quality standard, which mean the waterbodies have bacteria concentration higher than water quality standard at all times of the year. It is this year round violation not the beneficial use that determines the listing period.*
Comment 64.	Page 10-54: ODEQ suggests that "further investigations of watershed-specific bacteria sources" be conducted in order to develop an effective strategy for bacteria control. The lack of certainty about bacteria sources is out of synch with the expectation that bacteria concentrations could be reduced by 84% (for example, for Amazon Creek). (48)
Response	*The lack of certainty about bacteria sources as referenced on page 10-54 is independent of the calculation of percent reduction for a given waterbody, Amazon Creek included. The percent reductions were determine by comparing water sample*

	bacteria concentrations with the bacteria standard. The reduction required to meet water quality standards would be the same whether the source of bacteria was from agriculture, urban stormwater or point sources.
Comment 65.	Page 10-55: Under "Point Sources of Bacteria", statement is made that: "However, Sewage Treatment Plants (STPs) that discharge wastewater are likely to contain significant amounts of bacteria." This statement is misleading since STPs are operating under discharge permits with bacteria limits. (48)
Response	*The statement made on page 10-54: "However, Sewage Treatment Plants (STPs) that discharge wastewater are likely to contain significant amounts of bacteria" is correct because bacteria are present in effluent discharge. Concentrations of bacteria measured in the STP effluent can be below standards but still contribute bacteria to the waterbodies that receives its discharge. For example an effluent concentration of 50 bacteria counts per 100 milliliter (ml) with a discharge rate of 1,000,000 gallons per day would be contributing 189 billion bacteria to the waterbody while meeting water quality standards at the discharge point.*
Comment 66.	Ferguson Creek and Bear Creek are listed in Table 10.16 on page 10-63 as draining forest land, and noted to occasionally violate the instantaneous maximum water quality criterion. The Department uses creeks such as these as reference creeks to measure natural background bacteria loads as part of the TMDL development, and these occasional violations should be factored in to the development of TMDLs for other tributaries. (48)
Response	*ODEQ recognizes that there are natural source of bacteria entering waterbodies included in this TMDL.*
Comment 67.	Error: Page 10-56 (Map 10.16) shows a CAFO along Amazon Creek. There is no CAFO listed in the Department's database, and the City has no evidence that it exists at the location indicated. (48)
Response	*The CAFO in question is Valley Livestock Exchange. It is located at 82205 Butte Rd Creswell, OR. The location has been noted and corrections made.*
Comment 68.	Typo: Figures 10.17 and 10.18 both contain data from LASAR #11140 for the month of December, yet the data are different. Please correct the associated box plots.(48)
Response	*LASAR site 11140 has different number of December samples in Figures 10.17 and 10.18 because different data sets were used for each figure. Figure 10.17 shows the number of storm samples collected in December. This data set was used because data at each LASAR site were taken on the same days. Figure 10.18 shows the total number of December samples available for LASAR #11140.*
Comment 69.	Clarification on Page 10-69: The A-3 drain is a tributary to the lower Amazon Creek and drains 2.5 square miles of Eugene's urban area. (48)
Response	*ODEQ has corrected the text to read as follows: "The A-3 drain is a tributary to the lower Amazon Creek and drains 2.5 square miles of Eugene's urban area".*
Comment 70.	Correction on Page 10-69: A portion (2/3) of upper Amazon Creek drains to Fern Ridge reservoir, with the remaining flow continuing on to lower Amazon creek and the Long Tom River. (48)
Response	*ODEQ has made the correction.*
Comment 71.	In developing the Amazon Creek TMDL for dissolved oxygen, it does not appear that the Department took into account the potentially significant effects of backwater conditions from Fern Ridge Reservoir in assessing the sources of the problem, and in determining load reductions. (48)

Response	*ODEQ recognizes that the lack of water column mixing in the lower reaches of Amazon Creek Diversion Channel contributes to low dissolved oxygen levels in this area. Note, however, that during the July, 2001 water quality survey, the impounded nature of the lower reaches was not due to backwater from the Lake. At this time, Lake levels were low enough that the lower reaches of Amazon Creek Diversion Channel were impounded by a weir located downstream from Fir Butte Road, rather than from backwater. The characteristics of this impounded reach were included in the CE-QUAL-W2 model used to develop the TMDL.*
Comment 72.	On page 10-97, a margin of safety for dissolved oxygen for the Amazon Creek is applied by stating that cold-water class standards are not appropriate for the Amazon Creek so a cool-water class was assigned and not a warm-water class. This is an arbitrary designation and not consistent with the natural environmental characteristics of the Creek. (48)
Response	*As stated on page 10-97 ODEQ acknowledges that "it is unlikely that cold-water aquatic life would ever form a dominant component of the community structure, the cold-water class standards are not appropriate for Amazon Creek and the Amazon Diversion Channel". However, Amazon Creek has been impacted by urban and agricultural land use which has altered water temperature, nutrient loads, and flows. Current fish species utilizing the Creek are not representative of historical populations. To protect water quality ODEQ has chosen a conservative approach by targeting cool-water class standards.* *In a June 22, 1998 letter to Philip Millam, USEPA Region 10, ODEQ clarified several WQS interpretation issues including dissolved oxygen. Cold water dissolved oxygen criteria are applicable to much of the Willamette Valley Ecoregion typical of the upland areas south of Corvallis. Cool water criteria are applicable to the low lying areas.*
Comment 73.	Error: Page 10-122 lists a CAFO as valley livestock exchange. The valley livestock exchange is not listed in the Department's data base, and we have no evidence that it exists at the location indicated in the TMDL document. (48)
Response	*The CAFO in question is Valley Livestock Exchange. It is located at 82205 Butte Rd Creswell, OR. The location has been noted and corrections made.*
Comment 74.	On page 10-132 the use of sediment oxygen demand for model calibration is not supported by data and appears to be a correction factor for accumulated error. (48)
Response	*While it is preferable to directly measure SOD in all reaches modeled, it is a difficult and resource intensive parameter to measure. Because of this, SOD was estimated as part of the model calibration process. This is a typical water quality modeling approach.*
Comment 75.	The Amazon Diversion Channel is an Army Corps of Engineers-constructed flood control channel, with levees on either side, the tops of which are used for maintenance vehicle access. The City of Eugene is required by the Corps to mow the upper banks of Amazon Diversion channel levees regularly to accommodate annual inspection to identify bank stability issues. Therefore, opportunities to plant trees for shade on the inner banks and tops of the Amazon Diversion Channel levees are very limited. (48)
Response	*ODEQ factored levee maintenance into its system potential vegetation scenario (SysPotC) as stated on page 10-137, number 3: "System Potential C (SysPotC). This is the same as SysPotB except that Heat Source model zones 0 and 1, which comprise the first 10m beyond the active stream channel, are kept at the CCC condition. This reflects the possibility that no vegetation can be grown on dikes, channel riprap, etc., due to dike stability and flood control concerns".*

Comment 76.	The Department is currently reviewing the state water quality standard for turbidity, and is in the process of proposing a revised standard. In light of this, the City of Eugene believes that it is premature to develop a TMDL for turbidity and strongly advocates that the Department delay this effort until the state standard has been through a thorough review and adoption process. (48)
Response	*The TMDL is based on the existing standard for turbidity. While the standard may change in the future, state regulations and the federal Clean Water Act require that TMDLs specify allocations required to meet existing water quality standards. In the future, if the standard changes, revisions to the TMDL will target the standard that is applicable at that time. Furthermore, as shown in Figure 10.125, turbidity levels in reservoir tributaries at low and moderate flows substantially exceed potential turbidity criteria.*
Comment 77.	A relationship between Fern Ridge Lake turbidity and Coyote Creek and Amazon Creek is not well established in the TMDL development. No turbidity reduction should be placed upon Coyote Creek and Amazon Creek until such a relationship has been demonstrated through data collection and model verification. (48)
Response	*High turbidities in the reservoir are due both to internal cycling of solids within the reservoir and external loads of suspended solids from Amazon and Coyote Creeks. Both Amazon and Coyote Creeks have been shown to exceed water quality standards for turbidity due to elevated suspended solids concentrations and contribute to elevated levels of turbidity in the reservoir. Therefore, reductions in suspended solids concentrations in the streams are specified in the TMDL. In addition, suspended solids concentrations in the streams have been shown to correlate with bacteria, which contributes to bacteria standard violations, and BOD, which contributes to dissolved oxygen standard violations. Since both streams are also included on the 303(d) list due to bacteria and dissolved oxygen standard violations, reductions in bacteria, BOD, and suspended solids are needed for the streams to meet water quality standards and, therefore, are specified in the TMDL.*
Comment 78.	Determining exceedance probabilities for flows in Amazon and Coyote Creeks using data from the Long Tom River gage at Noti was discounted in the development of the bacteria TMDL (Page 10-79), but used to develop the turbidity TMDL for the Amazon and Coyote Creeks (Page 10-196). This signifies an apparent discrepancy in methodology and should be further explained. (48)
Response	*ODEQ did not utilize the Noti based flows for Coyote or Amazon Creek in the bacteria TMDL because there was not enough bacteria data available at the corresponding flow gage to justify a flow based analysis.*
Comment 79.	The Council's assessment was completed in February 2004 by two contracted watershed scientists: John Runyon and Chip Andrus. Their conclusions on summer stream temperatures in the Calapooia basin included: "Aerial photographs indicate that streamside trees provide little shade to the main channel upstream of the Sodom Ditch and downstream of Potts Creek because of the river's [Calapooia River] wide channel. Even where mature stands of trees exist, shade is sparse. It is likely that most parts of the Calapooia River never had much shade, even when the streamside trees were not influenced by human activities." (page 160) (15)
Response	*ODEQ agrees that mature riparian vegetation will have less affect on a river with a wide channel. However, the goal of the temperature TMDL is to decrease temperature by increasing shade through mature riparian vegetation. Any increase in mature riparian vegetation will help control temperature. Furthermore, as was discussed throughout the temperature TMDL, re-establishment and protection of riparian vegetation will have additional benefits to water quality and beneficial uses.*

Comment 80.	Additionally, "Water temperatures measured throughout the watershed are probably similar to natural patterns except along some tributaries. The main channel of the river is wide throughout much of its length, and even if mature conifers and hardwoods again grew along the banks, the trees would still not provide much shade to the summer channel." (page 198) (15)
Response	*As stated in the previous response, ODEQ agrees that mature riparian vegetation will have less of an affect on a river with a wide channel. However, the goal of the temperature TMDL is to decrease temperature by increasing shade through mature riparian vegetation. Any increase in mature riparian vegetation will help control temperature.*
Comment 81.	Another factor ODEQ cited that contributes to high water temperatures in the watershed, irrigation withdrawls, was addressed this way, "The state has granted many water rights to landowners along the Calapooia River and its tributaries. The amount of permitted water uses far exceeds the natural summer low flow of the river…an agricultural industry currently devoted to growing non-irrigated grass seed, has meant that the river flow is not greatly influenced by these water rights. The headwaters streams that provide most of the cool water habitat in the watershed during the summer have very little consumptive use." (page 198) (15)
Response	*ODEQ agrees with the statement regarding water withdrawals on the Calapooia River and with the habitat of the headwaters. Temperature remains as an issue that needs to be addressed in the Calapooia River.*
Comment 82.	Page 10-21, second paragraph: "The determination of system potential vegetation characteristics leads to an estimation of shade values for each riparian community. These shade values are often referred to as effective shade or system potential shade when associated with an area free of human disturbance. Effective shade for the purposes of TMDL development is the percent of incoming solar radiation that reaches the stream. Solar radiation is a function of regional and local characteristics and is a factor in determining water temperature in the absence of significant point source influences." This sentence seems incorrect ("shade" is NOT the amount of radiation that reaches the stream). Effective shade is defined as the fraction of incoming solar shortwave radiation above the vegetation and topography that is blocked from reaching the surface of the stream. (62)
Response	*ODEQ agrees and has corrected the sentence to read as follows: "Effective shade for the purposes of TMDL development is the percent of incoming solar shortwave radiation above the vegetation and topography that is blocked from reaching the surface of the stream".*
Comment 83.	Page 10-31, first paragraph: "Additional measures may also be taken to improve summer temperatures. For example, water conservation measures that improve summer stream flows will benefit stream temperatures through an increase in load capacity. Stream restoration efforts that result in restore narrow stream channel widths will improve the effectiveness of existing vegetation to shade the stream surface." This sentence should be re-worded to avoid implying the stream restoration means narrowing stream channels and thereby improving stream temperatures. Many channels would be restored by channel widening (to restore floodplain access, the creation of side channels, and the enhancement of meanders). (62)
Response	*ODEQ stated that if stream channel narrowing resulted from a restoration effort, it would increase effectiveness of current vegetation. ODEQ does not state that restoration should focus on narrowing of the stream channel. ODEQ agrees that creation of side channels and enhancement of meanders also can result from restoration efforts and have similar positive affects.*

Comment 84.	Page 10-43, second paragraph / last sentence: Instead, ODEQ will use the nearest adjacent geomorphic code as determined by the geomorphologic maps, Maps 10.8 to 10.14, applies. (62)
Response	*ODEQ agrees and has inserted the word "the" at the appropriate location.*
Comment 85.	Page 10-48, first paragraph / first sentence: A margin of safety (MOS) is intended to account for uncertainty in available data or in the effect controls will have on loading reductions and water quality. (62)
Response	*ODEQ has included the acronym (MOS) in the appropriate sentence.*
Comment 86.	Page 10-82, Fern Ridge Reservoir Watershed. The Corps agrees with the approach taken to derive the TMDL. However, the Bacteria TMDL for Fern Ridge Watershed is based, astonishingly, on data from one month – 5 samples! Meanwhile, in the Coast Fork Willamette TMDL it appears that about 40 samples were used, over the period 1996 to 2002, to determine the TMDL (Figure 13.17, Pg 13-46). The Corps feels that 5 samples are not enough data upon which to base a TMDL. That amount of data does not begin to cover the range of hydrological and environmental conditions to which the watershed is subjected. The year 2002 was a low-normal hydrological year. There is insufficient scientific justification for this approach to determining the load reduction for a watershed. Moreover, no presentation is made regarding the quality assurance of the data used. (33)
Response	*ODEQ agrees that more data would improve the Fern Ridge Reservoir analysis and will work with USACE and other designated management agencies to improve our understanding on bacteria sources in the Long Tom drainage. ODEQ documented impairment in the Long Tom River at Stow Pit Road with ambient monitoring data collected over a number of years (Figure 10.26). However, this information was insufficient to develop a TMDL and ODEQ collected the data to support such analysis. Because of data limitations, ODEQ used a different approach to develop a load allocation for Fern Ridge Reservoir than other TMDLs. However, the limited data ODEQ collected immediately downstream of the reservoir demonstrate that E. coli numbers substantially exceeded single sample criterion of 406 counts per 100 ml, in all samples.*
Comment 87.	Page 10-83, paragraph 1. This paragraph is confusing. First, it states that Figure 10.31 was not used in determining the load reduction, but examination of the figure shows the 64 % load reduction. Second, the rational for using the Noti gage #14166500, located several miles above the reservoir, to calculate exceedance probabilities, and not the flows at the Alvadore gage immediately below the reservoir, is not adequately explained. The reservoir's outflows will not correlate to those at Noti because of the way the reservoir is operated for flood control. Unlike the temperature TMDL, the bacteria TMDL does not describe who is responsible for the load reduction of 64 %. It is not stated whether a Water Quality Management Plan is required or who will be responsible for taking samples to corroborate the load reduction, or the number of samples required, nor how often reported. (33)
Response	*The paragraph has been rewritten and clarifying text has been added to explain that the Alvadore gage was used to calculate exceedence probabilities and that a concentration-based reduction analysis was used to determine the 64% reduction.* *In addition, Chapter 14 of the Willamette Basin TMDL document addresses the Water Quality Management Plan (WQMP). The WQMP does identity USACE as a Designated Management Agency. ODEQ will expect USACE to develop a TMDL Implementation Plan addressing how bacteria will be reduced, including any additional monitoring data collection needed. ODEQ is in the process of finalizing the TMDL Implementation Plan Internal Management Directive that explains what ODEQ's expectations are and how DMAs develop Implementation Plans.*

Comment 88.	Round particles of the same dimensions as angular particles have relatively less impacts to fish. Thus two turbidities of the exact same NTUs can have different impacts to aquatic life. Because of these considerations, extensive basin-specific sampling is needed to derive a Turbidity Water Quality Standard and associated TMDLs. A better approach would be to develop a suspended solids Standard and drop turbidity altogether. (33)
Response	*The turbidity TMDL for Fern Ridge Reservoir was designed to meet the current water quality standard for turbidity, and therefore targets turbidity, as well as the solids that contribute to turbidity. Note, however, that this comment has been forwarded to the ODEQ team responsible for development of water quality standards so that it may be considered when developing future water quality standards for turbidity and/or suspended solids.*
Comment 89.	Page 10-179, Turbidity TMDL: Fern Ridge Reservoir. Although the TMDL is titled "Turbidity TMDL: Fern Ridge Reservoir", it appears all the loads are allocated to tributaries to the reservoir. The TMDL seems more related to these tributaries and perhaps it should be called the "Coyote Creek and Amazon Creek TMDL", especially since no loads are ascribed to Fern Ridge Reservoir in Table 10.72 located on page 10-210. (33)
Response	*Reductions in turbidity loads from Coyote and Amazon Creek which supply water to Fern Ridge Reservoir will reduce turbidity loads in the Reservoir.* *The internal recycling of solids is more complex and difficult to quantify than the external loads from streams. While external loads enter the reservoir but once, internal loads are the result of the cycling of solids. Solids enter the reservoir from Coyote and Amazon Creeks, settle, become resuspended due to turbulence induced by high wind velocities, low lake levels, boat traffic, etc., resettle, and later again become resuspended. Therefore, internal loads are not a fixed quantity like external loads and cannot be quantified in a similar manner. Therefore, reductions in the resuspension of solids in the lake are addressed in the TMDL in a qualitative manner.*
Comment 90.	Page 10-181. The Corps agrees with ODEQ that the pool level at Fern Ridge Lake is kept as high as possible from April through September for recreation as well as wetland wildlife habitat stability. (33)
Response	*ODEQ concurs.*
Comment 91.	Some actions recommended by LCOG are not practical and may conflict with authorized purposes of the project. For instance, under the 5th bullet, "change bottom composition by applying a thin layer of sand over the clay bottom"; this is not practical for it would only be a temporary fix since incoming fine-grained sediment would cover the sand. In addition and more importantly, adding sand to the entire reservoir would hinder the authorized purpose of flood control since reservoir volume would be decreased. The third bullet from the bottom, "Summer flow augmentation into the lake…" is not something the Corps can control. The first bullet, "Chemical treatment…" is not practical as it could shorten the life of the project and potentially cause other water quality problems. (33)
Response	*The list of LCOG recommendations is found on page 10-225. ODEQ recognizes that some of these measures may not be practical.*
Comment 92.	The Corps currently has no funds programmed or specific plans in place to develop reservoir models for Cottage Grove, Dorena, Fern Ridge, and Big Cliff reservoirs. The reservoir models developed will need to be linked to the existing ODEQ CE-QUAL-W2 model for the Willamette Mainstem to replace the boundary condition assumptions used in that model. The Corps assumes that some calibration of both sets of models may be required. Following that, different alternative management

	strategies for the reservoirs will need to be described, defined and run through the models. Those strategies will need to consider operations of the reservoirs independently and together as a system. The alternatives will need to be evaluated not only for their impacts on reservoir and downstream temperature regimes, but also their effects on other authorized operating purposes of the reservoirs, including instream flow targets. All of these efforts need to be undertaken collaboratively between the Corps, ODEQ, EPA and other stakeholders. Obviously, this would not be a simple procedure. The Corps believes that it could take two to three years to complete at a minimum, assuming that all the participating parties are adequately staffed and funded fulfill their responsibilities. (33)
Response	*ODEQ agrees with this statement.*
Comment 93.	Page 29, 8. Upper Willamette Subbasin – Fern Ridge Lake, paragraph 1. The last sentence in the paragraph completely ignores all the statements made in the same paragraph. After stating an insufficient amount of data, which the Corps agrees with, and stating that the closest station will not produce accurate results, which the Corps agrees with, ODEQ then uses the insufficient data that will not accurately produce a representative result to set a load allocation for the Corps project. This is not a sound method for setting load allocations. (33)
Response	*ODEQ agrees that more data would strengthen the analysis but the data used represents violations. Violations of water quality standard require a reduction in loads.*
Comment 94.	Page 10-122, Confined Animal Feeding Operations discussion: The information on CAFOs in the basin is outdated. The Poland Dairy has sold and is now operating as the Lehman Dairy, an organic farm, under permit number 143657. Valley Livestock Exchange is no longer in business. (6)
Response	*Corrections will be made to update CAFO information presented on page 10-122.*
Comment 95.	Page 10-153, Figure 10.87: The y-axis label “l/day” needs to be explained, because it is not clear what these units are. Is this liters per day? (6)
Response	*The units for the algal growth rate coefficient are simply “per day,” which may also be referred to as 1/day or day-1.*
Comment 96.	Page 10-156, Figure 10.90: The y-axis labels for these four graphs say “T-C” when it appears that the units should be mg/L. (6)
Response	*ODEQ will change the y-axis to read “mg/L” milligrams per liter for Figure 10.90 on page 10-156.*
Comment 97.	Why are sample points for E.coli at 0-13.9 River Mile, Marys River, Benton County. Map 10-17, page 10-62 Upper Willamette Subbasin Bacteria Sampling Locations not listed? (2)
Response	*ODEQ will include Marys River sampling locations in Map 10.17 on page 10-62.*
Comment 98.	There seems to be no discussion about land use based % reductions for Marys River Watershed- for the Bacteria discussions within this document at or near page 10-62. E. coli data for this reach may be located within Appendix ? for more in depth/technical data presentations for E.coli Marys River reach 0-13.9 River mile and I have failed to review this information? The Marys River Watershed Council was concerned that this information is missing or not represented in the Draft TMDL Willamette River Basin on Map 10-17. Possibly a staff person can please, kindly provide feedback on this inquiry, or provide page numbers for the location of this data and provide a reason for E.coli sample point map information for Marys River reach 0-13.9 RM not being placed on Map 10-17. (2)

