Tenmile Lakes Watershed
Total Maximum Daily Loads (TMDLs)
& Water Quality Management Plan (WQMP)

Response to Public Comments

Prepared by:
Oregon Department of Environmental Quality
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DEQ
State of Oregon
Department of
Environmental
Quality

Introduction

This Response to Public Comments document addresses comments received regarding the Draft Tenmile Watershed Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) dated March, 2006. Grammatical, editorial, and formatting errors noted by reviewers are not addressed here but corrections have been made in the document where necessary. The Oregon Department of Environmental Quality (ODEQ) appreciates the time and effort that all the commenters put into reviewing the document. All comments have been considered by ODEQ and, where appropriate, have been addressed in the final document that has been submitted to the Environmental Protection Agency (EPA). EPA will then either approve or disapprove the TMDL.

Background

The public comment period on the proposed TMDL and WQMP opened March 20, 2006. Written and oral comments were received during the public comment period that extended through May 18, 2006. An Informational meeting to present background on the technical and modeling components of the draft TMDLs was provided preceding both public hearing on May 3, 2006 at the Lakeside City Council Chamber.

Two commenters provided ORAL comments at the public hearings in Lakeside. Remaining comments received by ODEQ were submitted in written (paper and electronic) form. Copies of the document were made available at various locations within the watershed including the Lakeside Public Library, the North Bend Public Library, the Coos Bay Public Library, the Coquille Public Library, the Lakeside City Council Chamber, and the Tenmile Lakes Basin Partnership offices, as well as at the Coos Bay and Portland ODEQ offices and on the internet.

List of Comments provided on the Tenmile Lakes Watershed TMDL and WQMP

The following entities provided comments on the TMDL and WQMP during the Public Comment Period and were received prior to closure of the comment period 5:00 PM May 18, 2006.

1. Jim Macardy, Landowner
2. Tenmile Lakes Basin Partnership (Mike Mader)
3. Milo Crumrine
4. Oregon Department of Forestry (Paul C. Bell)
5. Oregon Department of Fish and Wildlife (Mike Gray)

General

All comments received during the public comment period have been reviewed by ODEQ and addressed in this document. Some of the comments received overlap and can be addressed with a single answer. Comments which require modifications to the TMDL or WQMP are noted and the changes are noted. A copy of this responsiveness summary has been submitted to EPA as part of the TMDL-WQMP packet.

NOTE: As with any analysis there is uncertainty in the Tenmile Lakes Watershed TMDL analysis. The acknowledgement of such uncertainty should not be used as an excuse to delay the implementation of much needed improvements in the watershed. Local, state,

and federal agencies responsible for implementing the allocations in the TMDL are required to implement the TMDL with the understanding that they may be required to modify their programs over time as new monitoring information becomes available. An adaptive management approach has been adopted by ODEQ as the means to make these modifications while the designated management authorities (DMAs) are moving forward with actions that will improve water quality in the Tenmile Watershed.

Responses immediately follow each comment and are in *italic* font to avoid confusion. Responses including underlined TMDL or WQMP Section references denote areas where language in the documents has been edited or changed. Other responses did not result in changes. The changes identified in the following responses have been made to the TMDL and the WQMP submitted to EPA.

Summary of Comments

1. Commenter (1)
All documents need to be revisited and enforcement responsibilities and funding responsibilities need to be outlined and defined to where there are no gray areas whatsoever. There should be some central management of all the agencies that are playing around with the water quality issues. There are probably 15 that have independent little plans of their own and there's nobody responsible for pulling all of that together, eliminating overlap, ensuring responsibilities are clear and moving forward.

Response
Ten Designated Management Authorities (DMAs) were identified in the Tenmile Lakes Watershed Water Quality Management Plan (WQMP). Each of these entities has jurisdiction over an activity conducted in the watershed that has impacts or has the potential to impact water quality. As DMAs, each of these entities are required to develop a Water Quality Implementation Plan (WQIP) or review and revise their existing water quality related management activities and authorities in response to this TMDL and WQMP.

During the development of WQIPs, these entities are required to address enforcement responsibilities and funding issues. Needs identified in DMA WQIP documents will be connected to water quality and this should help to articulate and support funding needs. DMAs must report WQIP implementation progress on a yearly basis and this information will be collectively reviewed by the Oregon Department of Environmental Quality (ODEQ). ODEQ will work with DMAs to assure WQIPs are implemented in a timely manner, and to ensure that water quality is responding positively over time.

Although DMAs are discretely identified in the WQMP, they are encouraged to coordinate planning and implementation efforts. After the adoption of this TMDL and WQMP, DMAs will be invited to meet to discuss cooperative planning opportunities and benefits. This will not eliminate the need for each DMA to develop and implement WQIPs to address water quality needs.

2. Commenter (2)
Amounts that model shows coming into Shutters Creek do not match with 40 years of experience growing up on Shutters Creek. Recommend a listing, placing of ISCO, for the 2006-07 water year using whatever funding is available.

Response
The TMDL assessment was based on water quality measurements and on predictive modeling of pollutant loading. Big, Benson and Murphy Creeks are examples of streams where water quality monitoring was conducted to calibrate a predictive model. Pollutant loading from Shutters Creek was determined through predictive modeling. Murphy Creek (measured) and West Shutters (modeled) both showed a low yield of water runoff. Functioning wetlands present in the lower part of these watersheds serve to filter upland sediment production and reduce the amount of measured runoff and pollutant loads delivered to the lake. Watersheds with high water yields and elevated sediment production include Big, Johnson, South Shutters, and Adams Creeks. The South Shutters Creek catchment is notable for a high percentage of grazed uplands and wetland bottom.

The TMDL and WQMP discuss future monitoring needs in some detail. The need to conduct additional sampling in lake tributaries where sediment loads were not directly measured identified as a high priority. Identifying high priority monitoring needs in the TMDL and WQMP should provide support for funding requests.

3. Commenter (2)
On Page 116: would like to see how much, relatively speaking, septic tanks are contributing in the winter.

Response
Better defining nutrient