Response	*The discussion of allocations for Marys River was inadvertently omitted from the Upper Willamette Subbasin Bacterial TMDL. It is our intent to include the watershed specifically under the subbasin-wide reductions "calculated for each land use [applies] to stream reaches not otherwise analyzed in this TMDL on a year-around basis." (Reduction Summary - page 10-86). Marys River is in this category because of limited data in the upper watershed.* *ODEQ has analyzed data from the Marys River and believe that, although water quality appears to have improved relative to the late 80's/early 90's, application of these allocations is appropriate. As the Marys River Watershed Council Watershed Assessment indicates, bacterial violations are still likely in tributaries to the river.*

Comments on Chapter 11: McKenzie Subbasin	
Comment 1.	▪ A number of streams identified as temperature impaired on the 2002 303d list may no longer be so because of recent adoption of new temperature criteria. This is particularly true with respect to bull trout criteria which increased from 10°C to 12°C. DEQ should withdraw the TMDL until the new temperature standards can be fully incorporated into the TMDL and the 303d list of impaired waters updated (5). ▪ Please verify listings and criteria in Table 11.3 against new WQS tables and maps. (5)
Response	*Temperature data for the McKenzie Subbasin are located in Appendix C in the subbasin temperature analysis discussion. The McKenzie River above River Mile 54 is bull trout habitat and temperature data warrants a 303(d) listing. Horse Creek is still designated as bull trout use and Figure 11.1 in the McKenzie Subbasin TMDL illustrates that biological-based criteria are exceeded. French Pete Creek is now a core cold water designation. Deer Creek is also designated as bull trout use and Figure 11.1 demonstrates exceedances of numeric criteria for the use. Shotgun Creek is tributary to the Mohawk River, which is identified as a core cold water use. The 16°C biologically-based criterion is exceeded in Shotgun Creek.*
Comment 2.	Page 11-3, first paragraph: When addressing waterbody segments, please include river miles so that they may be easily correlated with the segments listed in Table 11.1 (65)
Response	*The river miles have been added to the final document.*
Comment 3.	Temperature: page 11-7: The listings referred to here are those listed for the subbasin and addressed by this TMDL, not all listings within the subbasin. The same comment applies to the first sentence of the third paragraph on page 11-23. (65)
Response	*The wording has been changed.*
Comment 4.	Temperature: page 11-10, Table 11.5—As these represent only the biologically based or numeric criteria, the title should be specific to that and not imply that they are all the criteria. This comment also applies to similar tables in other temperature sub-basin chapters. (65)
Response	*Title of appropriate table has been changed to Oregon's Biologically Based Numeric Temperature Criteria.*
Comment 5.	Maps throughout the document continue to show the "wrong" Mill Creek as being 303(d) listed. The supporting data for listing in the 303(d) database identifies that data for listing comes from a BLM site at the mouth and from the Upper Mohawk Watershed Analysis (June 1994). This data clearly refers to the Mill Creek which is a tributary to the Mohawk River that enters just upstream from the town of Marcola, and not the Mill Creek that enters the McKenzie River near Rainbow. We previously pointed out this error prior to publishing of the Final 2002 303(d) list. (11)
Response	*The comment is correct and Mill Cr. near Rainbow should not have been identified by ODEQ as impaired in Map 11.3. Mill Creek, a tributary to the Mohawk River near Marcola, however, did exceed biological temperature criteria and should have been included in the map. Due to changes in the temperature standard, Mill Creek (LLID 1228397441900) is now a core cold water designation. Consequently, it has been identified as impaired and the information considered in the next list.*
Comment 6.	Please provide the rationale as to why the "Natural Conditions Criteria" were not applied to French Pete Creek, as this stream is entirely within the Three Sisters Wilderness. (11)

Response	*French Pete Creek may not have been placed on the 2002 303(d) list if it had been demonstrated to ODEQ that natural conditions and processes alone account for exceedances of biologically based criteria. This opportunity exists during data submittal and the public comment period for each revision of the 303(d) list.* *ODEQ did not develop a natural conditions criterion using mathematical models to establish TMDL allocations for French Pete Creek. Instead ODEQ is relying on attainment, or in this case maintenance, of natural conditions as the sole TMDL implementation mechanism. USFS as designated management agency will have an opportunity to document that water quality in French Pete Creek is attaining standard.*
Comment 7.	• In the discussion on Page 11-22, and in other places, restoration efforts to "narrow channel widths and improve effectiveness of existing vegetation" are discussed. This is one dimensional treatment of a much more complicated subject. Channel narrowing in steep mountain streams is not really very likely; This approach is more clearly more appropriate to lowland streams with lower gradients and great sinuosity. In addition, some of our streams suffer from over simplification to single relatively narrow channels for their floodplains, as a consequence of the removal of large wood from these systems. These systems should have a much wider total channel profile, consisting of a multi-threaded system with high levels of connectivity and interaction with the adjacent floodplain. Enhanced hyporheic activity would moderate temperatures without the sacrifice of habitat for a "narrow" channel width. • If the parent document is going to address one restoration activity instead of developing specific restorations based on site conditions in WQRPs, then it would be appropriate to discuss them all and to the same extent. However, we do not believe the parent document should include site specific restorations. We would be uncomfortable if this document locks us into conclusions on stream conditions and restoration that don't fit site specific conditions and cannot be supported on the ground (11)
Response	*ODEQ agrees with the comments. Restoration of channel morphology and floodplain processes will benefit water quality and beneficial uses.*
Comment 8.	TIR Imagery for the McKenzie River was provide by the Willamette National Forest—McKenzie River Ranger District, not ODF. (11)
Response	*Willamette National Forest Service was an essential partner in this effort. The error has been corrected in the final TMDL.*

Comments on Chapter 12: Middle Fork Willamette Subbasin	
Comment 1.	Page 12-5, 2nd paragraph, 4th sentence – For clarity and accuracy, we recommend that the phrase "addressed in this chapter" be inserted after the phrase "only three NPDES point sources discharge to subbasin streams". (65)
Response	*ODEQ has inserted the following text: "addressed in this chapter" after the phrase "Three NPDES permitted point sources have the potential to affect temperature and discharge to subbasin streams".*
Comment 2.	Page 12-6, Table 12.2, Wasteload Allocations – The text states that 0.2°C is allocated to point sources rather than the 0.3°C stated here. (65)
Response	*ODEQ has added the following text at the end of the Wasteload Allocations in Table 12.2: "Where multiple point sources discharge to a single source, the accumulated heat increase for point sources is limited to 0.2˚C".*
Comment 3.	Page 12-7, Table 12.3 – Winberry Creek is listed but not included in this table. (65)
Response	*ODEQ has included the Winberry Creek summer temperature listing for river mile 2.9 to 8 in Table 12.3.*
Comment 4.	Page 12-23, Table 12.8 – This table lists the ODFW Willamette Fish Hatchery, a facility not included in the list of subbasin permits in Table 12.6. Are there other general permits which are not included in Table 12.6. (65)
Response	*The hatchery discharges to the Mainstem Willamette River and if necessary will be addressed in Chapter 4 of the TMDL. The hatchery has therefore been removed from both Table 12.6 and 12.8.*
Comment 5.	Page 12-24, Load Allocations, 1st paragraph – please include a discussion of how the nonpoint source allocation is/is not being distributed in this TMDL. Please provide a list of the sources to which the load allocation applies and clarify what is required. (65)
Response	*ODEQ has altered the Load Allocation discussion to address nonpoint source allocation distribution in the TMDL. The surrogate percent affective shade will be applied to temperature listed streams.*
Comment 6.	Page12-35, Reserve Capacity – Information provided in this section appears inconsistent with the information provided earlier in this TMDL. As there are not more than one discharge into any waterbody within this subbasin, does the second paragraph apply? (65)
Response	*ODEQ was unable to establish an inconsistency based on the information provided in Comment 6 for the Middle Fork Willamette. ODEQ believes that the second paragraph on page 12-35 is necessary for a complete description of Reserve Capacity.*
Comment 7.	Page12-3, Water Quality Parameters Addressed, 2nd bullet, 1st line – "of" should be "with" so the sentence reads "Bacteria … wide assessment with TMDLs developed …" (65)
Response	*ODEQ has made the suggested change.*
Comment 8.	The term "Pre-TMDL Limits" is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful. (65)
Response	*ODEQ will apply the decision tree to all existing sources with and without thermal limits in their permits. To clarify, ODEQ has altered the text in the first decision box to the following:* *"Does the point source discharge warm the river less than 0.3°C above numeric criterion given 25% of 7Q10 flow?"* *ODEQ will remove the box header Pre-TMDL Limits from the first decision box.*

Comment 9.	In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*In the decision tree, ODEQ has applied the recommended changes to the box displaying the result of "Determination of No Reasonable Potential ..." to read "Therefore, discharge at current level".*
Comment 10.	Page 12-19. The following statement makes a good point: "In addition, the 1964 flood removed riparian vegetation, and subsequent salvage of wood within the stream contributed to the reduction in channel complexity (Willamette National Forest, 1995)." It should be noted that floods are natural disturbances and can cause significant changes in stream morphology but this is not taken into account in the modeling. Only the non-anthropogenic, natural disturbances of wind throw, fire, and insect infestation are taken into account according to Chapter 12 page 24. (33)
Response	*ODEQ acknowledges that floods cause significant changes in stream morphology and that it is not explicitly factored into the model. However in lowland areas frequent flooding would influence system potential vegetation and it is this condition ODEQ attempted to capture in the modeling and shade curves. The purpose of the model is to establish appropriate effective shade levels and the amount of heat entering a stream when anthropogenic disturbances are minimized.*
Comment 11.	Page 12-34, Margin of Safety Methodology. See the comments regarding this topic in Chapter 1 Pg. 10. "Pg. 1-10, Margin of Safety. ODEQ spells out methods for assuring a margin of safety on page 12-34. Although the Corps agrees with the available approaches for incorporating a margin of safety, the Corps also understands any one of the approaches may be appropriate for certain situations and not at others. The use of assumptions and parameter values that will adjust for known model bias or for processes that were not accounted for in the analysis can be beneficial if used correctly. However, to use the term "conservative levels" when trying to identify a value which should not be too high or too low, such as in the case of "natural thermal potential," creates a bias and produces results that are not natural but are artificially skewed one way or the other. ODEQ consistently chose parameters and values that produced a lower "natural thermal potential" in the name of conservative analysis but in the process produced standards that are colder than the "undisturbed natural system." Colder temperatures than normal, just like warmer temperatures, can be detrimental to fish habitat and production. The approach for determining "natural thermal potential" which sets numeric targets lower levels than analytical results indicate seems inappropriate because it results in an unnaturally cool water temperature which can be detrimental to aquatic life and produces a standard that cannot be met without refrigeration." (33)
Response	*In a majority of streams the natural thermal potential calculated was greater than biologically-based criteria. In the subbasin analyses presented here when flow and temperature were modeled ODEQ did not layer conservative assumption upon conservative assumption. For example, small tributaries were not set at biological criteria or NTP. Channels were not simulated at natural condition for its classification as was done on other TMDLs. Similarly, water withdrawals were not accounted for. Adjustments for these factors would yield cooler temperatures.*

Comments on Chapter 13: Coast Fork Willamette Subbasin	
Comment 1.	Page 13-3, 1st paragraph - When addressing waterbody segments, please include river miles so that they may be easily correlated with the segments listed in Table 13.1. (65)
Response	*ODEQ will include river mile designations in the 1st paragraph on page 13-3.*
Comment 2.	Page 13-3, 1st paragraph, last sentence – As there are multiple mercury listings in this subbasin, this sentence should be modified such that it either specifies all the listed waterbodies or cumulatively includes all the waters listed in the Coast Fork Willamette River Subbasin. (65)
Response	*All mercury listed waterbodies have been included.*
Comment 3.	Page13-3, We recommend that another paragraph be added to this section which identifies the TMDLs which were previously established. Our records indicate that ODEQ established TMDLs for ammonia and nutrients in the Coast Fork Willamette in 1995. We recommend that it be noted that these TMDLs were not reviewed or changed as part of this TMDL and thus the allocations established in 1994 remain in effect. Such a paragraph would help provide the reader with a more comprehensive picture of water quality and TMDLs in this subbasin. (65)
Response	*ODEQ has added the following paragraph to page 13-3 identifying other TMDLS and their status: "ODEQ established TMDLs for ammonia and nutrients in the Coast Fork Willamette in 1995. These TMDLs were not reviewed or changed as part of this TMDL and thus the allocations established in 1994 remain in effect."*
Comment 4.	Page13-6, Reserve Capacity – The information stated here is not consistent with that provided on page 13-14. (65)
Response	*ODEQ has altered the language pertaining to Reserve Capacity in Table 13.2 so that it is consistent with the text of the chapter.*
Comment 5.	Page 13-12, Point Sources of Heat, 1st paragraph, last sentence – This statement would be strengthened through inclusion of a statement which states that "stormwater sources will therefore not be further addressed in this TMDL." (65)
Response	*ODEQ has included the statement that "stormwater sources will therefore not be further addressed in this TMDL".*
Comment 6.	Page13-27, Waste Load Allocations in Small Streams - This section needs to include mention of the results of the preliminary screening. Are any limitations required of the discharges within this subbasin. (65)
Response	*ODEQ has included information regarding the point sources addressed in the TMDL and limitations to discharges in the "Waste Load Allocations in Small Streams" section.*
Comment 7.	The term "Pre-TMDL Limits" is used in the first decision box. It is unclear weather this refers to the current Permit Limits for existing sources or current discharge levels. Also, it is unclear if this would also include sources that do not currently have permit limits for temperature. A footnote may be helpful. (65)
Response	*ODEQ has applied the decision tree to all existing sources with and without thermal limits in their permits. To clarify, ODEQ has altered the text in the first decision box to the following:* *Does the point source discharge warm the river less than 0.3°C above numeric criterion given 25% of 7Q10 flow? ODEQ will remove the box header Pre-TMDL Limits from the first decision box.*

Comment 8.	In the box displaying the result of "Determination of No Reasonable Potential ...", instead of "Therefore, No Allocation" we would recommend "Therefore, discharge at current level" so that "no" will not be mistakenly interpreted as "0". (65)
Response	*In the decision tree, ODEQ will apply the recommended changes to the box displaying the result of "Determination of No Reasonable Potential ..." to read "Therefore, discharge at current level".*
Comment 9.	Page 13-7. The Coast Fork Willamette River downstream of Cottage Grove Reservoir and the Row River downstream of Dorena Reservoir are listed year round for exceeding the temperature criteria. It should be noted that the Corps dams release cooler water than "natural temperatures" during certain times of the year. (33)
Response	*The Coast Fork Willamette River downstream of Cottage Grove Reservoir and the Row River downstream of Dorena Reservoir are included in the mainstem chapter of the TMDL. The Corps dam contribution to temperature will be addressed in the mainstem chapter.*
Comment 10.	Page 13-19, Figure 13.3: These photographs do not clearly illustrate a spring discharge into Big River. Because of the deep shadows in the color image, and the mixed pattern of red shades within the yellow on the TIR image, it is not clear where spring discharge may be occurring and whether the discharge is significant. Another set of examples photographs should be used. (6)
Response	*ODEQ has evaluated additional images to determine if a better image is available. A better image is not available, so the current image in Figure 13.3 will remain.*
Comment 11.	Page 13-23, Figure 13.10: This photograph of Mosby Creek is not a good example of problems associated with riparian vegetation set back from the wetted perimeter of a stream. The stream bank in the foreground appears to be a bedrock outcrop, and the gravel bar is clearly part of the active channel. It is not reasonable to assume growth of perennial vegetation within the active channel of a stream or on bedrock. (6)
Response	*The images do demonstrate a system that appears to have little effective shade during summer. ODEQ believes that for demonstration purposes the photograph illustrates shade setback. It is not ODEQ's intention to imply that the active stream channels or bedrock outcrops in this photograph require vegetation.*

Comments on Chapter 14: Water Quality Management Plan (WQMP)	
Comment 1. EWEB/DMA Status	Page 14-7, Section G. It is not clear why EWEB is identified as a designated management (DMA) with responsibility for developing a TMDL implementation plan when Chapter 4 of the draft TMDL document indicates that the EWEB's Leaburg and Walterville hydroelectric projects are not considered a source of heating and have not been assigned a load allocation (See Page 4-97). Please remove EWEB from the list of DMAs. (5)
Response	*While it is true that the 2004 draft TMDL did not identify downstream impacts from the EWEB projects, updated models used for developing WLAs for the 2006 draft TMDL demonstrate that these projects do have a downstream impact on stream temperatures. For this reason, EWEB has been named a DMA in the 2006 TMDL and will be required to develop and implement a TMDL Implementation Plan.* *ODEQ acknowledges that EWEB objects to these decisions based on EWEB's position that ODEQ does not have the legal authority to impose and enforce these decisions against EWEB. By letter to ODEQ, EWEB has agreed voluntarily to continue its efforts within the McKenzie River Subbasin to improve temperature conditions and to work with ODEQ to have these improvements recognized for purposes of this TMDL.*
Comment 2. General edit	Page 14-9, ODA Ag Water Quality Management Area Plans: This list should include the following Agricultural Water Quality Management Area Plans: Yamhill; Molalla-Pudding-French Prairie-North Santiam Subbasin; and Tualatin River Subbasin. (6)
Response	*The three plans have been added.*
Comment 3. General edit	Page 14-18. Senate Bill 1010 discussion: This section should cite the relevant OARs for the water quality management plans listed on page 14-9. These are: 603-095-0010 – 0180, 603-095-0500 – 0560, 603-095-1200 – 1280, 603-095-1900 – 1980, 603-095-2100 – 2160, 603-095-2300 – 2360, 603-095-2400 – 2460, 603-095-2600 – 2660, 603-095-3700 – 3760. (6)
Response	*A general reference to OAR 603-095 has been added to the discussion.*
Comment 4. General edit	Page 14-27, "4. Nonpoint sources": The first full sentence in this paragraph is a sentence fragment. (6)
Response	*The sentence has been edited.*
Comment 5. Development of Implementation Plan	Westfir's primary concern about this whole process is the requirement for the city as a designated management agency to prepare an implementation plan for TMDLs. … We don't have the expertise to prepare these technical plans or the funds to hire expertise. (7)
Response	*ODEQ understands the technical and financial concerns that small communities may have regarding development of Implementation Plans. However, ODEQ recognizes that Implementation Plan complexity will depend on community size. For example, ODEQ would expect a more complex Implementation Plan to be developed by a large city because it will likely have more complex water quality improvements needed. By contrast, ODEQ expects a small city or community will likely have less complex water quality issues and thus, a less complex plan to implement water quality improvements.* *In addition, ODEQ will provide technical assistance for Implementation Plan development as time and resources allow.*
Comment 6. Effect on river	…our potential effect on this river is so miniscule that we probably couldn't even show a benefit or detriment. (7)
Response	*ODEQ agrees that not all smaller communities have an effect, beneficial or detrimental, on water quality. For permitted discharges, the NPDES permit will incorporate any TMDL allocations needed, while pollutant reductions from nonpoint*

	sources will be implemented through the Implementation Plan. The specifics of the Implementation Plans will vary according to the needs of the community.
Comment 7. Legal authority to implement	Some of the land just doesn't belong to the city in the first place. … almost the entire two miles of the North Fork that flows through the city limits has a county road within fifty feet of it. So there's limited ability for us to mitigate whatever effects we might be having by managing riparian vegetation. (7)
Response	*For the purposes of TMDL implementation a Designated Management Agency (DMA) "means a federal state or local governmental agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL."* *ODEQ does not expect DMAs to be responsible for implementing water quality improvements if there is no legal authority for the DMA to do so.*
Comment 8. DMA Status	The City of Troutdale asks to be removed from the DMA list for the Willamette TMDL for the following reasons: The entirety of the stormwater from Troutdale drains to either the Columbia River or Sandy River; the City's wastewater treatment plant discharges directly to the Sandy River; and Troutdale has already been listed as a DMA for the Sandy Basin TMDL. (12) Also, the City of Troutdale is listed as a DMA. The City of Troutdale does not drain to the Willamette, and this should be corrected. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*ODEQ agrees with the request as there are no discharges to the Willamette Basin from the City of Troutdale. The City of Troutdale was removed from the list of DMAs.*
Comment 9.	OACES requests that DEQ provide more time for developing and funding TMDL Implementation Plans and provide information on financing the implementation of these plans. The requirements in the draft Willamette Basin TMDL add dramatically to our current workload. County road departments, as well as other county departments, will need time to plan for and secure funding to meet these requirements. The eighteen month timeline after receiving a notification letter to develop a TMDL Implementation Plan does not give county government adequate time to secure public support to meet these requirements, plan for programmatic development/implementation, and identify/secure funding sources. (23)
Response	*ODEQ is requiring TMDL Implementation Plans be <u>developed</u> in 18 months, not that implementation activity be fully funded and completed in 18 months. ODEQ understands that most DMAs will need more than 18 months to obtain public support, secure funding, and implement water quality improvements.*
Comment 10.	Moreover, information on state grants that are available to support the development and implementation of TMDL Implementation Plans as well as a list of DMAs and their contact information would help counties plan to meet TMDL requirements. Perhaps this information could be included in your TMDL Implementation Guide. (23)
Response	*This information will not be included in the TMDL Implementation Internal Management Directive but ODEQ would be willing to make it available upon request.*
Comment 11.	OACES strongly believes that DEQ must be the regulatory agency that enforces compliance when TMDL pollutants enter county road systems from agricultural and industrial sources. OACES believes that DEQ must clearly articulate its enforcement policy for all DMAs and play an active role in overseeing the implementation of Designated Management Agencies' (DMAs) plans. County roads are a critical and integral part of transporting people and commercial goods throughout the Willamette Basin. As a result, from an environmental management perspective, county roads and land uses such as residential developments,

	commercial developments, farming, forestry, and ranching are interconnected and inseparable. Consequently, county roads can serve as a conduit for run-off carrying mercury and bacteria from land uses under the jurisdiction of other DMAs. Given these interactions, DEQ must play a proactive role in ensuring that all DMAs comply with TMDL requirements. Moreover, maintaining working political and administrative relationships among contiguous jurisdictions is essential for effective regional governance on issues ranging from public safety to public education. Consequently, an active state role in ensuring compliance in a region is critical. This means that DEQ must be willing and prepared to directly intervene when TMDL pollutants cross the jurisdictional boundaries of DMAs. (23)
Response	*ODEQ acknowledges that upstream activities bring downstream impacts, and that local government only have control over sources of pollution that fall under their jurisdiction. ODEQ works with federal and other state agencies and local governments as cooperatively as possible to ensure they are implementing pollution reduction strategies.*
Comment 12.	First, since this document refines the requirements highlighted in the TMDL, DEQ should release its "TMDL Implementation Guide" as soon as possible – even if it is in draft form – to provide an opportunity for the target audiences to review it. This request will not only help us in our efforts to begin initial planning for the TMDL but provide DEQ with early input necessary in developing a guide that is useful and helpful to the target audience. (23)
Response	*A preliminary draft of the "TMDL Implementation Plan Internal Management Directive", which provides TMDL implementation plan guidance to ODEQ staff, was circulated in July and August of 2005. ODEQ will also provide for additional public review prior to finalizing the document.*
Comment 13.	In addition, clarifying your expectations for our TMDL Implementation Plans will help our members meet these. For example, provide a template for submitting a TMDL Implementation Plan or endorse the use of template developed by others (i.e., the Lane Council of Governments). OACES members find that templates help to expedite the plan development and approval process as well as eliminate surprises. Our members have found that using templates to help meet requirements has been helpful in other efforts such as Endangered Species Act compliance (see http://www.aocweb.org/em/Default.aspx?tabid=86). A template would articulate or identify DEQ's review criteria or expectations regarding the TMDL Plan and subsequent monitoring. (23)
Response	*ODEQ agrees that templates are useful tools. ODEQ also recognizes that DMAs have different water quality issues with varying levels of complexity. The TMDL Implementation Plan Internal Management Directive describes ODEQ expectations for Implementation Plans and provides a suggested template. The objective of the template is to provide a consistent format with enough flexibility to accommodate a wide range of implementing strategies.*
Comment 14.	Finally, OACES believes that DEQ should consider a phased approach for implementing the Willamette Basin TMDL starting with the largest contributors first based upon DEQ estimates of source contributions. A phased approach was used with the NPDES Municipal Separate Storm Sewer System Program, and it is consistent with the common program management technique of pilot testing. Pilot testing with larger contributors not only provides significant, initial environmental results but yields administrative efficiencies resulting from technology transfer in engineering, land use planning, and environmental monitoring that economize DMA resources that can be channeled into other services including environmental management. Moreover, pilot testing of TMDL implementation will help identify and address problems areas before expanding the scope of implementation. Early resolution of implementation issues will increase stakeholder confidence in DEQ's implementation of the TMDL and will conserve resources for more productive actions to control TMDL pollutants. Finally, a phased approach is consistent with

	adaptive management – the management approach which underlies the TMDL process. Moreover, this approach would give DMAs more time to develop collaborative partnerships that will be essential for not only efficient technology transfer but for developing an effective regional framework for monitoring the impact of TMDL Implementation Plans. (23)
Response	*ODEQ agrees that a phased approach to implementing water quality improvement plans is appropriate in certain situations – the phased approach to the mercury TMDL demonstrates that approach.* *However, for bacteria and temperature, the causes and effects of these parameters are well known, as are the mechanisms for pollution reduction and prevention. Therefore pollution reductions should occur as soon as possible. ODEQ acknowledges that complete implementation will take time and encourages DMAs to set priorities to address the most significant sources.* *ODEQ supports and encourages collaborative partnerships for improving water quality, especially regional frameworks that can maximize regional efficiencies for monitoring implementation effectiveness.*
Comment 15.	In the past, county roads were often located and constructed in riparian areas displacing the riparian vegetation and the stream shading that this vegetation provided. However, after reviewing the TMDL, OACES is not sure if historical impacts such as these must be reversed if the road can not be relocated during major reconstruction in the future. If these historical impacts must be mitigated, DEQ must articulate county options and timelines for mitigating these historical impacts? (23)
Response	*ODEQ does not expect counties or cities to move roads or streets unless there is an opportunity to do so during normal planning and construction activities. However, ODEQ does encourage all DMAs to look for and take advantage of opportunities to mitigate existing roadway impacts.*
Comment 16.	For reasons of equity and comprehensive management, OACES believes that the Oregon Water Resources Department (OWRD) should be identified as a Designated Management Agency (DMA) and water withdrawals from streams impaired for temperature should be regulated under a TMDL Implementation Plan. The Water Quality Management Plan for the Willamette Basin TMDL identifies responsible persons/DMAs. Among the DMAs are several state agencies and local governments that either regulate or manage actions influencing water quality in the basin. However, the list of state agencies appears to be incomplete. The Oregon Water Resources Department regulates, via a permit, the alteration of streams to create a reservoir that may be used for pumping water for irrigation. This action reduces the volume of water flowing in the stream, and this reduction may increase stream temperature. (23) In some instances, irrigation diversions completely eliminate surface flow within streams. Irrigation diversions must be regulated under the TMDL framework and, given its regulatory authority, OWRD should be among the DMAs listed in the Willamette Basin TMDL. Relying on DEQ's review of OWRD permits for stream diversions is an inadequate and inequitable approach to lowering temperatures on listed water bodies. Given DEQ's perennial resource constraints, relying on this review to minimize the water quality impacts is questionable. (23)
Response	*ODEQ understands that flow influences temperature and other pollutants as well. The federal Clean Water Act doesn't provide authority to regulate flow and ODEQ lacks state jurisdiction to regulate water withdrawals. However, ODEQ works with Oregon Water Resources Department and other state agencies through the Oregon Plan for Salmon and Steelhead to coordinate, restore, and maintain watershed health.*

Comment 17.	As is demanded of county government, DEQ must demand that state efforts to minimize the impact of public services on temperature must be institutionalized within all agencies of the state that affect water temperature. (23)
Response	*ODEQ agrees that all entities – federal, state, or local – that have legal authority over a sector or source of pollutants are equally responsible for improving water quality. ODEQ works with all state agencies to implement TMDL waste load and load allocations.*
Comment 18.	As DMAs develop their TMDL Implementation Plans, OACES expects DEQ to be consistent in its review of TMDL Implementation Plans proposed by various sectors. For example, counties are being asked to review their ordinance to evaluate its effectiveness for protecting water bodies listed as impaired for one or more of the three TMDL pollutants. OACES anticipates that DEQ will critically review these county evaluations and the measures proposed to control TMDL pollutants. OACES expects DEQ to ensure that the Oregon Department of Forestry's (ODF) TMDL Implementation Plan and the Forest Practices Act (FPA) rules identified in this plan adequately address the concerns raised in DEQ's 2002 Sufficiency Analysis of the FPA. In its 2002 analysis, DEQ recommended additional protections on Type N streams on private and state forest lands. OACES expects DEQ to ensure that ODF addresses these recommendations during the development of its TMDL Implementation Plan. (23) (T)he assumption that DEQ will be able to require stream restoration under existing tools such as SB 1010 and the State Forest Practices Act on private and State lands is unrealistic and assumptions about temperature reductions that would be achieved by this increased shading are therefore unrealistic and overly optimistic. (29)
Response	*Comment noted. ODEQ continues to work with Oregon Department of Agriculture and Oregon Department of Forestry and their Boards to evaluate effectiveness of programs for water quality.*
Comment 19.	As required by other DMAs, OACES strongly believes that DEQ's Air Quality Division should develop and implement a TMDL Implementation Plan for managing the air deposition of mercury on the landscape by stationary and mobile sources. As noted in our general comments section, county road systems are interconnected and can serve as a conduit for channeling TMDL pollutants into listed water bodies. Moreover, considering the significance of atmospherically deposited mercury as a source of this pollutant in the Willamette River and the role of roads as a conduit for this source, the approach highlighted in the Water Quality Management Plan for airborne sources of mercury is minimal (i.e., voluntary measures) when compared to the requirements/expectations of other sources in other sectors. DEQ has the authority to regulate these mobile and stationary sources of airborne mercury under its Air Toxics Program. As with other state agencies such as ODOT, ODF, and the Oregon Department of Agriculture, DEQ's Air Quality Division should propose measures and a timeline for controlling these airborne sources. If the technology based performance standards for these sources are insufficient for satisfying the mercury load allocations, DEQ should encourage cross media emission trading that enables air sources to meet TMDL requirements through sources in other sectors (e.g., local government and agriculture) by helping to finance their mercury mitigation measures. Designating DEQ's Air Quality Division as a management agency under the TMDL and integrating TMDL requirements into Air Contaminant Discharge Permits would more justly allocate the burden of controlling mercury deposition in the Willamette River. (23, 37, 50, 55) *(+35, 40, 46, 56, 68, by reference)* • Airborne sources of mercury subsequently deposited onto paved areas, vegetated land, exposed soil, and directly onto water from activities permitted by DEQ's Air Quality Program may be significant. Additional commitments are

	needed from the Department regarding the specific actions that will be taken by Air Contaminant Discharge Permit and Title V air permit holders (page 14-27) to reduce the discharge of mercury into the air. (37) • Air borne sources of mercury from activities permitted by ODEQ's Air Quality Program may be a significant source of mercury contamination in the Willamette River. Additional commitments are needed from ODEQ regarding specific actions that will be taken by air contaminant discharge permittees (Chapter 14, page 14-27) to reduce their atmospheric mercury discharges. All municipal and industrial wastewater permit holders will be obligated by a TMDL implementation rule to develop and implement mercury reduction plans. The City requests that air permit holders that report mercury releases through any of the local, state, or federal Community Right-to-Know regulations also be included under this rule. (50) • Air sources of mercury from activities permitted by DEQ's Air Quality Program may be significant. Additional commitments are needed from DEQ regarding specific actions that will be taken by Air Contaminant Discharge Permit and Title V air permitees (page 14-27). (55) *(+35, 40, 46, 56, 68, by reference)* • Air sources of mercury from activities permitted by DEQ's Air Quality Program may be significant. Additional commitments are needed from DEQ regarding specific actions that will be taken by Air Contaminant Discharge Permit and Title V air permitees (page 14-27). For example, all municipal and industrial wastewater permit holders are going to be obligated by a general permit to develop mercury reduction plans and implement them,(see page 14-25). Air permit holders (ACDP and Title V) that report mercury releases through any of the local, state, or federal Community Right-to-Know regulations should be included in this permit category, with a similar reduction plan requirement. (63) • Page 14-27, fifth bullet. It seems unrealistic that truly meaningful mercury reductions can be achieved if the air sources' efforts are to be "voluntary." (63)
Response	*Since the 2004 draft TMDL was released, the emissions inventory for local air emissions has been revised downward, while that for global sources (primarily on the Asian mainland) is now seen as larger than originally thought. Thus deposition of mercury from local air sources is now expected to make less of a contribution to mercury loads in the mainstem. Work will continue through Phase II of the TMDL to better define deposition of mercury from local and global air sources.* *ODEQ will work closely with air sources to explore mercury reduction strategies. This could include employing various approaches to reduce air emissions from mobile, area, and point sources.*
Comment 20.	Our general concern relates to the lack of a clear articulation of how designated management agencies (DMAs) shall maintain existing shade and achieve site and system potential shade- and thereby the temperature standard- over time. ODEQ needs to articulate with greater clarity the need for "no-net-loss" of existing shade and some active and assured investment in enhancing shade. (28) The management strategies in Appendix 14.B appear to be options. Hence, it is unclear how the desired future condition of system potential shade will be achieved by DMAs. (28)
Response	*ODEQ expects DMAs to target protection or restoration of natural or system potential levels of riparian vegetation and shade but does not prescribe how DMAs accomplish that. Appendix 14B lists management strategies that are meant to be options that DMAs can chose to meet their specific situations. ODEQ will track and monitor activities to restore and protect riparian vegetation through its work with DMAs and review of TMDL Implementation Plans.*
Comment 21.	We urge ODEQ to give clearer guidance to DMAs in exercising their land-use authorities as part of their implementation plans. Exercising their land-use authority should include adopting local land-use and development ordinances to require a.)

	no loss of existing shade with new development or redevelopment and b.) enhancement of existing conditions with new development or redevelopment toward achieving site potential shade. (28)
Response	*ODEQ agrees that adopting local land-use and development ordinances can be effective strategies for protecting water quality. However, ODEQ does not prescribe management strategies. DMAs will need to choose strategies that are appropriate for their local conditions and pollutant load allocations.*
Comment 22.	Toward providing a consistent watershed-based approach to meeting Lower Willamette Temperature TMDLs, we would strongly urge ODEQ to designate Metro as a TMDL management agency for its land-use authority. (28)
Response	*Metro has been identified as a DMA where it has legal authority over sources of pollutants, which is true for all DMAs. Whether Metro becomes a 'regional' DMA will be up to Metro and the jurisdictions that work with Metro. ODEQ encourages TMDL implementation on a subbasin scale with all DMAs coordinating their efforts to maximize resource and technical efficiencies.*
Comment 23.	DEQ's deferral of TMDL requirements affecting the Army COE, one of the most significant heat sources in the Willamette system, fundamentally undermines the validity of the TMDL itself. Deferring adoption of a TMDL implementation plan for the Corps for 18 months means that neither the public nor decision makers have the ability to accurately evaluate the effectiveness of the proposed TMDL. As we commonly remind DEQ during permit renewal, DEQ has a responsibility to have data that supports that its actions will comply with state and federal rules at the time it takes a given action and merely promising that a future study will provide necessary information cannot substitute for the need to have an adequate basis for a given decision. (29)
Response	*ODEQ disagrees that USACE is receiving a deferral of TMDL requirements. All DMAs, including USACE, named in this TMDL that are responsible for developing and implementing a TMDL Implementation Plan have up to 18 months to submit their plan to ODEQ for approval. At the same time this effort is underway, the USACE will be working with ODEQ and others to conduct additional studies to better assess the impacts of their dams and reservoirs. Should these studies demonstrate that the Corps projects have a significantly different effect on water temperatures in the system than those described in this TMDL, those impacts will be addressed in the next TMDL update.*
Comment 24.	Page 14-3, Background, paragraph 1. Change "precisely" to "precision" (33)
Response	*The section has been revised and this comment is no longer relevant.*
Comment 25.	Page 14-4, Goals and Objectives: Reference the second bullet under objectives. Suggest rewording this statement as follows: "Conduct quantitative and qualitative analysis of alternative management strategies to a level of detail adequate to provide reasonable assurance regarding the ability of those strategies to meet load allocations." Under the current operational and structural configuration of the Willamette Basin dams, the Corps does not believe there is any way to give reasonable assurance that the TMDL load allocations for temperature can be met. In fact, the Corps is reasonably certain that the draft load allocations cannot be met. Hence the Corps belief that UAA under 40 C.F.R. §131.10(g)(4) will be necessary. (33)
Response	*The language referred to was intended to describe ODEQ's expectations of DMAs in general. This paragraph has been revised and the sentence referenced in your comment is no longer there.*
Comment 26.	Page 14-5, Source Categories with Management Strategies: Reference the statement, "… can be used as tools for developing a comprehensive watershed approach by land use to address water quality …". The Corps believes that a watershed approach addressing each of the individual major subbasins of the

	Willamette is the appropriate approach. However, that approach will require numerous DMAs and other entities to come together in a collaborative effort. That kind of effort will need to be well coordinated. Does ODEQ intend to play that coordinating role within the WQMP framework? (33)
Response	*Yes, ODEQ intends to help DMAs coordinate their implementation activities where appropriate and as resources allow.*
Comment 27.	Page 14-5, Source Categories with Management Strategies: … The Corps' has some capacity to work within a large-scale and comprehensive watershed approach but that ability is constrained by the Corps potential cost-sharing requirements. The Corps would like to discuss with ODEQ anticipated requirements for making operational or structural modifications at the Corps existing reservoir projects. (33)
Response	*ODEQ agrees to continue implementation discussions with USACE.*
Comment 28.	Page 14-5, Timeline for Implementing Strategies and Attainment of Water Quality Standards: Reference items (D)(b) "schedule for achieving appropriate incremental measures and measurable WQ targets" and (F) "Timeline for Attainment…" The Corps agrees with the statement in these sections describing anticipated implementation of water quality improvement strategies and attainment of standards. From the Corps perspective, water quality improvement, particularly as it relates to modification of temperature effects from Corps dams, will be an ongoing, long-term and iterative process. Attaining standards may involve modifications to dams, which would require decades to implement if found to be feasible. (33)
Response	*Comment noted.*
Comment 29.	Page 14-6, Table 14-1: Data appears to be missing from this table. Regarding the row entitled "DMA implementation of TMDL allocations (including USACE)" the Corps concurs that this will be a longer-term activity. The Corps requests a meeting with ODEQ to discuss timelines for implementation of structural or operational modifications consistent with the TMDLS before the final TMDL is published. (33)
Response	*This table has been omitted from the document so the comment is no longer relevant. However, ODEQ fully anticipates having future discussions with the USACE regarding implementation actions and timelines.*
Comment 30.	Page 14-9, Table 14.1, Summary of Willamette Basin TMDL Parameters with responsible DMAs by Basin: Some additional detail on this table is needed. For example, for the Lower Willamette, which parameters will the Corps be expected to be a DMA? While the Corps recognizes that flows affected by the Corps projects may be a critical component of water quality conditions in the lower Willamette, the Corps doubts that there is anything the Corps can implement in terms of operations or structural changes at those projects that will affect a temperature change in the lower Willamette reach. (33)
Response	*DMAs are only responsible for pollutants that they have legal authority over. For the Willamette TMDLs, USACE has been allocated temperature loads for specific dams and is responsible for implementing water quality improvements for those load allocations.*
Comment 31.	Page 14-10, Schedule for Preparation and Submission: In the next to last paragraph in this section, reference is made to requirements for DMAs to submit an annual status report and an evaluation report every fifth year. The Corps requests that additional detail on the scope, content and processing of the annual and five-year reports is warranted. (33) Page 14–10. pp 4: BLM can accommodate an annual report on activities as part of our Annual Program Summary. It is unclear at this time whether the budget exists to conduct effectiveness monitoring that would be part of the 5th year report you refer to. The WQMP needs to address the uncertainty of budgets and money to

	implement. (62)
Response	*ODEQ is in the process of finalizing a TMDL Implementation Plan Internal Management Directive that will address the scope, content and reporting details of DMA implementation activities.*
Comment 32.	Page 14-12 and 14-13, Dam Operation: Reference to Section 401 of the CWA and Section 313, 33 USC 1323. … The Corps understands that as a major federal water resource manager in the basin, the Corps has a significant role to play in improving and maintaining water quality conditions in the Willamette Basin. The Corps remains committed to working as a team with ODEQ and the other federal, state and local agencies and entities with water resource management responsibilities in the Willamette Basin to improve water quality conditions. … Understand, however, that the Corps must take into account CWA and ESA responsibilities with the congressionally authorized operating purposes under federal statutory authorities for the Willamette Valley Projects. (33)
Response	*ODEQ appreciates the Corp's commitment to Willamette Basin water quality improvement and understands that the Corps must accomplish this in accordance with its Congressionally mandated operating purposes.*
Comment 33.	Page 14-13, Plan to Monitor and Evaluate Progress toward Achieving TMDL Allocations and WQS: Under the heading "Identification of Persons responsible for monitoring" the Corps is not listed. Is this an oversight; should the Corps be listed. Should the Corps provide a statement summarizing the Corps water quality monitoring and evaluation programs, including the Corps efforts in support of the TMDL development? (33)
Response	*Yes it was an oversight, the Corps should be listed. Text has been added summarizing USACE monitoring activities.* *ODEQ also expects the USACE to address monitoring information in the TMDL Implementation Plan as appropriate.*
Comment 34.	Page 14-16, (M) Description of planned efforts to maintain management strategies over time: A reference to Table 14.1 (pg 14-9) may be useful since the jurisdictions of DMAs are referenced in this paragraph. (33)
Response	*A general reference has been included.*
Comment 35. Costs, Funding, & budgeting	Page 14-16, (N) Costs and Funding: Reference the statement "DMAs will be expected to provide a fiscal analysis of the resources required to develop, execute and maintain the management strategies described in their implementation plans." Is this submitted as part of the implementation plan? (33)
Response	*Yes, it is part of the Implementation Plan. ODEQ understands that DMAs have fiscal responsibilities and budgeting processes that can be quite lengthy. The intent of the provision is for DMAs to explain how much water quality improvements will cost, based on their load allocation(s) and local conditions, and how funding of improvements will be incorporated into their operating budgets.*
Comment 36.	Page 14-18, USACE Dam Operation and Management: Reference the statement that "… the Corps is charged with operating its projects in compliance with the federal Clean Water Act, and in accordance with all federal, state, interstate and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water quality pollution as per § 313 (33 USC 1323). The Corps believes that this quoted passage does not comprise an accurate, complete statement of Corps responsibility under the Clean Water Act after the recent ruling of the 9th Circuit Court of Appeals in National Wildlife Federation v. United States Army Corps of Engineers, 384 F.3d 1163 (9th Cir. 2004), *en banc den*. Jan 2005. (33)

Response	*ODEQ has revised the statement to make it more explicit and inclusive of the legal directives that govern their operations.*
Comment 37.	Page 14-29, Reserve Capacity, paragraph 3: Reference the statement, "a new or significantly updated model will likely be developed after there has been a thorough analysis of the Corps dams and reservoir operations." The Corps believes a more detailed discussion of the limitations of the existing water quality model, or reference to that discussion elsewhere in the document is warranted. Suggest replacing that sentence with the following: "USACE has been in the process of developing water quality models for each of the major reservoirs in the system. It is recommended that those models be linked to the existing mainstem water quality model used to develop the preliminary TMDL load allocations presented in this document. The results of the reservoir models could be used to replace boundary condition assumptions used in the initial TMDL modeling. The improvements in the models would significantly improve the Corps ability to thoroughly analyze and evaluate alternative reservoir management strategies, including re-analysis of heat source loading from point sources." (33)
Response	*ODEQ agrees with the clarification and has included similar language in appropriate sections of the WQMP to make these points. Chapter 4 of the TMDL document includes a revised discussion of load allocations for USACE projects.*
Comment 38.	Page 14-29, Reserve Capacity: Regarding the statement "Future dam related decisions could significantly affect mainstem temperatures…" The Corps believes that future potential operational modifications to reservoir operations could have significant effects on tributary temperatures but the Corps does not believe operational or structural modifications could have significant effects on temperature regimes in the middle and lower Willamette mainstem reaches. (33)
Response	*ODEQ believes that reservoirs do influence flow and temperature patterns throughout the basin. The magnitude and timing of changes in dam operations will determine whether effects are observed in mainstem river temperatures. Future modeling will be used to document this.*
Comment 39.	Page 14-29, Reserve Capacity, Options: The Corps takes no position regarding preference for Reserve Capacity Option 1 or Option 2. However, the Corps does recognize that if Option 2 is selected the Corps would have a key role to play in collecting data and developing models and other tools required to address critical uncertainties regarding the relationship between reservoir operations and downstream thermal conditions. The Corps also recognizes the potential that applicants could end up waiting a significant amount of time for the Corps, ODEQ and EPA to complete that analysis before reserve capacity could be made available. It is not clear from the discussion contained in this draft document the level of analysis and scrutiny EPA believes will be required before the uncertainties are adequately addressed. At a minimum, the Corps believes that this will require that reservoir water quality models will need to be developed for at least all of the larger Willamette Basin Projects and possibly the smaller ones as well. Currently, reservoir models are completed for Cougar, Blue River, Hills Creek, Lookout Point, Dexter, Green Peter, Foster and Detroit. The Corps currently has no funds programmed or specific plans in place to develop reservoir models for Cottage Grove, Dorena, Fern Ridge, and Big Cliff reservoirs. The reservoir models developed will need to be linked to the existing ODEQ CE-QUAL-W2 model for the Willamette Mainstem to replace the boundary condition assumptions used in that model. The Corps assumes that some calibration of both sets of models may be required. Following that, different alternative management strategies for the reservoirs will need to be described, defined and run through the models. Those strategies will need to consider operations of the reservoirs independently and together as a system. The alternatives will need to be evaluated not only for their impacts on reservoir and downstream temperature regimes, but also their effects on

	other authorized operating purposes of the reservoirs, including instream flow targets. All of these efforts need to be undertaken collaboratively between the Corps, ODEQ, EPA and other stakeholders. Obviously, this would not be a simple procedure. The Corps believes that it could take two to three years to complete at a minimum, assuming that all the participating parties are adequately staffed and funded and fulfill their responsibilities. (33)
Response	*ODEQ agrees with the USACE assumptions. It should be noted that one half of the reserve capacity will be available for allocation to any and all sectors upon approval of the TMDL. The remaining portion will be held (not allocated) until the impacts of the USACE projects on downstream temperatures are defined. It is expected that ODEQ and USACE will work jointly on this effort which should be completed for the next TMDL check-in targeted for 2013.*
Comment 40.	Page 14-30, Nonpoint Source Allocation, paragraph 2: It is stated that it is envisioned that this nonpoint source allocation could be used by any of the nonpoint sources located in the Willamette River Basin, including: … Dam and reservoir operations, including those under the jurisdiction of the Corps, … however this statement is contradicted in Chapter 4, page 114, first paragraph, last sentence, where a heat load allocation of zero applies to all the Corps Willamette Project reservoirs. (33)
Response	*Chapter 4 is correct that USACE is not getting an allocation at this time. Except for load allocations to the PGE and EWEB hydroelectric projects, the nonpoint source allocation was not specifically allocated to an individual sector or source. No heat load above background was allocated in the TMDL to individual USACE reservoirs or the entire project. Individual reservoir projects may be allocated a portion of the nonpoint source allocation or reserve capacity when the near field and far field temperature effects of an individual project are understood.*
Comment 41.	Page 14-30, Water Quality Trading: Because of potential limitations in the scope of the Corps authorities under federal law, ODEQ should be aware that the Corps participation in water quality trading might be limited in the same way or to the same extent as non-federal entities. (33)
Response	*Comment noted.*
Comment 42.	Page 14-32, US Army Corps of Engineers (USACE), first bullet: It should be mentioned that the Corps would work in coordination with ODEQ to refine the load allocations for each of the 13 dams and reservoirs since the present analysis was not thorough, due to insufficient time, data, models, and analysis. (33)
Response	*ODEQ is committed to working jointly with USACE.*
Comment 43.	Page 14-32, US Army Corps of Engineers (USACE), last paragraph: Reference the statements, "the existence and operation of the dams and their reservoirs contribute to excessive seasonal heating of rivers. Typically this results in shifting of the thermal regime that results in cooler water being released in the summer and warmer water being released in the fall …". The Corps previously requested that ODEQ add language recognizing that summer flow augmentation in the mainstem Willamette and its tributaries yield significant water quality benefits. This relationship is addressed very briefly elsewhere in the TMDL, but is absolutely critical for the WQMP Chapter. The reservoirs only have a limited amount of water storage any given year with which to meet the dams multiple authorized purposes. Any shift in operation (timing and volume of flow releases) will result in tradeoffs pertaining to those purposes. (33)
Response	*ODEQ agrees that these trade-offs must be considered and has added language that provides an example.*

Comment 44.	Page 14-33, USACE Implementation Plan: Statements contradict themselves unless ODEQ is not expecting the Corps to meet the temperature standard. The statements being: "However, the very presence of a dam and reservoir may result in heat loading that cannot be mitigated except through the removal of the dam." And the very next sentence: "This TMDL/WQMP is not advocating for the removal of the dams in Willamette River Basin Projects". The sentence on Pg. 14-53 (Dam Operation) states, "The State of Oregon does not advocate dam removal as a means of meeting water quality temperature standards, but expects that operators will work activity and diligently to control and mitigate the heat input from their structures/projects." A proposed re-write would be: "The ODEQ will work with the Corps through the TMDL/WQMP process to determine the effects of the existence and operation of the dams. This TMDL/WQMP is not advocating for the removal of the dams in the Willamette River Basin Project, and is not intended to be used by any third party in furtherance of dam removal objectives." (33)
Response	*Clarifying text changes were made to the USACE Implementation Plan section.*
Comment 45.	Page 14-33, Monitoring, paragraph 3: Reference the recommendation that the Corps would be expected to develop detailed cross-sectional and vertical transect temperature studies … to assess localized temperature effects of operational strategies and to support refined temperature modeling." The recommended data collection is expensive and the Corps has no funds currently programmed to conduct such analysis. (33)
Response	*Actually the terminology used is 'encourage', not 'recommend'. ODEQ acknowledges that all DMAs will need to decide what type of monitoring will best fit the need to assess localized temperature effects in their surface water management plan, Temperature Management Plan, Stormwater Management Plan or TMDL Implementation Plan.*
Comment 46.	Page 14-33, Monitoring, paragraph 4: The Corps concurs with statements presented in this section that additional monitoring, evaluation and modeling is required to refine temperature load allocations for the reservoirs. The Corps questions whether or not the statement in the second sentence that states "the TMDL identifies modeled "natural river temperature" as an objective to meet current water temperature standards is accurate and consistent with information presented in Chapter 4. That portion of the TMDL document describes the load allocations for the reservoirs being based on the 25th percentile of the rolling 7-day average temperature of historic inflow data into the reservoirs. As the Corps has stated elsewhere in these comments, the Corps believes the techniques used to develop the load allocations are not scientifically supportable and that the Corps is being held to a more stringent standard than modeled "natural river temperatures." Also the model runs were performed with river flows augmented by the operations of the dams but temperatures as if the dams did not exist. The system that was modeled was a mixed comparison that could never exist in a "natural" state. Either the additional flow from the impounded water should be eliminated, or the temperature effects of the impounded water need to be incorporated in the model runs. The current "natural state" modeled has never been experienced, pre or post dam. (33)
Response	*ODEQ has responded to these and similar comments in detail in the Chapter 4 Response to Comments.*
Comment 47.	Page 14-33, Monitoring: The TMDL acknowledges that "The modeled temperatures for a given river mile and time of year will vary between years as a function of the system hydrology and meteorology and thermal loadings." Therefore it seems inconsistent that the TMDL would subsequently assign a set temperature value to the Corps dams instead of a range of temperatures that may occur due to natural variations. (33)

Response	*The load allocation for each USACE Willamette Project reservoir is no increase above natural background temperatures. As ODEQ explained elsewhere, no portion of the human use allowance is allocated to the project. Lacking data comparable to that provided by other sources of heat and lacking any other information with which to characterize all project heat loads, ODEQ has identified target temperatures for each project reservoir on a monthly basis. These target temperatures are not the actual load allocation, but are useful to identify the approximate impact of current heat loads on receiving stream temperatures. USACE may submit better load information that may be used to revise either load allocations (currently no change in natural thermal potential temperature), or temperature targets (median of monthly average tributary temperatures)*.
Comment 48.	Page 14-33, Interagency Management Advisory Process: The Corps concurs that an interagency water quality plan implementation work group should be convened to implement the system-wide water quality implementation plan. The Corps cautions that NOAA-F and USFWS anticipate that a similar work group with many of the same participants be convened to coordinate activities undertaken to implement ESA measures resulting from the Biological Opinions. Likewise, the Corps already has an interagency group in place that coordinates the development of the annual reservoir operation plan and real time management—again with many of the same agencies participating. Because of the close relationships between all three of these groups, perhaps some consideration should be made to have one group in place to assist in managing the Willamette Reservoirs. As a further consideration, ODEQ should become an active participant on the existing reservoir management team. (33)
Response	*ODEQ supports coordination efforts and plans to actively participate in an interagency group that oversees TMDL implementation. Further, if the existing reservoir management team continues as a separate entity, ODEQ will participate as resources allow.*
Comment 49.	Page 14-34, Agreement Process between ODEQ and USACE: The Corps concurs with the proposed agreement process. In ODEQ's view, would fulfillment of either of the alternative agreements provide the Corps with protection or defense in third-party lawsuits under the CWA? (33)
Response	*Dams are considered nonpoint sources which are not normally subject to third party lawsuits.*
Comment 50.	Page 14-34, USACE UAA Process: The Corps concurs with the basic conclusion of this section that the UAA process and procedures in connection with the provisions of 40 C.F.R. §131.10(g)(4) should follow the Internal Guidance Memorandum currently being developed by ODEQ in concert with EPA and other stakeholders, including the Corps. The Corps assumes that this Section will be revised and updated to reflect the outcomes of that process. In particular, reference the last sentence of the third paragraph: "ODEQ commits to reviewing use attainability analysis and re-evaluating standards if and when sufficient information exists to support it". The Corps believes it is critical that ODEQ clarify, either in this chapter or in the UAA Internal Guidance Memorandum, the specific level of data, analysis or other information the Corps will be expected to provide to enable ODEQ to determine if UAA is appropriate, and adequately complete a UAA. (33)
Response	*The final TMDL does not include the cited sentence. The UAA Internal Management Document will provide guidance.*
Comment 51.	Page 14-53, Dam Operation: The Corps does not agree with the statement "As to the operation of dams, there would appear to be greater flexibility to control and manage temperature impacts." The statement is unsubstantiated and made without a full understanding of the limitations of dam capabilities, their operations, the authorized purposes and mandates of the projects, and the interagency

	coordination process that is occurring between the Corps, ODFW, and NOAA Fisheries. (33)
Response	*The sentence has been removed but as part of the ongoing TMDL process ODEQ will continue to work with USACE to identify opportunities to operate dams to reduce temperature impacts.*
Comment 52.	Page 14-54, Dam Operation, first paragraph after bullet: The Corps suggests the addition of the line "This group would manage the system-wide implementation plan." after the sentence "ODEQ recommends that the Corps undertake this process through a multi-disciplinary interagency management group." so that there is not the misconception that this group would be managing the dams. The management of the dams was congressionally delegated to the Corps; therefore the Corps is not authorized to delegate that authority and responsibility to any other entity. (33)
Response	*Revisions to the chapter have made this comment no longer relevant.*
Comment 53.	OLSD [Oak Lodge Sanitary District] participated as a member of the Oregon Association of Clean Water Agencies (ORACWA) in the Willamette River TMDL process but not as a separate participant. OLSD supports the written comments made by ORACWA. For the Department's convenience, OLSD is not repeating in this letter the comments made by ORACWA, but instead incorporates those comments by reference as if expressly made by OLSD. (35)
Response	*Acknowledged.*
Comment 54.	With specific regard to OLSD, as discussed above, OLSD is a special service district with limited authorities relating to sanitary sewerage and storm water services. Accordingly, The Department should not include OLSD as a DMA and any requirement relating to cold water refugia imposed upon OLSD will be arbitrary, capricious and not in accordance with applicable law. (35)
Response	*The definition of a DMA per OAR 340-042-0030(2) is "…a federal, state, or local governmental agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL." Oak Lodge Sanitary District (OLSD) has not been identified as a DMA by ODEQ for implementing TMDL load allocations. However, OLSD does have a NPDES permit for the waste water treatment plant. As the issuer of NPDES permits ODEQ is considered the DMA for all NPDES permit holders. Waste load allocations for bacteria and temperature have been allocated to OLSD as part of the Willamette Basin TMDLs and will be incorporated into the NPDES permits as appropriate. Additionally, the NPDES permit would contain any requirements related to cold water refugia if there were to be any.*
Comment 55. Source equity	Chapters 2 and 14 of the draft documents establish definite waste load allocations and compliance schedules for the point sources, which the Department will enforce through the NPDES permit process. But the dam operators and non-point contributors do not have the same binding requirements. The TMDL process should provide equal application of the law and fairness to all contributors. Without definite management efforts by other contributors in the Willamette Basin, the point source efforts to improve water quality will prove to be an expensive and futile effort. OLSD requests that DEQ delay any establishment of waste load allocations for point sources until the other significant contributors, such as dam operators and the agricultural and forestry industry are required to provide equal contribution toward correcting the temperature concerns. (35)

Response	*ODEQ does not agree that implementation of TMDL waste load allocations should be delayed. The TMDL ascribes allocations according to the relative contributions of a point source or nonpoint source sector, and each source or sector is only responsible for addressing the sources of pollution that are within their jurisdiction. While the legal mechanisms vary, as do the timelines for achieving load reductions depending upon the strategies employed, all sources are expected to take necessary actions to achieve their allocations.*
Comment 56.	• On page 14-54, the following statement is present: "All municipal and industrial dischargers of bacteria shall be required to notify the local news media of discharges that will likely result in the exceedence of bacteria water quality criteria. The discharges can result from major storms, power failures, or equipment failures. This notification practice is being used by the City of Portland to inform potential recreational users and citizens when elevated bacteria levels result from major rainfall events in the Willamette River. Expansion of this practice will protect citizens throughout the Willamette Basin." This statement's requirement to contact the local news media should be removed, for it contradicts the requirements that are in most or all NPDES permits for publicly owned sewage treatment plants. These permits currently state that the public shall be required to be notified only upon request by the Department. If the Department wishes to change this reporting requirement, it should be done through the NPDES permitting and/or renewal processes. In addition, this phrase is misleading, for it should state that these requirements only pertain to illicit discharges (i.e., process wastewater) and/or spills, not storm water. Storm water is a municipal discharge. (37) • Request that the Department exclude stormwater-only discharges from the required sewerage overflow notification procedures (a bacteria specific strategy identified in Chapter 14, Page 14-54). This strategy could be interpreted to mean that stormwater containing bacteria would require continuous notification and posting. (48A) • The bacteria specific strategies section (page 14-54) discusses the need for sewage overflow notification procedures. Schedule C of the City's current NPDES permit already contains the requirement for notification procedures. These procedures have also been approved by ODEQ. Substitution of the City of Portland program is not appropriate and the City requests this be deleted. (50) • On page 14-54, we recommend that the media notification provisions be modified as follows: *Except for discharges comprised entirely of stormwater, all municipal and industrial dischargers of bacteria shall be required to notify local news media of discharges that will likely result in the exceedance of bacteria water quality criteria.* NPDES permit holders have existing sewerage overflow SSO notification procedures in their permits; substitution of the City of Portland CSO program is not appropriate (Page 14-54). (55) *(+35, 40, 46, 56, 68, by reference)* • We understand that other jurisdictions would like to choose their own means for alerting the public of high bacteria levels. Because Gresham has only stormwater discharges to the Willamette basin, we request clarification of the text on the last paragraph on page 14-54. It should read (italicized words are proposed for addition): "*Except for discharges comprised entirely of stormwater*, all municipal and industrial dischargers of bacteria shall be required to notify the local news media of discharges that will likely result in the exceedence of bacteria water quality criteria." (57) • Page 14-54, last paragraph: This needs to be revised to eliminate reference to the Portland CSO program, and to reflect that it does not apply to municipal stormwater systems (unless there's a spill or some similar event involving the MS4). (63)

Response	*The paragraph has been rewritten to state that any public notification requirement will be addressed in the NPDES permit and on a case by case basis. This could include a permit condition for developing a response plan with a media notification element.*
Comment 57.	• For the mercury "bubble" concept to work effectively as outlined by the Department (pages 14-27 and 28), a mechanism for water quality credits that are associated with early actions to reduce mercury discharges into the Willamette must be established. This will be especially important if municipalities are to continue to be interested in continuing to pursue both creative and tried-and-true mercury reduction programs. Without a system to "bank" mercury reduction credits, municipalities will be obligated to cease their early mercury reduction programs, since it would damage their ability to capture those mercury reductions in the future. (37, 55, 63) *(+35, 40, 46, 56, 68, by reference)* • In order for the "bubble concept" to work effectively, a mechanism for credits to municipalities that have taken proactive early actions to reduce mercury discharges into the Willamette River must be established. For example, Corvallis has voluntarily removed mercury sources from local schools and implemented dental clinic BMPs for amalgam waste. This is important because it will keep municipalities interested in continuing to pursue mercury reduction programs. Without a system to "bank" mercury reduction credits, municipalities will be obligated to discontinue current mercury reduction programs since it would limit their ability to capture those mercury reductions in the future for permit compliance purposes. (50)
Response	*ODEQ encourages sources to take proactive steps to reduce mercury discharges in the short term and commits to working with the stakeholders in the Basin to develop a mechanism for tracking mercury reductions so these can be appropriately considered at the time that source-specific WLAs are assigned.*
Comment 58.	• Page 14-15 contains the following statement: "…MS4 monitoring requirements might not fully cover all TMDL parameters, such as temperature. The MS4 monitoring plans may need to be augmented to cover other pollutants within their jurisdictions." Some jurisdictions also have NPDES permits for discharges from wastewater treatment plants. For those jurisdictions that have wastewater treatment plant permits that currently require ambient in-stream monitoring for temperature, we request that the condition requiring MS4 *(wastewater treatment plant?)* permit holders to monitor in-stream temperature not be inserted into the same jurisdiction's MS4 permit's monitoring plan. (37) • The Department states in numerous places in the Draft TMDL that stormwater has no reasonable potential to increase instream temperatures (*see* Draft TMDL and WQMP at 14-28, 5-45, 5-72). Therefore, no temperature monitoring should be required for stormwater. However, the WQMP references stormwater monitoring for temperature under MS4 permits (*see* Draft WQMP at 14-15). The WQMP states: "The Portland, Salem, and Eugene urban areas will be required to conduct specific storm water monitoring in conjunction with their MS4 Phase 1 permits. It should be noted that the MS4 monitoring requirements might not fully cover all TMDL parameters, such as temperature. The MS4 monitoring plans may need to be augmented to cover other pollutants within their jurisdictions." The reference in the WQMP to stormwater monitoring for temperature should be removed. (44) • The temperature section discusses temperature monitoring for stormwater runoff. This should be removed. The Department has repeatedly mentioned and documented in earlier permit notices that temperature is not a pollutant of concern for urban stormwater runoff. (55, 63) *(+35, 40, 46, 56, 68, by*

	reference)
Response	*The sentence referring to stormwater temperature monitoring has been removed and clarifying text has been added.* *ODEQ has no plans for incorporating temperature monitoring into MS4 stormwater permits. However, jurisdictions implementing TMDL waste load allocations or load allocations may need to incorporate in-stream temperature monitoring into non-stormwater NPDES permits or TMDL Implementation Plans. In addition, jurisdictions with both NPDES permits and TMDL implementation plans that require monitoring may want to coordinate monitoring efforts as appropriate.*
Comment 59.	On page 14-16, the timeline for attainment of water quality standards is stated for temperature as 20-50 years, mercury is 50-100 years and bacteria is 20 years. On page 14-16, it is stated that the Department will have an iterative process to review progress towards attainment of TMDLs on a 5-year cycle. However, the document goes on to state that DMAs will need to submit annual reports which describe implementation efforts that are underway and note any changes in water quality. The production and submission of annual reports when long-term trending is the only appropriate evaluation form given the variability of storm water runoff is unwarranted. We request the Department consider more appropriate reporting frequencies. (37)
Response	*The intent of the annual report would be to report on actions taken to implement the plan. ODEQ will work with DMAs to identify the most appropriate time and format for reporting (for example, these could be submitted at the same time as reports required under permits). These annual reports would not report on water quality unless otherwise required (such as under a permit).* *A more comprehensive report, that would include available water quality information, would be developed on a 5-year cycle. This is a more appropriate time frame for reporting on status and trends.*
Comment 60.	• In figure 14.1 on page 14-6, the column titled "2004" should be removed and the projected timelines for short and long-term activities should be adjusted, where appropriate. (37) • "Estimates of time for meeting standards and full protection of beneficial uses …" Figure 14.1 does not show this information. (46B) • Page 14 – 6 Figure 14 -1 The portion of the table which illustrates the "DMA" development and submittal of implementation plan should indicate 2007 instead of 2005. (62) • Page 14-6. Figure 14.1 is lacking the charted timelines for the various Shorter Term Activities. (63) • Page 14-6, Figure 14.1 As printed, this table lacks the timing information which the text suggests it contains. (65)
Response	*ODEQ apologizes for any confusion regarding the figure. The figure did not reprint with the appropriate boxes shaded. The figure has been adjusted.*
Comment 61.	On page 14-6, the City of Damascus should be added to the list. (37)
Response	*The correction has been made.*
Comment 62.	On page 14-11, the document states that phase II MS4 permits are to be issued in 2004. Please change this figure to reflect the fact that this didn't occur in 2004. (37)
Response	*The correction has been made.*
Comment 63.	On page 14-20, the following statement is present: "In instances where ODEQ does not have direct authority for implementation, DMAs are responsible for developing

	Implementation Plans that will ensure attainment of the TMDL allocations and water quality standards". This statement is inappropriate and should be removed from the document. (37) A DMA may not be able to ensure attainment of all TMDL allocations. Examples of this could include non-point sources of temperature and E. coli in many locations, including rural residential areas. Please note that property owners in rural residential areas are legally allowed to: a) Remove at least some riparian vegetation in most instances, causing some additional surface water warming, and riparian areas that are devegetated at this time are very likely to continue to be devegetated. b) Let a few pets or head of livestock wander near surface waters or ditches that are tributary to surface waters. These animals will occasionally defecate while wandering, allowing at least some E. coli to be pushed into a surface water body. In the two instances outlined in "a" and "b" above, how does the Department propose a DMA's Implementation Plan will ensure attainment of non-point source TMDL allocations for heat and bacteria? (37)
Response	*ODEQ expects DMAs to work within their jurisdictional authority to improve water quality. ODEQ does not expect – nor legally can ODEQ expect – DMAs to implement load allocations where they do not have authority to do so.*
Comment 64. Implementation guidance availability	• On page 14-20, the following statement is present: "The guidance should be available in 2004". If this guidance isn't available yet, this date needs to be revised. (37) On page 14-10, the document states that DMA TMDL Implementation Plans are due no less than 18 months after notification letter are received. If the DMA Implementation Plan "guidance" (it is described on page 14-20) isn't available yet, these notification letters shouldn't be sent until after the Implementation Plan "guidance" has been published. (37) • Page 14-20. We do not believe the TMDL implementation guidance was available in 2004. Perhaps this should read 2005? (63) • Page 14-20: ODOT appreciates the statement made in the Draft that DEQ plans to develop future TMDL Implementation Plan guidance for DMAs. ODOT suggests this guidance include: ▪ Recognition of the diversity and variety of Willamette Basin DMAs and their different needs, jurisdictional authorities and responsibilities. ▪ Guidance on the development of practical and affordable TMDL monitoring programs. ▪ A summary of DMA TMDL Implementation Plan requirements that clearly and succinctly outlines DMA responsibilities. (64)
Response	*A preliminary draft of the TMDL Implementation Plan Internal Management Directive was released for informal review in July and August, 2005. Another review with opportunity for comment will occur before final adoption. The reference to 2004 has been removed.* *The requirement for DMAs to develop a TMDL Implementation Plan is set forth in rule and the absence of guidance does not negate the validity of this rule. DMAs have been developing TMDL Implementation Plans for some time in spite of the absence of guidance. ODEQ will do its best to provide DMAs with adequate guidance to assist them with the development of their plans.*
Comment 65. Implementation guidance review	• ACWA would like an opportunity to review and comment on the TMDL Implementation Plan guidance when it is available (page 14-20). (55) *(+35, 40, 46, 56, 68, by reference)* • Page 14-5: Through ACWA, Salem would like to participate with DEQ staff in

	the development of the TMDL implementation guidance. (63)
Response	*ACWA has been a part of the informal, preliminary draft review process.* *There will be another opportunity for review and comment before adoption of the final TMDL Implementation Plan Internal Management Directive.*
Comment 66.	In the first few paragraphs on page 14-21, the Department claims that storm water plays a significant role in contaminating surface waters in the Willamette watershed, then proceeds to only mention the regulations that apply to storm water discharges from urban sources. We believe that it is appropriate to also mention: a) that storm water from agricultural areas, rural residential areas and timber management areas can also contain significant amounts of E. coli and mercury, and b) that the regulations that apply to these discharges be listed in this section of the WQMP as well. (37)
Response	*A new section titled "Non-Urban Control Measures" has been added to capture agricultural, forestry, and rural residential storm water sources.*
Comment 67.	DEQ is responsible to implement the Clackamas TMDL through the 401 process for the FERC relicensing of the Clackamas Project. As a result, the 18-month deadline otherwise applicable to the TMDL implementation process should not be applicable in this case. (39)
Response	*The intent of both the 401 Certification process and the TMDL Implementation Plan is to ensure that water quality standards will be met within a reasonable time period. ODEQ does expect that requirements from all programs will be met. Therefore, ODEQ will work with the hydro-electric operator to determine whether and when the hydroelectric operator needs to complete or revise a Temperature Management Plan (TMP) to address the new TMDL allocations.* *Regardless of the schedule and final mechanism for completing the TMP, a TMDL Implementation Plan may also be needed if the project is a source of pollutants other than temperature. ODEQ will review requests for both Implementation Plan and TMP timeline extensions on a case by case basis if appropriate.*
Comment 68.	Second part of paragraph: Moreover, since the Clackamas River does not contribute any heating to the Willamette River, completion of the Clackamas TMDL could be deferred until PGE has been able to refine the NTP calculation. This can be undertaken in the upcoming 401 proceeding. Alternately, DEQ should note in the final TMDL report that the Clackamas NTP is being recalculated, and that this refinement will be incorporated as an improvement of the model input, not as a revision to the TMDL. (39)
Response	*ODEQ included the Clackamas River and the most recent PGE and ODEQ estimates of natural and anthropogenic heat loads in the final TMDL.*
Comment 69.	• Within Chapter 14--Water Quality Management Plan, there are two statements that conflict regarding when the TMDL implementation plans are due. Both of these are different from a statement on the same topic in the Overview, and in the Sandy TMDL that was recently open for comment. (Italics added below for emphasis): o Page 1-13, first paragraph says, "ODEQ will work with DMAs in developing Implementation Plans that are consistent in meeting … For the Willamette Basin TMDLs, these plans will be developed *within 18 months of ODEQ approval of the TMDL and WQMP.* o The first full paragraph on page 14-10 states that "DMAs are required to submit TMDL Implementation Plans for this Willamette Basin TMDL iteration to ODEQ *18 months after notification letters are received*…"

	○ On page 14-27, the second sub-bullet under Nonpoint Sources says "The strategy shall be incorporated into the DMA's Implementation Plan that is due to ODEQ *within 18 months of the issuance of the 2004 TMDL*…" (N.B. Note that a date change is needed). We think the correct statement is the one given in the draft Sandy River TMDL, which says "These DMA-specific Implementation Plans will be submitted to ODEQ *18 months after this TMDL is approved by EPA and adopted by ODEQ."* (See the first paragraph of Section 6.6 in the draft Sandy TMDL.) (40, 57) • A consistent trigger date for the DMA water quality implementation plan submission is needed. Some portions of the document reference 18 months after DEQ adoption; some portions of the document reference 18 months after EPA approval. We recommend the plans be due 18 months after EPA approval to ensure all federal comments are incorporated before DMAs initiate plan development with their limited resources. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*ODEQ recently clarified the notification process and the TMDL Implementation Plan development timing policy which is stated in the draft TMDL Implementation Plan Internal Management Directive (IMD). For the Willamette Basin ODEQ has stated the TMDL Implementation Plans are due 18 months from the date of the Notification Letters that ODEQ sends to DMAs, permitees, and other affected parties. The Notification Letters are to be sent out by ODEQ within 20 days of the TMDL being issued as an Order by ODEQ. The Implementation Plan due date is not dependent on USEPA's approval of the TMDL.* *Corrections were made to the appropriate references in Chapter 1 and Chapter 14.*
Comment 70.	The bullet "MS4 Phase 1 and 2" on page 14-26 should be revised to reflect any changes that are made in the MS4 permits related to 303(d) Listed Pollutants. (40, 57)
Response	*Recent Phase I permit modifications did not make any changes to the 303(d) requirements in the permit.*
Comment 71.	The first paragraph under 2009 TMDL Update, page 14-28 says "…One goal of the updated TMDL will be to set water quality based effluent limits for water point sources that discharge significant levels of mercury." The words "when appropriate" should be added to the end of the sentence to accommodate existing policy related to stormwater permits. (40)
Response	*The correction has been made.*
Comment 72.	Bacteria: Steps we have not taken to address bacteria include animal waste management, standardized erosion control measures, illegal discharge detection, and monitoring septic systems. We would hope that we could choose which would be most effective at reducing bacteria for our area, and not be required to implement all of these measures. (43)
Response	*ODEQ believes that storm water management can be an effective strategy for controlling nonpoint sources of bacteria in urban areas. ODEQ understands that jurisdictions will need to prioritize control strategies that are most appropriate for their specific jurisdiction.*
Comment 73.	In addition, water flows from forest and farms into our urban area. We can only reduce the portion within our city limits. (43)
Response	*ODEQ agrees with this statement. DMAs are only responsible for implementing TMDL load allocations where they have legal authority to do so.*
Comment 74.	Mercury: According to DEQ, half of all mercury released into waterways is through

	the erosion of native soils. A potential management strategy may be to extend erosion control requirements to all building permits (also a strategy for bacteria reduction). This strategy creates a whole level of administration, review, inspection, and enforcement for which we currently do not have funding. (43)
Response	*Comment noted. The intent of this management strategy is not to create a burdensome bureaucratic process – particularly for the smaller municipalities and designated management agencies. ODEQ is in the process of developing guidance materials that will help municipalities and other designated management agencies develop their implementation plans and comply with the requirements of the TMDL.*
Comment 75.	The Draft TMDL and Draft WQMP discuss the identification of Designated Management Agencies (DMAs). The discussion is inconsistent and unclear as to which entities will be DMA's. Table 1.1 of Section 5 includes the Port of Portland as a DMA in the Lower Willamette Subbasin. The WQMP, which implements the TMDL, does not include the Port as a DMA. Table 1.1 of section 5 should be revised to delete reference to the Port since the Port does not meet the definition of a DMA. The Port does not have the broad legal authority over nonpoint sources or sectors within the basin (e.g., land use jurisdiction, permitting authority) that would be necessary to develop and enforce a DMA Implementation Plan. This change will make the TMDL consistent with the WQMP; the Port should be removed from Table 1.1 to make clear that the Port is not a DMA. (44)
Response	*The Port of Portland **does** meet the definition of a DMA as defined in OAR 340-042-0030(2) which states that a "Designated Management Agency means a federal, state ,or local governmental agency that has legal authority over a sector or source contributing pollutants, and is identified as such by the Department of Environmental Quality in a TMDL." The Port has authority through ORS Chapter 778 and as well as 777.190. However, DMAs are only responsible for implementing TMDL load allocations where they have legal authority to do so.* *The WQMP has been corrected to include the Port as a DMA.*
Comment 76.	Given the FAA restrictions on site potential shading for the Middle and Upper Columbia Slough and the inappropriate beneficial use designation, the Port makes the following recommendations to the Department: …… The WQMP should specifically require Implementation Plans for the Middle and Upper Columbia Slough to comply with the requirements of the Port's WHMP and FAA regulations that restrict revegetation and land use in these areas. As discussed above, the federally-mandated WHMP, FAA regulations, and public safety concerns supersede the Department's shade targets and requirements. (44)
Response	*ODEQ recognizes that the Port of Portland needs to adhere to Federal Aviation Administration requirements and that those requirements may preclude certain types of water quality BMPs (such as establishing site potential vegetation) from being implemented on portions of the Port's property.*
Comment 77.	Moreover, it appears the Department may be contemplating monitoring as a component of the DMA Implementation Plans to address the nonpoint sources and shading. It is important to note that MS4 permittees are not equivalent to DMAs. To the extent a DMA is also an MS4 permittee, there may be efficiencies in coordinating MS4 permit programs with the Implementation Plans. However, not all MS4 permittees are DMAs, and not all DMAs are MS4 permittees. For example, the Port is an MS4 permittee, but the Port is not a DMA.[1] The Draft TMDL and

	WQMP appear to confuse this distinction. The Department should ensure that this distinction is made clear throughout the TMDL and WQMP. (44) [1] As discussed above, the draft WQMP does not include the Port as a DMA. This is consistent with the fact that the Port does not have the broad legal authority to implement nonpoint source controls. Thus the Port has assumed that it is not a DMA and is therefore not commenting on the requirements for DMAs and Implementation Plans.
Response	*ODEQ agrees that there may be efficiencies to be gained by coordinating NPDES permit and TMDL Implementation Plan activities where appropriate. ODEQ is supportive of coordination efforts where applicable.* *Additionally, as mentioned in a previous comment and response, the Port is a DMA.*
Comment 78.	The WQMP should specifically state that compliance with Schedule D(2)(e) of the MS4 permit is compliance with the TMDL for both mercury and bacteria. Unlike other industrial discharge permits, MS4 systems are subject to the Maximum Extent Practicable (MEP) standard. The allocation of a waste load to MS4 permittees beyond what is required under the MEP standard would be arbitrary and not in accordance with the law. (44)
Response	*ODEQ agrees that the MS4 permit will be a primary vehicle for addressing the mercury and bacteria TMDLs. However, the Department will be requiring the City of Portland to do additional monitoring and develop a mercury minimization plan. ODEQ would work jointly with the City, Port and other co-permittees to develop such a plan.*
Comment 79.	• Page 14-10 (I) "DMAs are required to submit TMDL Implementation Plans for this Willamette Basin TMDL iteration to ODEQ 18 months after notification letters are received." What about DMAs, which have TMDLs incorporated in their MS4 permit? MS4 SWMPs are the equivalent of TMDL implementation plans, correct? (46B) • The fifth paragraph on page 14-21 states "Phase I and Phase II MS4 jurisdictions may *reference* their MS4 permits in their TMDL Implementation Plans." We would like to clarify that for Gresham, the only Willamette basin TMDL parameter that will be implemented outside the MS4 permit is temperature. Because Gresham has no point sources that discharge either directly or indirectly to the Willamette other than stormwater, Gresham considers the MS4 permit to *be* the implementation plan for bacteria and toxics. If this is consistent with DEQ's intent, it would be helpful to include a statement to this effect in the text. (57)
Response	*MS4 Stormwater Management Plans incorporate TMDL pollutant reductions but only for stormwater discharges. A TMDL Implementation Plan is broader in scope.* *When DMAs have an MS4 permit and are responsible for implementing TMDL allocations they will need to have the Stormwater Management Plan (SWMP)* ***and*** *a TMDL Implementation Plan that addresses pollutants and sources not addressed in the SWMP. The SWMP addresses TMDL allocations as they relate to stormwater discharges while the TMDL Implementation Plan addresses nonpoint source pollutant reductions, non-stormwater pollutants, and timelines longer than 5 years necessary to meet TMDL allocations. The growing of shade producing vegetation is an example of a longer timeline as it may take 10 to 20 years to become effective.*
Comment 80.	In the vein of partnership, there is one area that the document is sorely lacking. That is a financial element. It would seem appropriate to analyze fiscal impact in the WQMP as an element of implementation. This could take many forms. For instance, there should be good information available to the Department related to NPDES MS4 Phase 1 permits showing program start-up costs, examples of staffing structures, costs of implementing selected BMPs, etc for a variety of municipal and/or county government structures and levels. It is felt that this would go a long

	way to help DMA's manage the TMDL and help bring perspective to the effort for "decision makers", such as elected officials, who typically have the final budgetary authority related to programmatic strategies. (45A)
Response	*ODEQ agrees that the fiscal impact of TMDL implementation is a major concern for most DMAs. ODEQ will work with DMAs when requested to do so and will share information as warranted.*
Comment 81.	It will be a large burden to Lane County to develop and implement monitoring plans for the sub basins. Land Management Division staff are not qualified to develop or implement a monitoring plan. (45B)
Response	*ODEQ understands that most DMAs will not have water quality pollutant reduction (effectiveness) monitoring expertise. ODEQ will provide technical assistance where requested and encourages collaboration and cooperation among DMAs and other entities to maximize resources and expertise. For example, undertaking monitoring activities in a subbasin may include partnerships between soil and water conservation districts, watershed councils, NPDES permittees, as well as DMAs.*
Comment 82.	Page 14-5 (D)(a): "Mercury will be implemented either through general permits or a TMDL Implementation rule and will not include any water quality based effluent limits for some NPDES permits until after the 2009 TMDL update for mercury." Clarify that MS4 permits are excluded from any effluent limits. The entire discussion is not very specific. It is unclear whether mercury will be implemented via a permit or an implementation plan or both. (46B)
Response	*Beginning in 2007, ODEQ will require selected major NPDES domestic, industrial and MS4 and selected minor point sources with the potential to discharge mercury to increase monitoring and reporting of mercury under a permit action letter.* *MS4 permits utilize performance measures and benchmarks, as opposed to numeric effluent limits. Text was added to Chapter 14 to clarify that MS4 permits will not contain numeric effluent limits.*
Comment 83.	Page 14-5 (D)(c): NPDES permits typically require new effluent limits resulting from a TMDL to be implemented during the next five-year permit cycle. Change the statement to: "NPDES permits, except MS4 permits, typically require…" (46B)
Response	*Clarifying text changes have been made.*
Comment 84.	Page14-6. Figure 14.1: Change title of Figure to reflect what it really is, a schedule of actions in the near term and not a timing of attainment of water quality standards. The schedule is extremely optimistic; e.g. DMA implementation of TMDL allocations (including USACE). The Corps has not even started yet to study the reservoirs. They are years away from implementing any results of these studies. Jumping from year 2012 to 2017 appears to indicate that all implementation actions must be completed by then. That is certainly not the case and impossible to achieve. (46B)
Response	*ODEQ disagrees that the figure is titled incorrectly. ODEQ believes that years of steadily improving water quality will bring standards attainment for bacteria and temperature.* *In addition USACE has developed reservoir models for all of the large projects in the Willamette Basin to better understand natural thermal potential temperatures and the effects of the projects on stream temperature. Extensive study on the McKenzie River led to the construction of the Cougar Temperature Control Structure at Cougar Dam. Water from Cougar Dam is now being released from varied depths in the reservoir so that the outflow water temperature follows a more natural thermal regime. USACE is also investigating the historic temperature regime above and below USACE reservoirs.*

Comment 85.	• Page 14-6 (F): "For example, system potential shade for a small stream may take 10 years versus 20 years for a larger stream." These timelines appear overly optimistic and can lead to expectations that are impossible to meet. "Achieving water quality standards for bacteria will take approximately 20 years." Where does this number come from? Appears overly optimistic. The entire section seems speculative. It should be left up to the DMAs to present this type of information that is based a more realistic goals in the implementation plan. (46B) • Statement predicting that "Achieving water quality standards for bacteria will take approximately 20 years" appears arbitrary and unsubstantiated. (48A)
Response	*ODEQ is responsible for explaining to USEPA, through the WQMP, how standards will be attained. The point of the TMDL and the WQMP is to ensure that water quality improvements will be made. ODEQ does not believe that the timeline is overly optimistic.* *The timing is based on ODEQ's experience with other TMDLs and implementation activities. However, ODEQ does understand that DMAs may be concerned about a specific location or pollutant meeting standards in a given time period. Each TMDL Implementation Plan will define what is realistic for the jurisdiction.*
Comment 86.	• Page 14-7 (G): The DMA list appears incomplete. Under State Agencies, State Parks (for Tryon Creek temperature TMDL) is missing. Under Cities, Lake Oswego as a DMA for bacteria in Springbrook Creek is missing. Under others, Drainage Districts, e.g. in the Columbia Slough; Port of Portland, School Districts, and Water Districts, are missing. (46B) • Page 14-7, State Agencies: ODEQ should be included in the list of State DMAs. (65)
Response	*Corrections have been made where appropriate. For example, the Port of Portland was added to the list of DMAs and Columbia County was removed from the list.*
Comment 87.	• Page 14-9, Table 14.1 DMA list should be inclusive. Using the term "others" in a legal document appears out of place. (46B) • The listing of the responsible DMAs on page 14-9 must be complete. It cannot mention "others" – state and local agencies must know if they are being named as DMAs. Some DMAs appear to be missing from the list. (55) (+35, 40, 46, 56, 68, by reference) • Chapter 14, Table 14.1, page 14-9: The Yamhill subbasin Designated Management Agencies column should include the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). (58) • Page 14 – 9: Is BLM not considered a DMA for the Clackamas Subbasin? The only TMDL implementation plan BLM has at present for the Willamette Basin is a draft for the Clackamas sub-basin. (62) • Page 14-9, Table 14.1: The City of Stayton is missing as a DMA for both the Middle Willamette (stormwater flows into Mill Creek) and the North Santiam. (63) •
Response	*Corrections were made where appropriate. For example, the Port of Portland was added to the list of DMAs and Columbia County was removed from the list.*
Comment 88.	Page 14-17 (O): "This could occur first through direct intervention from land management agencies (e.g. ODF, ODA, counties and cities), and secondarily through ODEQ." DEQ does not appear to have this kind of authority over ODF and ODA. Please clarify how DEQ intends to enforce the TMDL implementation. (46B)

Response	*ODEQ has authority to enforce water quality standards violations caused by agricultural activities and when violation of OFPA results in water quality standards violations. ODF and ODA have inter-agency agreements with ODEQ defining the collaborative relationship our agencies agree to have in order to improve water quality. For example, ODEQ engages with ODA in the review of Agricultural Water Quality Management Area Plan and works with ODF on the Forest Practices Act rulemaking process.*
Comment 89.	Page 14-18 / Page 14.11: "NPDES and WPCF Permit Programs" Why are WPCF permits mentioned in this context? They are not related to TMDLs. (46B)
Response	*The description of WPCF permits was included simply to describe the permitting program more completely. ODEQ agrees that WPCF permits are generally not related to TMDLs.*
Comment 90.	Page 14-19 (O): "Adaptive Management" A better discussion of how DEQ intends to apply 'Adaptive Management' in the TMDL process is required. (46B)
Response	*Text has been added explaining that The TMDL Implementation Plan Internal Management Directive addresses how DMAs apply adaptive management to their TMDL Implementation Plans.*
Comment 91.	Page 14-21 "Part 2 - Pollutant Specific Information" : This entire section appears speculative. It has the feel of a guidance document that should be provided separate from the TMDL. (46B)
Response	*ODEQ disagrees. The intent of Part 2 is to describe additional requirements for DMAs that are specific to the Willamette Basin TMDL.*
Comment 92.	Page 14-21 "Smaller DMAs with populations of 10,000 or less should give consideration to any of these six control measures that are relevant." : While the City supports equity among DMAs, DEQ needs to consider whether it has sufficient resources to oversee inclusion of these communities as DMAs. (46B)
Response	*Comment noted and differing expectations for urban/rural storm water control measures based city size are noted in the WQMP. ODEQ is developing guidance and tools for developing implementation plans and will assist DMAs in the development of their plans. ODEQ understands that jurisdictions will need to prioritize control strategies that are most appropriate for their specific jurisdiction.*
Comment 93.	Page 14-23 / Page 14-26 "It is anticipated that the 2009 TMDL will include revised water column guidance values, revised allocations, and water quality based effluent limits for mercury point sources." "Mercury requirements shall be specifically incorporated into the first permits issued after the issuance of the 2009 TMDL, which will trigger the TMDL requirements found in Schedule D(2)(d) of the MS4 permit." These statements are too speculative. What if it turns out that water column concentrations are not well correlated to fish tissue concentrations? Remove references to establishment of absolute allocations in 2009. (46B)
Response	*The State Department of Human Services has issued fish consumption advisories for the Willamette River and Dorena and Cottage Grove Reservoirs because the levels of mercury in bass and northern pikeminnow routinely exceed the mercury criterion of 0.35 parts per million . ODEQ's mercury TMDL was developed to reduce the amount of mercury in the river so that mercury levels in fish will be reduced, with a goal of eliminating the fish consumption advisories. Because the fate and transport mechanisms for mercury can be very complicated, especially when it involves the legacy of abandoned mines and air deposition of mercury from outside the basin, ODEQ is taking a phased approach to reducing mercury. We are requiring actions to address mercury beginning in 2007, and we are taking actions to increase our understanding of mercury in order to update the mercury TMDL in 2011.*

	ODEQ developed this mercury TMDL using a Basin-Specific Aquatic Food Web Biomagnificant Model for Estimation of Mercury Target Levels, and a Revised Estimate of a Mercury Mass Balance for the Willamette River Basin. A basin-wide mercury monitoring program was implemented to support the food web model and to estimate mercury mass loads and sources. ODEQ developed mean estimates of relative mass contributions for the following source categories: erosion of mercury-containing soils; runoff of atmospherically deposited mercury; landfill emissions; historical mining activities; municipal and industrial point sources; stormwater; and sediment resuspension. The load associated with the erosion of native mercury-containing soils (47.8%) and the runoff of atmospherically-deposited mercury from global and local sources (47.7%) are the two largest mercury inputs to the mainstem Willamette River. The estimated average input from municipal point sources is 2.7% and industrial sources contribute 1.2% of the total load. Beyond this mass balance estimate, there are significant data gaps that limit ability to accurately estimate the magnitude of source-specific mercury contributions. Following the issuance of this TMDL as an Order, ODEQ will be taking actions to fill in those data gaps leading to a revised TMDL in 2011. *Beginning in 2007, ODEQ will require selected major NPDES domestic, industrial, MS4 and selected minor point sources with the potential to discharge mercury to increase monitoring and reporting of mercury. Major NPDES domestic and industrial point sources will also be required to develop and submit mercury minimization plans that identify and implement strategies to reduce mercury. For example, ODEQ and municipal facilities are working with dentists to install dental amalgam separators and implement best management practices when disposing of amalgam, to keep mercury used in dental office products from entering wastewater treatment plants.* *ODEQ will also work with communities and businesses to reduce soil erosion that can carry mercury to rivers. Some of this work will occur through existing stormwater general permits that control erosion and storm water pollution. Nonpoint sources will also be expected to incorporate mercury reductions and concerns into the established mechanisms for TMDL implementation pertaining to agriculture, forestry, and urban land use activities, primarily through erosion control by stabilizing shorelines and reducing the upland sediment input into the river system.* *At the same time, ODEQ will be developing a comprehensive framework for better understanding mercury in the Basin, along with the methodological and modeling tools needed to calibrate and validate this framework. To provide data for this purpose, ODEQ will: (1) conduct three years of water quality monitoring to collect additional information on ambient mercury and methyl mercury concentrations and (2) perform additional source characterization work to help refine the estimates of sector-specific source contributions. The availability of the expanded data set will help reduce uncertainties and enable the development of more refined estimates of the appropriate water column guidance values and sector-specific load and wasteload allocations. ODEQ also commits to the further evaluation of the methodological and modeling tools employed in this study. In the event new information suggests improved alternative methods for establishing water column guidance values and/or load allocations, this information will be incorporated into the 2011 revisions of the TMDL. In updating the TMDL ODEQ will be determining whether it is necessary and appropriate to assign facility-specific wasteload allocations and land use-specific load allocations and establish numeric permit limits.*

Comment 94.	Page 14-26 "If sufficient information is not available to make the determinations required above, the co-permittee must compile the additional pertinent information necessary to adequately complete these determinations." This statement seems overly prescriptive and seems counter to the statement that mercury will not be included in MS4 permits. (46B)
Response	*The language quoted is directly out of the Phase I MS4 permits.* *ODEQ will be requiring selected MS4 permittees to increase monitoring and reporting of mercury through a Permit Action Letter.*
Comment 95.	Page 14-29 Option 1 and Option 2 See previous comments to Chapter 4 regarding Reserve Capacity. (46B)
Response	*See Chapter 4 response to comment.*
Comment 96. Cold water refugia	• Page 14-32 "DMAs located along the mainstem Willamette River from river mile 50 downstream to the confluence with the Columbia River need to address cold water refugia options within their TMDL Implementation Plan." See previous comments to Chapter regarding 'Cold Water Refugia'. (46B) • How will DEQ determine which DMA will be responsible for addressing cold water refugia in their TMDL implementation plan? (46B) • What role will DSL play in this process since they own the bed and banks below the ordinary high water mark. (46B) • The section regarding cold water refugia (Chapter 14, page 14-32) is written too broadly. Municipalities can evaluate cold water refugia within their designated mixing zones. Creating additional new cold water refugia is not the responsibility of local government. As stated in the Minimum Duties language found at OAR 340-041-0058(12), "There is no duty for anthropogenic sources to reduce heating of the waters of the state below their natural condition....each anthropogenic point and non-point source is responsible only for controlling the thermal effects of its own discharge or activity..." (50) • The section regarding cold water refugia (page 14-32) is written too broadly. Municipalities will evaluate cold water refugia within their designated mixing zones. The responsibility of creating additional new cold water refugia does not fall to local governments. (55, 63) *(+35, 40, 46, 56, 68, by reference)* • The cold water refugia language on page 14-32 requires DMAs on the mainstem Willamette River from RM 50 down to confluence to address cold water refugia options in their TMDL implementation plans. This appears to contradict the Minimum Duties language in OAR 340-041-0058(12): *"Minimum Duties: There is no duty for anthropogenic sources to reduce heating of the waters of the state below their natural condition. …each anthropogenic point and non-point source is responsible only for controlling the thermal effects of its own discharge or activity…"* We believe that point sources should only be required to determine any cold water refugia within their discharge mixing zone, and ask that additional language be added to clarify this. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*ODEQ agrees that point sources are responsible for identifying and protecting areas of cold water refugia at discharge points or within their mixing zones. ODEQ also agrees that point sources are not responsible for creating cold water refugia. However, where DMAs have altered localized cold water refugia through channel modification, sea wall development, or other means, ODEQ believes DMAs have responsibility to improve or explore options for enhancing or restoring cold water refugia where feasible.*
Comment 97.	Page14-32 "If the resulting load allocations are different than the ones included in the TMDL, the TMDL may be reopened to modify the load allocations." The possibility of the TMDL being reopened at an indefinite time creates tremendous uncertainty about how to proceed. It could make a huge difference in the way other DMAs approach their TMDL implementation. (46B)

Response	*Allocations can change whenever a TMDL is reopened. Reopening can occur if there is compelling new information or on a regular cycle. In any event, ODEQ has a strong record of providing public participation to TMDL development. Oregon Administrative Rules (OAR) 340-042-0050 also require public participation.*
Comment 98.	Page14-36. Table 14.2: • Identify which 303(d) parameters are being addressed by this TMDL. • 303(d) Temperature listing for JC *(Johnson Creek)* removed – provide explanation in footnote and cross-reference to Chapter 5. (46B)
Response	*The table has been modified to list only stream segments addressed by a TMDL. Even though the temperature listing for Johnson Creek was administratively removed from the 303(d) list a temperature TMDL was developed. See Chapter 5 for details.*
Comment 99.	Page 14-42, Appendix 14.B: DEQ should clarify the purpose of this entire section. Is it a laundry list of possible actions, it is guidance, or are the actions required? (46B)
Response	*Clarification has been added. The intent is to provide possible management strategies for DMAs that need to begin the implementation process. ODEQ does not require or prescribe specific management strategies.*
Comment 100.	With respect to urban and agricultural land uses, the emphasis needs to be on the restoration of stream channel and floodplain functions in advance of restoring streamside vegetation. Restoration efforts focused solely on vegetation may fail if the underlying channel and floodplain functions are not restored as well. (47)
Response	*ODEQ agrees and will continue to work with DMAs and others to help ensure restoration efforts are undertaken in a manner that ensures their success.*
Comment 101.	The Forest Practices Act, first passed in 1971, was the first law of its kind nation wide to set standards that require streamside buffers and numerous other BMPs to protect fish and wildlife habitat while producing a viable source of timber. The verb tense used throughout Appendix B provides no recognition of programs which have provided a high level of protection for many years. The verb is used as if something needs to happen, e.g. implement; develop; provide; ensure, when the verb should be implements; develops/developed; provides, continue to provide, etc. to accurately reflect existing and ongoing work. Rewording the verb tense where designated managements agencies already have programs in place is necessary to identify what is already in place vs. programs that need to develop BMPs. A quick fix would be to head each section with a statement such as "*BMPs/Programs are currently in place to…implement, develop,* etc. (47)
Response	*Text has been added to Appendix B to clarify that some DMAs already have programs in place.*
Comment 102.	Appendix B, Section C. Forestry: Under the Structural subheading, the bullet related to "P*rotect/restore stream banks for stabilization"* is inaccurate as written. Forest landowners/operators are not responsible for stream bank stabilization not related to a forest management practice. (47)
Response	*Clarifying text has been added.*
Comment 103.	*Source equity*: We believe that controls on pollutant sources contributing to exceedances of water quality standards should be applied equitably and proportionally to their share of the overall loading. Wasteload allocations should reflect the true pollutant contributions of a source, be based upon accurate and representative data, and should be managed to a similar degree of responsibility regardless of the type of control mechanism used. For example, the draft Water Quality Management Plan outlines only voluntary BMPs for air sources of mercury, which are some of the largest contributors to the overall mercury load to the

	Willamette. Air emissions of mercury should be directly regulated under Clean Air Act permits to meet any necessary and appropriate mercury TMDLs for the Willamette River. Non-point sources of mercury, such as those from the application of pesticides and fertilizers in agricultural practices, should receive a similar degree of regulation as required of all other sources of the pollutant under the final TMDL. (48A)
Response	*The issue of developing a proportional framework for mercury allocations was discussed in detail on numerous occasions at meetings of the Mainstem Willamette TMDLs stakeholder council. ODEQ received significant input on this topic and the general consensus was that an 'across the board' allocation framework was preferable at this point in time given the state of the science and the uncertainties associated with the quantification of the mercury contribution from the various source sector categories. The issue of proportionality, however, can still be a topic of discussion during the next incremental phase of this mercury TMDL.* *ODEQ agrees with the general comment that all potentially controllable mercury source categories, including those associated with nonpoint source sectors, will need to address their mercury contribution. The importance of achieving reductions in nonpoint source categories is especially significant given that industrial and municipal point sources were estimated to have only minor contributions to the load of total mercury in the mainstem of the Willamette River. It should be noted, however, that some of the inputs of mercury in the Willamette system are not readily amenable to local controls. These inputs include the 'global' air sources (mercury originating from sources outside of Oregon's borders) and the resuspension of native sediments in the river.*
Comment 104.	*Adaptive management:* TMDLs are highly complex, and the database and scientific understanding used to determine the source contributions, impacts, and appropriate loading limits are continually evolving. TMDLs must incorporate allowances for adaptive management, as provided for in the underlying regulations, to refine and improve wasteload allocations (WLAs), load allocations (LAs), and their implementation as data and understanding advance in the future. How this will be addressed for municipal NPDES permits is especially important. The Department must develop guidance for permit writers that outlines the allowance of extended compliance timeframes, and which identifies strategies for revising TMDL components included in NPDES permits when new data and new scientific understandings lead to revisions of the TMDLs. In this regard, the Department must also commit to a regular review of the TMDLs and to conducting appropriate assessments of new data and science. (48A)
Response	*ODEQ is working to develop more explicit guidance addressing the translation of TMDLs into NPDES permits and other implementation programs (e.g. 401 Certifications). This is one of the recommendations of the Blue Ribbon Committee report on enhancements to the wastewater permitting program that ODEQ is committed to implementing. ODEQ is also committed to continued assessment of new data and periodic revisions to the Willamette TMDLs. The next Willamette TMDL check-in is targeted for 2013.*
Comment 105.	Page 14-11, Point Sources/MS4 Discharge Permits: Add to the paragraph a statement similar to that for Point Sources/NPDES and WPCF Permit Programs, to clarify that: "As permits are renewed, they will be revised to ensure that all 303(d) related issues and TMDL allocations are addressed in the permit." (48A)
Response	*The suggested change was added.*
Comment 106.	Chapter 14 states that DMAs are required to submit a TMDL Implementation Plan 18 months after notification letters are received from DEQ (Page 14-10). DEQ indicated verbally at an informational meeting in Eugene that the current schedule is to issue the final TMDL rule *(by Order)* by summer 2005, which would require that the TMDL Implementation Plan be submitted to the DEQ by end of 2006. The

	City's new Stormwater NPDES permit, issued in March 2004, states: "If within 3 years following permit issuance a TMDL is approved the EPA … the permittee must, at the time of the next permit renewal application, complete a review and strategy development, and propose changes, if appropriate, to the SWMP to address the urban stormwater discharges" (Schedule D(2)(d)(iv)). The Stormwater NPDES permit renewal package is required 180 days prior to permit expiration, therefore by September 1, 2008. Please clarify timeline and content of the TMDL Implementation Plan relative to existing NPDES permits processes. (48A)
Response	*ODEQ will work with DMAs on a case by case basis to coordinate timelines to the extent possible when permit and TMDL Implementation Plan due dates are different.*
Comment 107.	In Chapter 14, page 14-26, ODEQ states that it is willing to explore the implementation of a "permit bubble concept" that would allow a group of similar point sources to join together to determine the best way to reduce mercury effluent loadings. The City supports this concept as it will allow POTWs to collectively develop and implement mercury reduction options. (50) • Additionally, ACWA applauds the Department's inclusion of the concept of "bubbling" as an implementation strategy for the mercury TMDL. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*Comment noted.*
Comment 108. Trading	• The City supports the water quality trading component included in the TMDL Implementation Plan, and anticipates that trading will be a critical element in a community's strategy for meeting permit limits and water quality standards compliance. The City looks forward to working with ODEQ and other Willamette Basin stakeholders on exploring and implementing effective water quality trading alternatives. This mechanism is consistent with ODEQ's watershed approach to improve water quality basin-wide. (50) • ACWA strongly supports and encourages water quality trading as an important tool in meeting the TMDL wasteload and load allocations. (55) *(+35, 40, 46, 56, 68, by reference)* • ACWA encourages the Department to encourage and support innovative, non-traditional implementation strategies including, but not limited to, water quality trading. ACWA applauds the Department's recent efforts to develop a water quality trading program within the State. (55) *(+35, 40, 46, 56, 68, by reference)* • ACWA requests that the Department add additional language in the various TMDL documents specifically referring to and encouraging the inclusion of cost-effective, water quality trading strategies in any and all implementation plans. Currently the only mention of a water quality trading program is in the Temperature TMDL section of Chapter 14. While ACWA strongly supports water quality trading for temperature, we believe that this strategy has far greater application and the Department should encourage this approach in all implementation strategies. We look forward to continuing to work with the Department, ACWA members, and others on exploring and implementing effective water quality trading in the Willamette and other Oregon watersheds. (55) *(+35, 40, 46, 56, 68, by reference)* • The City of Salem strongly supports trading as an important tool in meeting water quality standards. (63) • Salem urges the Department to encourage and support innovative, non-traditional implementation strategies including, but not limited to, water quality trading. Salem applauds the Department's recent efforts to develop a water quality trading program within the State. Additionally, Salem applauds the Department's inclusion of the concept of "bubbling" as an implementation strategy for the mercury TMDL. Salem requests that the Department add additional language in the various TMDL documents specifically referring to and

	encouraging the inclusion of cost-effective, water quality trading strategies in any and all implementation plans. Currently, the only mention of a water quality trading program is in the Temperature TMDL section of Chapter14. While Salem strongly supports water quality trading for temperature, we believe that this strategy has far greater application and the Department should encourage this approach in all implementation strategies. (63)
Response	*Comment noted. Suggested changes were made.*
Comment 109.	• The City supports the inclusion of the Use Attainability Analysis as an appropriate tool at site-specific locations. (50) • ACWA supports the inclusion of Use Attainability Analysis (UAA) as an appropriate tool at site-specific locations (page 14-31). (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*See Response to Comment 50.*
Comment 110.	• There appears to be a contradiction between the language on Pages 14-29 and 14-30 regarding the unused wasteload allocations for point sources. Page 14-29 states that point sources may hold their wasteload allocation when the permit is in effect, and implies that any unused portion of the wasteload allocation could be available for trading and/or held in reserve for growth. On page 14-30 it states that if the wasteload allocation is not used, the unused portion is returned to become part of the Reserve Capacity "bank". This contradiction needs to be eliminated. The City supports the language on Page 14-29, which allows the unused wasteload allocation to be available for trading and/or growth, and requests that this language be included in the TMDL Implementation Plan. (50) • There appears to be a contradiction between language on Pages 14-29 and 14-30 regarding the unused WLAs for point sources. Page 14-29 states that point sources may hold their WLA when the permit is in effect, and implies that any unused portion of the WLA could be available for trading. On page 14-30 it states that if the WLA is not used, the unused portion returns to become part of the Reserve Capacity. This contradiction should be clarified. ACWA supports the language on Page 14-29, which allows unused WLAs to be available for trading. (55) *(+35, 40, 46, 56, 68, by reference)* • There appears to be a contradiction between language on Pages 14-29 and 14-30 regarding the unused WLAs for point sources. Page 14-29 states that point sources may hold their WLA when the permit is in effect, and implies that any unused portion of the WLA could be available for trading. On Page 14-30, it states that if the WLA is not used, the unused portion returns to become part of the Reserve Capacity. This contradiction should be clarified. Salem supports the language on Page 14-29, which allows unused WLAs to be available for trading. (63)
Response	*The section has been edited to provide more clarity.*
Comment 111. Measure 37	• Appendix 14.B: Source Categories; The discussion of source categories with respect to management strategies will need to be reevaluated since the passage of Ballot Measure 37 and its impacts on the ability of local governments to require additional protections in sensitive ecological areas. (50) • Overall, the discussion of Source Categories with Management Strategies will need to be reevaluated since the passage of Ballot Measure #37, and its impact on the ability of local governments to require additional protections on sensitive areas. (55) *(+35, 40, 46, 56, 68, by reference)* • (Page 14-13) Also, under Urban and Rural Lands, there should be some acknowledgment of potential implications Measure 37 may have on municipal and county efforts to implement their TMDL responsibilities. (63)

Response	*Appendix 14.B is intended to be a resource of possible management strategies, that have been implemented in other areas, which DMAs may, chose to implement. DMAs are not required to develop ordinances if this management strategy is not appropriate for their situation.* *Clarifying text changes have been.*
Comment 112.	Metro is identified as a DMA on page 14-8, as part of a list of DMAs in the TMDL chapter describing Water Quality Management Plans. Metro was not identified as a DMA, however, in other sections of the Draft TMDL that identify and refer to DMAs. Metro's jurisdiction includes portions of four of the Willamette River subbasins covered by the draft TMDL (Lower Willamette, Tualatin, Clackamas, and Middle Willamette), and Metro owns property in all four subbasins, yet Metro is identified as a DMA only for the Lower Willamette Subbasin (Table 14.1 on page 14-9). Moreover, although Metro is identified as a DMA for the Lower Willamette Subbasin in Chapter 14, Metro was not listed as a DMA in Chapter 5, the chapter that describes TMDL specifics for the Lower Willamette Subbasin (see Table 1.1 on page 5-8, "Designated Management Agencies in the Lower Willamette Subbasin"). To the extent that Metro is named as a DMA, I recommend that the TMDL be edited to be more consistent and clear regarding the designation. (54)
Response	*Metro has been added as a DMA to all four subbasins in Table 14.1. Changes to Chapter 5 have been made as suggested.*
Comment 113.	In addition, I note that Metro has regional land use planning authority and, although not required to, has exercised its discretion to enact regional requirements regarding future development to address some regional water quality issues consistent with Statewide Planning Goal 6. Metro notes that it may, or may not, be appropriate for the DEQ to acknowledge and incorporate such requirements in the designation of Metro as a water quality management agency. I therefore ask that DEQ engage in discussions with Metro before finalization of the Willamette Basin TMDL to determine the extent of Metro's DMA responsibilities that will best serve the interests of complying with the Clean Water Act by achieving the water quality goals established in the TMDL for the areas within the Metro region. (54)
Response	*ODEQ agrees to continue discussions with Metro.*
Comment 114. Reserve Capacity	• ACWA supports the Department's position regarding determining and using the reserve capacity when the TMDL is approved. Waiting for federal action on the dams is not fair to Oregon municipalities and industries that operate under NPDES permits. We would like to work with the Department on a system to make the allocation and amount of reserve capacity in the Willamette transparent to permit holders and policy makers. (55) *(+35, 40, 46, 56, 68, by reference)* • Chapter 14, Temperature TMDL Implementation, Reserve Capacity, pages 14-29 to 14-30: The Tribe chooses Option 2 – USEPA Version for the Reserve Capacity method to be used in the Willamette Basin TMDL. This comment follows closely with the temperature comment #2 above. (58) • *Reserve Capacity (Water Quality Management Plan, pg. 14-28).* The Plan notes two options for implementing the "reserve capacity" in temperature loading and requests comments on which option ODEQ should take. We strongly recommend that ODEQ pursue the option presented by EPA which we believe is appropriately cautious. The Willamette, system-wide, has considerable problems with heat loading and any heat added to system cannot be considered "insignificant." Because there are many uncertainties to clarify, EPA's suggestion that certain uncertainties, such as timing of actions needed to reduce heating and the heating impact of the dams, be explored before a reserve is allowed is the best course of action. (60) • The City of Salem strongly supports the Department's position regarding

	determining and allocating reserve capacity for temperature at the time the TMDL is ultimately approved (Option 1). Waiting to make the reserve capacity available until federal action is decided for the dams and reservoirs in the Willamette system is not fair to Oregon municipalities and industries that operate under NPDES permits. The Department needs to develop a system to make the reserve allocation and amount of reserve capacity in the Willamette transparent to permit holders and policy makers, and we would like to help in this effort. (63)
Response	*ODEQ has decided that, for the mainstem Willamette River, only half of the Reserve Capacity will be available for use at the time the TMDL is issued by ODEQ and can be allocated according to the policies and procedures established by ODEQ. The other one-half of the Reserve Capacity will not become available until modeling analyses for the USACE dam and reservoirs linked to the mainstem Willamette have been completed and their effects on the river – and potential strategies for addressing these effects – are more fully understood. O DEQ expects to make a decision regarding the allocation of this portion of the Reserve Capacity in the next update of the TMDL.* *In the tributaries, Reserve Capacity will become available for use at the time the TMDL is issued by ODEQ.*
Comment 115.	Additional discussion is needed in the Implementation Plan about how the Department intends to improve its own construction erosion permitting and enforcement program under NPDES permit 1200C. The "sample list" of organizations and responsibilities on page 14-7 does not mention DEQ's responsibilities for implementing, and for some local governments overseeing, the construction erosion control NPDES permit, 1200C. If local governments will be required to implement local erosion control programs in medium sized communities like Newberg and Dallas, the Department must improve the implementation of the 1200C permits. Increased technical assistance, inspection and enforcement is needed to ensure an even playing field for all land developers and contractors in the state, if they are developing land in a medium sized community or more rural area. (55, 63)
Response	*ODEQ has recently updated the 1200C permit. ODEQ intends to provide some additional, limited technical to local governments during the implementation phase and will be seeking additional staffing to provide greater assistance.*
Comment 116.	• At this time, ACWA believes the best use of the Department's resources is to assist those non-Phase I and II communities over 10,000 in population in developing a stormwater control program. We recommend that the requirements for communities under 10,000 be deferred for the first 5 years of the TMDL, and be re-evaluated when the TMDL is updated in 2009. (55) *(+35, 40, 46, 56, 68, by reference)* • Willamette Valley communities under 1,000 in population should also be dropped from the DMA list at this time (page 14-21). These smaller communities should also be further evaluated as part of the 2009 TMDL review and update. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*DMAs can customize management strategies so that strategies are appropriate to the DMA and the pollution contribution. Further, there is no need to wait to improve water quality when DMAs can and should be planning and preparing for improvements as soon as possible in order to meet TMDL allocations.*
Comment 117.	As stated earlier, ACWA does not support a timeframe in the TMDL that commits to mercury load allocations in permits by 2009. There are too many unanswered

	questions regarding mercury and fish accumulation in the Willamette watershed to make this policy decision at this time. (55, 63) *(+35, 40, 46, 56, 68, by reference)*
Response	*See response to Comment 93.*
Comment 118. Mercury monitoring	• Ambient mercury monitoring should be undertaken by the Department, not by permitted sources, as outlined in page 14-25. (55) *(+35, 40, 46, 56, 68, by reference)* • Ambient mercury monitoring should be undertaken by the Department, not by permitted sources. (63) • Page 14-13, second Paragraph under (K). What specific point sources does DEQ expect to undertake additional mercury monitoring? We believe the air quality point sources should have a similar responsibility. (63)
Response	*ODEQ agrees that additional monitoring data would help clarify certain aspects of mercury loading and cycling in the Willamette Basin and would be extremely useful for calculating refined targets and for supporting sound management decisions. ODEQ is doing some additional monitoring of mercury in the rivers under an USEPA grant.* *ODEQ would like to work with the permitted and other sources to obtain the funding necessary to support the additional data collection efforts. One of the highest priorities for Phase II of this study will be to better understand the multiple processes related to methylmercury formation in the Willamette Basin. Costs are associated with both taking and analyzing samples at lower detection limits and with performing defensible QA/QC procedures. ODEQ will work with the stakeholders in the Basin to determine how best to fill the remaining data gaps pertaining to mercury in the Willamette given the resources available.*
Comment 119.	ACWA strongly supports the Department's position that the reserve capacity is available when the TMDL is approved. A federal agency (EPA) should not hold local municipalities and industries in Oregon hostage in order to get control over another federal agency (Army Corps of Engineers). (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*Comment noted. One half of the reserve capacity will be available under the procedure outlined in the WQMP and one half will be reserved until the Corp finishes their reservoir modeling.*
Comment 120.	ACWA supports the Department's thinking that an advisory committee process will be needed to oversee the TMDL implementation (page 14-33). ACWA would like to be included in this group, and we are interested in exploring if any existing organizations could support this function. (55) *(+35, 40, 46, 56, 68, by reference)*
Response	*ODEQ acknowledges ACWA's request and will keep it under consideration as the process unfolds.*
Comment 121.	• On Page 14-29, the term "valid permit" should be clarified – permits that have expired and have not yet been renewed are "valid permits." (55) *(+35, 40, 46, 56, 68, by reference)* • On Page 14-29, the term "valid permit" should be clarified - permits that have expired and have not yet been renewed are still "valid permits". (63)
Response	*The "valid permit" was intended to mean "current or administratively extended permit". Language has been modified.*
Comment 122.	Under A – Watershed Approach (14-42), it is not reasonable to advocate a single option for treating stormwater – the Department and municipalities continue to advocate a pollution prevention, not a treatment, approach to reducing water pollution in stormwater to the Maximum Extent Practicable (MEP). (55) *(+35, 40, 46, 56, 68, by reference)*

Response	*ODEQ is not advocating for a single option for treating stormwater. In fact the 'Watershed Approach' section lists six broad objectives with strategies to meet the objectives. Again, ODEQ is not advocating any one strategy, only that DMAs be aware of the range of choices and implement what works best for their situation and pollutant contribution.*
Comment 123.	Chapter 14, (L) Plan for public involvement in implementing management strategies, page 14-16: Tribes are not mentioned and will play an important role in the development and implementation of the Willamette Basin TMDL, Water Quality Management Plan (WQMP), and individual Implementation Plans. (58)
Response	*ODEQ acknowledges the important role the Tribes play in the development and implementation of the Willamette Basin TMDLs. We would also like to acknowledge the significant input The Confederated Tribes of the Grand Ronde Community of Oregon provided as an active member of the Mainstem Willamette TMDLs Council. In response to the comment above, the Tribes have been added to the text of the paragraph in question in the WQMP.*
Comment 124.	Chapter 14, TMDL Implementation Strategy, page 14-26, 8th bullet: "Trading would be an option to meet future waste load allocations." The Tribe believes this is appropriate for the Temperature TMDL, but inappropriate for the Mercury TMDL. The individual point sources should be responsible for reducing their mercury effluent to acceptable levels. (58)
Response	*Decisions about mercury trading have not been made. These discussions will be part of the Phase II of the Mercury TMDL. There will certainly be an official public review and comment process incorporated into this next incremental phase of the study.*
Comment 125.	• The mercury TMDL marks a significant policy shift for how ODEQ conducts contaminant TMDLs (see pages 14-23 through 14-28). In this approach, ODEQ proposes an incremental TMDL where interim water column guidance values replace water quality- based numeric effluent limits and sector-specific load reductions are established. Consideration of water quality based effluent limits are postponed until 2009 (see page 14-25). It is unclear how this approach fulfills the regulatory requirements of a Clean Water Act (CWA) TMDL. Instead, the sector-specific allocation will not be translated into numeric water quality based effluent limitations and the interim targets are used to describe the problem rather than assign the specific point and nonpoint source reductions (see pages I, IV, V, 3-2 and 14-25). Sources (both non-point and point) are not required to reduce their discharge levels of mercury except through a voluntary-only basis, providing little effective means of reducing mercury levels in the near-term. The importance of this new policy direction cannot be understated as it establishes precedence for how future toxic contaminant TMDLs might be conducted in Oregon. ODEQ must therefore provide adequate opportunity for public review of this policy pursuant to the Oregon Administrative Procedures Act. (60) • This apparent change in policy also raises important questions that are left unanswered by ODEQ in the draft mercury TMDL. For example, ODEQ does not indicate whether they believe TMDL requirements are met once interim or revised water column guidance values are determined or when actual load and waste load allocations are established post 2009. It is not evident that by itself, a multi-year strategy to enhance our understanding of mercury fulfills the requirements of a TMDL. Although data limitations confounded this TMDL, a preferred solution would be to obtain the necessary data (which we understand is part of the long-term strategy) without substituting process for the actual TMDL. (60) • In addition, the TMDL should encourage discussion related to how non-enforceable guidance values and voluntary monitoring programs will ensure

	necessary mercury reduction. The TMDL should, at a minimum, include a list of performance measures ODEQ will use to measure success and a more detailed time frame (. e.g., compliance schedule) for achieving the necessary mercury reductions (as examples) in order to add specificity to the document and reduce uncertainty. (60)
Response	*See response to Comment 93.* *In regard to the Oregon Administrative Procedures Act, TMDLs are issued by order, rather than as rule. This policy is allowed under ORS 468B.110 and OAR Division 42. The Oregon Administrative Procedures Act does not include any requirements for public notice or an opportunity to comment with respect to orders. The Environmental Quality Commission's Division 42 rules, however, require notice and opportunity for public comment. According to these rules, this public comment period "will generally be 60 days" (OAR 340-042-0050). The public comment period for the draft Willamette Basin TMDLs was open between 10/25/04 and 1/31/05 so ODEQ has more than adequately complied with the public comment requirements specified in OAR Division 42.*
Comment 126.	A heavy reliance on other state agency programs, private entities and, as yet, undeveloped reduction strategies are major weaknesses in the approach outlined by ODEQ to reduce mercury fish tissue concentrations (see page 14-24) and temperature. We believe the proposed Water Quality Management Plan relies too heavily on out-of-date natural resource practices, voluntary efforts, too little actual enforcement, and protracted time frames to achieve the success envisioned for mercury and temperature reductions. The mercury TMDL implementation strategy, for example, emphasizes process, guidance values and long-term studies. (60)
Response	*See Response to Comment 93.*
Comment 127.	In contrast, ODEQ, and arguably ODF, will rely on out-dated forestry practices to achieve temperature goals set forth in the TMDL. In addition, the recently adopted temperature rule (2003), appears to relieve ODF of much of the burden of protecting water quality by setting biological standards that in many places can significantly exceed site NTP. Further, there is a very weak link between the ODF forest practices and the desired temperature endpoint. Even though ODF is charged with providing evidence of reasonable assurance of meeting standards, no evidence from monitoring data has been provided that would indicate that on a cumulative basis in a sizeable watershed, temperatures will be no greater than 0.3°C above NTP at all points along the stream, at any point of maximum impact, or at the downstream extent of any designated reach (or even no greater than 0.3°C above biological criteria for the reach). (60)
Response	*Several comments similar to this were addressed in the Chapter 4 Response to Comments. ODEQ believes that implementation of Forest Practices (FP) rules are an important pathway towards attainment of water quality standards. Implementation of FP rules does not ensure attainment of numeric criteria, but does meet the water protection requirements of the FP Act and implementation requirements in the Oregon temperature standard (OAR 340-041-0028(12)(e)). ODEQ continues to work with ODF and other designated management agencies to improve the effectiveness of both regulatory and voluntary best management practices (BMPs).*
Comment 128.	Salmon do not have the luxury of waiting decades for restoration and numerous iterations of TMDLs. Restoration admittedly can take decades and this is the most urgent reason for preventing the loss of habitat or water quality degradation at the outset. Given this urgency, emphasis and preference must be given to those strategies and practices that result in real on-the-ground improvement and protection of salmon habitat. Only with this approach can we achieve the goals mandated by the CWA and listed in this draft TMDL for the Willamette Basin. (60)

Response	*Achieving and maintaining beneficial uses, such as spawning and rearing water temperatures for salmonids, is an agency priority. ODEQ believes the water quality improvements that will result from TMDL implementation efforts will directly contribute to salmon restoration efforts by addressing the water quality element of salmonid habitat.*
Comment 129. Effluent monitoring	Page 14-25. These two statements seem mutually exclusive. "Effluent monitoring will not be required for sources that do not acknowledge mercury on their application, report it in their TRI data, or have not been otherwise identified as a potential mercury source by ODEQ" "If valid effluent monitoring data indicates that mercury is not present or does not exceed deminimus levels, then future effluent monitoring will not be required." (60)
Response	*See Response to comment 93.*
Comment 130.	Page 14-25. "Intent: Permit limits will not be….A general permit or a TMDL……..such as municipal wastewater treatment plants and the pulp and paper industry." Please provide a list of other potential point source discharges to which this statement applies. (60)
Response	*ODEQ included information on the sources that will be required to collect mercury data in the WQMP. Permittees will be notified through a Permit Action Letter.*
Comment 131.	Page 14-26. What type of public review process does ODEQ envision for the development of the Permit Bubble Concept, Multi-media Bubble and pollution trading strategies for mercury? (60)
Response	*These concepts will be developed in more detail as part of the Phase II of the Mercury TMDL. There will certainly be an official public review and comment process incorporated into this next incremental phase of the study. In addition, there will be additional opportunities for the public to provide comment on how these concepts will be integrated into individual permits, as the permits themselves are developed.*
Comment 132.	Page 14-26. What mechanisms are in place to ensure funding will be available to support the proposed mercury reduction plan? (60)
Response	*ODEQ has already secured funding for a pilot study to measure mercury in the effluent of the major municipal and industrial point sources in the Basin. The State Legislature included funding for the implementation of the Willamette TMDL in ODEQ's 2005-2007 budget. ODEQ will work with the permitted and other sources in the Basin to obtain the necessary funding to support additional data collection efforts.*
Comment 133.	Page 14-29. RE Reserve Capacity: It is noted that "minor" point sources (of temperature) will not go through the thorough analysis as the "major" point sources. While we understand the resource-limitations of the agency, we are concerned that if too many of these so-called minor sources are approved on a staff-level, there might be a cumulative adverse affect on the system. Will there be any cumulative effect analysis done on minor point sources to avoid such a problem? (60)
Response	*ODEQ is responsible for tracking the sources that are allocated a wasteload allocation under the Small Source Bubble to ensure that the allocation is not exceeded by the cumulative effect of the sources.*
Comment 134.	Page 14-30. Why does the TMDL single out Willamette Falls hydro project as a non-point source by allocating nonpoint source load to it? EPA's policy is to consider dams "non-polluting point sources." While this distinction may have no practical significance, we were curious about the reasoning behind singling out Willamette Falls. (60)

Response	*The Willamette Falls hydro project is not the only project to receive a load allocation. The Clackamas hydro project, EWEB's Leaburg-Walterville project and the USACE dams have received load allocations as well. All hydro projects that have stream temperature impacts have been assigned load allocations.*
Comment 135.	ODEQ has not provided justification for why the agency believes ODF forest practices will achieve the temperature goals set forth in the draft Willamette Basin TMDL. Please provide a response to this comment and the quote cited below. • A review of ODF forest practices and BMPs by USFWS, EPA, and NMFS (February 28, 2001) concluded: "Our review of the SAST and the body of scientific literature related to forestry effects on factors affecting water temperature (see Attachment 1) confirms, with a high degree of confidence, that practices under the FPA adversely affect temperature-related factors such as shade levels, surface erosion, landslide rates, stream morphology and substrate, and landscape-scale conditions. Therefore, we concur with ODF and DEQ that "there are water quality impairments due to forest management activities even with FPRA rules and BMPs" (SAST, p. 58 and Table 9). Scientific research and temperature assessments completed in Oregon and the pacific Northwest also indicate that these adverse effects affect water quality and fisheries on small, medium and large streams. (60)
Response	*As determined in the 2002 Sufficiency Analysis: A Statewide Evaluation of Forest Practices Act Effectiveness in Protecting Water Quality, it is uncertain if OFPA is adequate to attain water quality standards. In order to address some of these uncertainties, ODF and its governing body, the Board of Forestry (BOF), have been in the rulemaking process since 2003 to provide greater water quality protection. (See ODF/DEQ joint staff report for detail at: http://www.deq.state.or.us/about/eqc/agendas/attachments/oct2004/10.21.04.EQC-BOFjointReport.pdf) The adequacy of the proposed rules to meet water quality standards and TMDL load allocations have not been determined, although their implementation should provide greater protection than current OFPA rules. ODEQ has and will continue to encourage ODF to conduct OFPA effectiveness monitoring to ensure water quality standards and TMDL load allocations are being attained. It should be noted that ODEQ believes effectiveness monitoring will determine whether TMDL load allocations are being met where federal or nonfederal forest activities or any other anthropogenic land use activity occurs.*
Comment 136. Implementation Plan Timing	According to this draft TMDL, the Salem BLM implementation plan (WQRP) will be due 18 months after the time of the ODEQ director signing as an order. An estimated timeframe for this due date would be January 2007. The BLM is currently revising our Resource Management Plans with a due date of 2008. These plans will be devoting a significant portion of the analysis to water quality elements of which would be the basis for implementation plans. In a time of reducing budgets and workforce we want to make every effort to avoid redundancy and streamline our planning workload. We ask that the timeframe for the due date on the implementation plan be extended approximately 1 year so it would align with out current planning effort. If this were agreed to, we could potentially "fold in" the results from the TMDL's development in both the Yamhill and Molalla sub-basins thus giving a complete analysis for the Salem District lands in the Willamette Basin. These currently are not included in this TMDL. (62)
Response	*ODEQ is willing to discuss TMDL Implementation Plan (WQRP) timing with BLM or other DMAs when circumstances are such that a longer timeline would be advantageous.*
Comment 137.	Why is the BLM / ODEQ Sufficiency Analysis for Stream Temperature not mentioned in the WQMP? (62)

Response	*The document has been renamed and is now called the Northwest Forest Plan Temperature TMDL Implementation Strategy (Strategy). The document was not mentioned in the WQMP because it was not in its final form when the draft TMDL was released to the public for comments. ODEQ will reference the Strategy in the final WQMP as a tool to implement the temperature TMDL on federal forest lands.*
Comment 138.	Page 14 – 7 Point of Clarification: BLM is **not** responsible for an Implementation Plan for Mercury at this time. Is this correct? On page 14 – 9 it shows responsibility in the sub-basins for both mercury and temperature. (62)
Response	*No, it is not correct. BLM is responsible for addressing mercury (as well as temperature) in a TMDL Implementation Plan that is required to be submitted to ODEQ within 18 months following issuance of the TMDL. For rural lands, mercury control is generally addressed through soil erosion control BMPs.*
Comment 139.	Page 14-27: Salem BLM agrees with the goal to link the control of mercury to our existing or emerging soil erosion control efforts. We also agree that Best Management Practices employed to minimize soil erosion will control the mercury non-point source from the forestry sector. (62)
Response	*Comment noted.*
Comment 140.	Economic Considerations: The TDML, and particularly its subsequent implementation, must realistically reflect the potential economic impacts upon local communities. Salem's ratepayers, for example, have shouldered annual increases in sewer and water rates of 8.9 percent and 8.3 percent respectively for the last three years, principally to meet unfunded regulatory mandates (especially sanitary sewer overflow, SSO, and controls). Through prudent engineering and fiscal resourcefulness, those annual increases for the next two years have been reduced to 6.5 percent each. Salem is committed to responsibly doing its fair share to the "maximum extent practicable," but it cannot be at the expense of our ratepayers' backs. (63)
Response	*Comment noted.*
Comment 141. Source equity, air sources	Source Equity: We believe that controls on pollutant sources contributing to exceedances of water quality standards should be applied equitably and proportionally to their share of the overall loading. Wasteload allocations should reflect the true pollutant contributions from a source, be based upon accurate and representative data, and should be managed to a similar degree of responsibility regardless of the type of control mechanism used. For example, the draft Water Quality Management Plan outlines only voluntary BMPs for air sources of mercury, which are some of the largest contributors to the overall mercury load to the Willamette. Air emissions of mercury should be directly regulated under Clean Air Act permits to meet any necessary and appropriate mercury TMDLs. Non-point sources of mercury, such as those from the past and/or present application of pesticides and fertilizers in agricultural practices, should receive a similar degree of regulation as all other sources of the pollutant required under the final TMDL. (63)

Response	*The issue of developing a proportional framework for mercury allocations was discussed in detail on numerous occasions at meetings of the Mainstem Willamette TMDLs stakeholder council. ODEQ received significant input on this topic and the general consensus was that an 'across the board' allocation framework was preferable at this point in time given the state of the science and the uncertainties associated with the quantification of the mercury contribution from the various source sector categories. The issue of proportionality, however, can still be a topic of discussion during the next incremental phase of this mercury TMDL.* *ODEQ agrees with the general comment that all potentially controllable mercury source categories, including those associated with nonpoint source sectors, will need to address their mercury contribution. The importance of achieving reductions in nonpoint source categories is especially significant given that industrial and municipal point sources were estimated to have only minor contributions to the load of total mercury in the mainstem of the Willamette River. It should be noted, however, that some of the inputs of mercury in the Willamette system are not readily amenable to local controls. These inputs include the 'global' air sources (mercury originating from sources outside of Oregon's borders) and the resuspension of native sediments in the river.* *Since the draft version of this TMDL was released, the emissions inventory for local air emissions has been revised downward, while that for global sources (primarily on the Asian mainland) is now seen as larger than originally thought. Thus deposition of mercury from local air sources is now expected to make less of a contribution to mercury loads in the mainstem. Work will continue through Phase II of the TMDL to better define deposition of mercury from local and global air sources.* *ODEQ will work closely with air sources to explore mercury reduction strategies. This could include employing various approaches to reduce air emissions from mobile, area, and point sources. For example, ODEQ is implementing various elements of its mercury reduction strategy, such as removing mercury switches from automobiles and implementing mercury recovery programs for thermostats.*
Comment 142.	A reminder that the majority of stormwater in urban areas flows from forest and farm areas; municipalities will be responsible for bacteria reduction within the urban portion of their jurisdictions. Salem will work in a logical manner to address bacteria issues by exploring areas of cross-connection, working with DEQ and Marion County on failing septic systems, and through public education. However, once all reasonable measures have been instituted to control urban bacteria, we will have fulfilled our commitments. (63)
Response	*ODEQ generally agrees that urban areas are responsible for controlling urban sources of bacteria. However, in some cases, urban stormwater systems can transport pollutants to streams from agricultural or forested lands. In this case, a cooperative approach is needed.*
Comment 143.	Page 14-7: Why is the Conservation Reserved Enhancement Program listed under the Oregon Department of Forestry and not the Oregon Department of Agriculture? (63)
Response	*The Oregon Department of Agriculture administers the program while the Oregon Department of Forestry helps determine a site's eligibility and makes recommendations for implementing forest buffers. The correction has been made.*
Comment 144.	Page 14-11, fourth Paragraph: The first round of Phase II permits will most likely be issued in 2005. (63)
Response	*The date has been changed to 2006.*

Comment 145.	Page 14-12. Under Agricultural Lands, the statement is made that "these reports will be available to ODEQ for review ...." This appears to lack any accountability whatsoever. DEQ has to have a more substantial role than being able to "review" progress reports. (63)
Response	*ODEQ has a more substantial role than just "review" of ODA's progress reports. The interagency agreement (1998 DEQ/ODA MOU) defines how ODEQ and ODA agree to work collaboratively to improve water quality. Examples of our collaboration include ODEQ 319 funding for ODA staff to attend USEPA enforcement training, ODA staff participation in TMDL development, and ODEQ participation in AWQMAP development, implementation, and biennial review. ODEQ's water quality monitoring provides one of the tools for continued evaluation of waters associated with agricultural lands. This data is used by both ODEQ and ODA to track changes in water quality and advise the agencies on potential modifications to ODA programs.*
Comment 146.	Page 14-14, fourth Paragraph: We request that DEQ pursue the availability of the "water quality and landscape monitoring" studies being conducted by ODA to evaluate plan and rule effectiveness. (63)
Response	*Comment noted and we will follow up with ODA.*
Comment 147.	Page 14-21: The first sentence is too broad, and does not reflect the Department's position that temperature is not a stormwater issue; and seems to conflict with the second bullet on page 14-23 under "Overview of the 2004 TMDL." In the third paragraph, Polk County is missing from the list of Phase II permits. (63)
Response	*Changes were made as appropriate.* *Polk County was added to the list of Phase II permits.*
Comment 148.	Page 14-22, Section 5: This appears to set up a double jeopardy of sorts, with the local municipality and DEQ both having parallel erosion prevention and sediment control programs within the same geographical area; DEQ under its 1200-C Permit, and the municipality under its own ordinances. (63)
Response	*It is true that the 1200-C permit requires stormwater management plans for land disturbances greater than one acre. It is also true that MS4 permits require certain local jurisdictions to have local ordinances that address land disturbances from construction activity. This dual regulatory structure is the result of federal regulatory requirements. However, ODEQ has agreements with several jurisdictions to help implement the 1200-C for ODEQ, thus reducing potential regulatory duplication. ODEQ hopes to increase the number of such agreements with local governments. It should also be noted many local ordinances regulate construction activities that disturb less than one acre that would not otherwise be regulated by the 1200-C permit.*
Comment 149.	Page 14-23, 1st paragraph under Mercury TMDL Implementation. The last sentence needs to explicitly state that there will be no numeric limits in MS4 permits. (63)
Response	*MS4 permits currently utilize performance measures and benchmarks, as opposed to numeric effluent limits. ODEQ has no plans to include numeric limits in future MS4 permits, but the agency can not guarantee that such limits will never be in these permits as court decisions or other circumstances may dictate ODEQ's future permit requirements.*
Comment 150.	Page 14-24: In the "Overview" section, will the multi-year effort include tapping into other USGS data and findings (both locally and nationally) and are air sources part of this effort. In the Implementation section, what sources are being expected to do additional monitoring, and what are the expectations? In addition, is a "calibrated mass balance model" realistic goal? Is this setting unrealistic expectations for the

	watershed and its stakeholders? (63)
Response	*ODEQ will utilize the USGS dataset once it has been finalized (as indicated in our response to Comment #122 in the Response to Comments for mercury (Chapter 3)). Additional source monitoring has been addressed in our responses to Comments #114 and 115. In ODEQ's opinion, a calibrated mass balance model for the Basin, as it is currently envisioned, is a realistic goal for Phase II of this effort.*
Comment 151.	Page 14-25, second paragraph: Delete the last sentence related to water quality based effluent limits after the 2009 update. There are far too many uncertainties and unknowns for DEQ and point sources to be locked into such a commitment now. This same issue needs to be addressed on Pages 14-26, 14-27, and 14-28. And again… no numeric limits for MS4 stormwater permits! (63)
Response	*See response to Comment 93.* *As stated above in the response to Comment 149, MS4 permits utilize performance measures and benchmarks, as opposed to numeric effluent limits. Text was added to Chapter 14 to clarify that MS4 permits will not contain numeric effluent limits.*
Comment 152.	Page 14-26, fourth bullet: Salem, through ACWA, would like to participate with DEQ to "examine" the potential for credits for implemented mercury reductions. (63)
Response	*Comment noted.*
Comment 153.	Page 14-28, 2009 TMDL Update, third paragraph: In the last sentence, if DEQ "elects to follow a different course of action…" there should be a corresponding and explicit commitment for stakeholder and public involvement in the decision making process. This also applies to development of the Internal Management Directive for temperature cited on Page 14-29 (fifth paragraph) and also on Page 14-30 (fifth paragraph). (63)
Response	*ODEQ agrees and would expect to include opportunities for stakeholder involvement when undertaking these activities.*
Comment 154.	(Chapter 14, Section G, page 14-8) Included in section G is a short list of ODOT DMA responsibilities. It is unclear if this list is intended to call out ODOT responsibilities to comply with environmental requirements ("Pollution Control Plan and Erosion Control Plan") or control the impacts that transportation facilities ("Design and Construction") can have on Willamette TMDLs. ODOT thinks it would be clearer if DEQ first called out ODOT's responsibility in managing Willamette TMDLs and then listed items such as the ODOT "Routine Road Maintenance, Water Quality and Habitat Guide Best Management Practices" as examples of how ODOT meets those responsibilities. (64)
Response	*Clarifying changes to the text have been made.*
Comment 155.	(Chapter 14, Section J, page 14-11, paragraph 4) The document lists National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permits here as point source permits. Earlier in the document (Chapter 14, Part 1, page 14-4, paragraph 4) MS4 permits were referred to as non-point source permits. ODOT would suggest that DEQ be consistent in how point source and non-point source NPDES permits are defined. EPA and DEQ have always defined the NPDES MS4 permit program to be a non-point source program. (64)
Response	*The error has been corrected. USEPA and ODEQ define the NPDES MS4 permit program as a point source program. While stormwater can be a nonpoint source of pollutants, all NPDES permits are issued as point source discharges.*

Comment 156.	(Chapter 14, Section K, page 14-12, "Dam Operation and Management") Clean Water Act, Section 401 certification documents are discussed here and in several other places throughout the document in terms of how they apply to dam operation and management. Clean Water Act, Section 401 certification and water quality certification for Department of State Land (DSL) permits can also apply to many projects outside of hydropower and dams. The Draft should recognize the other applications for 401 certifications. (64)
Response	*ODEQ agrees. Changes were made where appropriate.*
Comment 157.	(Chapter 14, Section K, page 14-14) Included in Section K is a description of ODOT TMDL monitoring efforts. The ODOT monitoring efforts described were developed primarily to meet ODOT MS4 NPDES permit requirements. However, both ODOT and DEQ recognize these monitoring efforts can apply to TMDL monitoring requirements. ODOT continues to negotiate with DEQ on the development of an ODOT TMDL monitoring program. To clarify this, ODOT suggests the following sentence be added to the first paragraph of the ODOT monitoring section: "ODOT is now working with DEQ to expand or refine ODOT monitoring activities to ensure they meet all DEQ TMDL monitoring requirements." (64)
Response	*The suggested sentence has been added.*
Comment 158.	(Chapter 14, Part 2, page 14-21) Part 2 of the Draft includes in depth discussions on controlling temperature and mercury in "TMDL Implementation" discussions. Control of bacteria is addressed only in a general way through a discussion of NPDES permit requirements. It would be helpful if the Draft discussed bacteria "TMDL Implementation" on the same level as temperature and mercury, to offer DMAs more guidance on controlling this pollutant. (64)
Response	*ODEQ has modified the headings in Part 2 so that it clearly indicates that the storm water management measures are aimed at controlling bacteria.*
Comment 159.	(Chapter 14, Part 2, pages 14-21 and 14-22) Control Measures listed under "Stormwater Management for Bacteria and Other Pollutants" cites NPDES stormwater permit requirements. It should be acknowledged that there is considerable variation in how the NPDES stormwater permit requirements are interpreted or applied between NPDES permit holders. This would help everyone involved with TMDLs understand why there is so much variation between individual DMA NPDES and TMDL programs. (64)
Response	*The permit requirements listed are from the federal Phase II MS4 regulations and provide the parameters for developing certain types of stormwater management programs. There can be much variation in the details of how a jurisdiction will address those required program elements. The specific approach taken by a jurisdiction should be tailored to the community's needs, opportunities and constraints. However, interpretation of the requirements themselves should not vary.*
Comment 160.	(Chapter 14, Part 2, page 14-25, paragraph 2, bullet 4) The Draft states: "A general permit or TMDL implementation rule will be developed for all municipal and industrial wastewater point sources." ODOT would like it clarified that MS4 stormwater discharges would not be required to operate under this general permit or rule, as this would be redundant for TMDL discharges already covered by MS4 permits. (64)
Response	*ODEQ will be requiring selected major NPDES domestic, industrial and MS4 sources and selected minor sources with the potential to discharge mercury to increase monitoring and reporting of mercury. These permitees will be notified through a Permit Action Letter which will specify what will be required of them.*

Comment 161.	(Chapter 14, Part 2, page 14-25, bullet 4, sub bullet 3, sub sub bullets 2 and 3) The Draft states that "effluent monitoring will not be required for sources that do not acknowledge mercury". It would be helpful if DEQ could further define what is meant by "acknowledge" and if data collection or documentation will be required to justify why mercury is not "acknowledged". (64)
Response	*See response to Comment 160.*
Comment 162.	(Chapter 14, Part 2, page 14-28 through page 14-35, Temperature TMDL Implementation) The Draft offers an extensive discussion on temperature as related to dams and reserve capacity but only marginally discusses riparian enhancement and shading efforts. Many DMAs have no authority over reserve capacity and their primary temperature control efforts will be through riparian enhancement and planting. It would be helpful if Chapter 14 provided more guidance on riparian enhancement and shading efforts for these DMAs. (64)
Response	*ODEQ agrees that riparian protection and enhancement will be an important temperature management strategy. ODEQ intends to provide technical assistance for implementing management strategies upon request.*
Comment 163.	(Chapter 14, Appendix 14.B, page 14-42) The Appendix lists "Source Categories with Management Strategies" identifying "potential source categories with management strategies within a comprehensive watershed approach by land uses". It would be helpful if DEQ could provide more information on this list and why it is included in the Appendix. It appears the list is intended as an example of a comprehensive TMDL management program and not as a list of required management strategies. (64)
Response	*Language has been added to explain that this list is intended to assist DMAs that have not begun TMDL implementation or may want suggestions for additional management strategies.*
Comment 164.	(Chapter 14, Appendix 14.B, pages 14-47 and 14-48, Roads, Highways, Bridges, bullet summaries) ODOT has concerns with many of these bullet summaries if they are intended to summarize TMDL management requirements rather than provide examples of TMDL management strategies (see comment above). For example, the Draft states under the "Structural" section: "ensure …stormwater from roads highways and bridges is treated prior to discharge to a waterbody." While ODOT installs treatment for some discharges the ODOT MS4 program offers a process that determines when treatment should be considered and when it should not. Another example is the statement under "Monitoring, Evaluation, and Reporting" "Conduct instream monitoring". ODOT does not conduct instream monitoring because it is an inappropriate use of gas tax dollars and waterways are outside of ODOT jurisdictional authority. (64)
Response	*The intent of the listed management strategies is to assist DMAs that have not begun TMDL implementation. The strategies are meant to be informative rather than prescriptive as DMAs must use strategies that meet their specific situation.*
Comment 165.	The DMAs' programs run on separate tracks so it is not clear what the unifying mechanism will be that would consistently look at the watershed as a whole, piecing together the numerous DMA implementation plans. We believe that a coordinated approach, where data and technical information are shared among DMAs, would be more effective and efficient than keeping each DMA plan on a separate track and process. (65)

Response	*ODEQ agrees and intends to encourage and support such collaborative efforts as resources allow.*
Comment 166. Data coordination	As the implementation of water quality management plans progresses, the amount and variety of monitoring data will drastically increase. These data are not compiled, collectively stored, or readily accessible to entities throughout the Basin. Consequently, existing implementation and monitoring data are infrequently linked which likely means cumulative impacts and cumulative benefits are being overlooked. DEQ has been instrumental in developing the Pacific NW Water Quality Data Exchange. The Exchange makes a variety of data from different sources available in a common format. Although the Exchange has not been used at the basin scale for water quality and habitat data, this potential does exist. EPA strongly encourages DEQ to explore establishing a Willamette Basin Comprehensive Monitoring Program using the Exchange as common data compilation tool. (65)
Response	*Comment noted.*
Comment 167.	Page 14-3, Background, 2nd paragraph: Since the MOA between ODEQ and EPA is still in effect, the following changes are recommended for the first two sentences in this paragraph. "ODEQ and USEPA have a Memorandum of Agreement (MOA) which defines what …document. In December 2002 …" (65)
Response	*Suggested changes have been made.*
Comment 168.	Page 14-5, Source Categories with Management Strategies: The immediate paragraph under the "Source Categories with Management Strategies" directs the reader to Attachment 14.B for a list of potential source categories and their respective management strategies. One source category specifically mentioned but not included in Appendix 14.B is "airports". Appendix 14.B should be expanded to include management strategies for "airports" since airports can be significant sources of surface water runoff. (65)
Response	*ODEQ agrees and a section on airports has been added.*
Comment 169.	Page 14-5, (E) Explanation of how implementing management strategies will result in attainment of water quality standards: DEQ indicates reviews and assessments of TMDL implementation plans will be completed annually. EPA completely agrees with this approach, however, the workload this represents far exceeds the resources/staff available to ensure this occurs. We recognize and applaud DEQ's current efforts to obtain program funding for implementation personnel, however, with the State's current budget limitations and the possibility that the funding request will not be fully realized, it might be prudent to set priorities and realistic goals at the current staff levels for achieving required implementation actions. (65)
Response	*ODEQ agrees and shares USEPA's concerns. ODEQ will need to carefully manage resources and staff workloads.*
Comment 170.	Page14-6, Fifth paragraph: EPA recognizes that many factors impact the attainment of the bacteria criterion especially the sources of bacteria and types of treatment needed in such a large, diverse basin. Rather than setting a twenty year compliance timeframe for the entire basin, which was likely based on achieving the criterion in the most difficult areas, EPA strongly recommends DEQ consider establishing attainment timeframes based on the likely sources of bacteria and the difficulty of treatment. For example, addressing bacteria in the lower basin through CSO improvements will likely occur more quickly than addressing the non-point sources of bacteria in the upper tributaries. Compliance in the Portland area could possibly be achieved in ten years instead of the proposed twenty years. Whereas the timeframe for achieving compliance in the upper tributaries primarily impacted

	by non-point sources may take the full twenty years. (65)
Response	*ODEQ agrees that time frames outlined for water quality standards attainment were based on the most difficult areas. As noted in the 6th paragraph, ODEQ believes that individual DMA TMDL Implementation Plans will have more accurate timelines for achieving source specific load allocations.*
Comment 171.	Page14-11, Non Federal Forest Lands: We believe that the finalized implementation plans should closely comport with the specific targets in the TMDL. Data show that the present forest practice rules do not put forest lands on a trajectory to meet TMDL temperature targets, and likely contribute to the mercury loading in the basin. Therefore, we recommend striking the words "or applicable forest practice rules" from this sentence unless ODF and the forest landowners have agreed to basin specific rules or some other approach that more closely aligns with the TMDL targets. (65)
Response	*ODEQ was unable to find the language referenced in this comment. See the response to Comment #135 for a response to a similar concern.*
Comment 172.	Page 14-14, Oregon Department of Agriculture (ODA): This paragraph states that "Under Senate Bill 1010, ODA is responsible for developing basin plans and rules known as Agricultural Water Quality Management Area Plans and Rules (Plans and Rules)." The paragraph also states that ODA conducts water quality and landscape monitoring to evaluate plan and rules effectiveness, and defines the water quality parameters which are monitored for this evaluation. Mercury is not included as a parameter to be monitored. Since DEQ determined that a large percentage of mercury originates from undisturbed native soils being mobilized via land management activities, mercury monitoring, or a comparable surrogate, should be included as parameter to be monitored when evaluating the effectiveness of 1010 plans. (65)
Response	*ODEQ believes that total suspended sediment (TSS) is a comparable surrogate for mercury monitoring. Since mercury binds with soil, keeping soil on the land and preventing sediment from entering streams can protect streams from mercury loading. Agricultural Water Quality Management Area Plans address erosion prevention with sediment control methods, such as vegetative filter strips.*
Comment 173. Implementation Plan review	Page14-15, Plan and Review schedule for reviewing monitoring information and revising TMDL. DEQ indicates it will collect and review TMDL implementation plan information on an annual basis. As previously mentioned, because of the expansiveness of the Willamette TMDL study, a large number of implementation plans and associated monitoring data will be part of this review. EPA applauds DEQ's intended efforts, however, as previously stated, it might be prudent to establish a prioritized review plan which considers existing resources and areas of greatest concern rather than commit to comprehensive annual reviews which will likely be extremely difficult to achieve. (65)
Response	*Comment noted. ODEQ is developing guidance for Implementation Planning. The Department will be working with DMAs to make annual reports brief, focused on key implementation activities and compatible with other required reports (such as reports required under permits). More comprehensive reporting will be done on a 5-year cycle.*
Comment 174.	Page 14-16, Plan for public involvement in implementing management: DEQ's discussion of the public involvement process for implementation did not include any information on the extensively involved public outreach process used in establishing the TMDL. While it is recognized that outreach/public involvement for TMDL development is considerably different than TMDL implementation outreach, the lessons learned, the partnerships established, etc. during the TMDL development

	process should be considered in developing the implementation program. EPA recommends DEQ describe in this section, some of the major components and successes of the TMDL development outreach program and how those successes would benefit the development of the implementation planning process. (65)
Response	*Comment noted but ODEQ did not elect to develop this section as suggested given the priority address other key Willamette TMDL issues* .
Comment 175.	Page14-17, Citation of Legal Authorities. DEQ identifies some of the key legal authorities for implementing TMDL allocations, waste load allocations, and associated implementation plans. An additional federal legal authority relevant to implementing this TMDL which should be mentioned is the Endangered Species Act. (65)
Response	*Text has been added.*
Comment 176.	Page14-20, TMDL Implementation Plans: The last paragraph indicates DEQ is preparing guidance for developing implementation plans as a tool to assist DMAs. The guidance will focus on urban and rural areas excluding agriculture and non-federal forestry land uses. DEQ, in its mercury TMDL, shows that one of the major sources of waterborne mercury is from undisturbed native soils made mobile through land disturbing activities. Forestry and agricultural processes are clearly land disturbing, and certainly contribute sediment to the waters in the Willamette Basin. The sediment likely contains levels of mercury as well. Therefore, EPA strongly encourages DEQ to not exclude these two sectors in its guidance document, rather the guidance provide both sectors information on how to improve their existing management plans to address the pollutants addressed in this TMDL. (65)
Response	*The text has been removed. The TMDL Implementation Plan Internal Management Directive focuses on how to write Implementation Plans rather than what measures should be used to control sources. It is not intended to provide guidance on how to improve management measures on agricultural or forested lands.*
Comment 177.	Page 14-25, Mercury Limits in Permits: This plan appears to waive the requirements for water quality based effluent limits for mercury in NPDES permits issued between 2005 and 2009. The TMDL cannot do this for all cases. If a reasonable potential analysis for mercury indicates that the facility exceeds the mercury criteria, a reissued permit must contain a mercury limit. The first sentence of 2) should read "Intent: Numeric permit limits…" (65)
Response	*Comments noted (as indicated in response to Chapter 3, Comment #154). The suggested changes have been made to the text.*
Comment 178.	Page14-25, Mercury Limits in Permits: The Plan allows a permittee with valid effluent monitoring data indicating that mercury is not present to end monitoring. The Plan, however, does not state the required detection limits for existing non-detect data to be considered valid for this purpose. We recommend that the data have low detection limits (i.e. 0.2 ng/L) in order to release a permittee from future effluent monitoring requirements. (65)
Response	*The text has been removed and the issue will be addressed through the Permit Action Letter.*\
Comment 179.	Page 14-21, Pollutant Specific Information. There appear to be several pollutants discussed in the TMDL such as sediment, bacteria, and toxics which are not specifically addressed in this WQMP. DEQ should assure that adequate detail is provided for addressing these important pollutants. (65)

Response	*Part 2 describes additional requirements for implementing this TMDL. These requirements are specific to the Willamette TMDL and the pollutants addressed by this TMDL.*
Comment 180.	Page 14-28, Temperature TMDL: This section should include a subsection which discusses requirements of the private PUD dams. (65)
Response	*A new section to address private dams has been added.*
Comment 181.	Page14-28, Reserve Capacity: EPA strongly recommends that ODEQ adopt Option 2 in the final TMDL. The following outlines our reasons for this recommendation. While this TMDL had done a good job in utilizing the best available information to assess the current conditions and determining the temperature allocations, a large amount of uncertainty exists around whether the US Army Corps of Engineers will be able to attain the allocations provided in the TMDL. As the temperature at the base of these dams provide the baseline conditions utilized in determining much of the TMDL, it is important for DEQ to maintain the flexibility provided for within the Reserve Capacity until more information is known about what the dams can actually achieve. Since this is a water-quality impaired river, EPA believes it is important to delay allocation of additional heat loading until such time as reductions are being attained and progress is being made towards the attainment of the water quality criteria. (65)
Response	*ODEQ has decided that, on the mainstem Willamette River, only half of the Reserve Capacity will be available for use at the time the TMDL is issued by ODEQ. The other one-half of the Reserve Capacity will not become available until modeling analyses for the USACE dam and reservoirs linked to the mainstem Willamette have been completed and their effects on the river – and potential strategies for addressing these effects – are more fully understood. ODEQ expects to make a decision regarding the allocation of this portion of the Reserve Capacity in the next update of the TMDL.*
Comment 182.	Page14-29, Reserve Capacity: The last sentence in the first paragraph indicates the reserve capacity will be available on a first come basis unless the future desire is to allocate the reserve capacity in some other manner. Reserve capacity allocated on a “first come” basis creates a very competitive, challenging and often unfair allocation process. Initial applicants’ requests are often for the maximum reserve which quickly diminishes the total leaving little for addressing the existing needs of entities not quick to submit their requests. Additionally, if temperature trading is established in the basin, the net worth of the awarded allocations increases drastically. The allocation becomes a valued commodity. For these reasons EPA recommends that the concept of allocating the reserve capacity on a first come basis be excluded from this discussion. (65)
Response	*This language has been changed.*
Comment 183.	Page 14-32, US Army Corps of Engineers (USACE): The first bullet can be read as if the USACE is charged with refining the TMDL load allocations, an action which can only be done by DEQ (or EPA under specific circumstances). Please rewrite this to better reflect the activity to be undertaken by the USACE. The roles of the USACE and ODEQ should be similarly clarified in the second paragraph below this list. (65)

Response	*The first bullet has been clarified to indicate that USACE will assist with the collection and analysis of data necessary to support ODEQ revisions of load allocations and target temperatures for each project reservoir.* *The second paragraph has been rewritten to indicate that USACE may gather data and even perform the analyses necessary to identify natural thermal potential temperatures and project effects on natural thermal potential temperatures, but ODEQ is responsible for revisions to the TMDL including modification of USACE load allocations.*
Comment 184.	Page 14-42, A. Watershed Approach: The reference to the Center for Watershed Protection in Maryland in the first paragraph might cause some readers to wonder what a Maryland program has to do with implementation in Oregon. To avoid this, you may wish to either footnote the source or add a phrase which notes that these strategies are also applicable in Oregon and the Willamette Basin. (65)
Response	*The text was changed to reflect that the strategies are applicable in Oregon.*
Comment 185.	Page 14-53, Dam Operation: This section focuses exclusively on the USACE dams and fails to mention the private PUD dams. Both should be addressed. (65)
Response	*Additional information has been added to address private hydroelectric projects.*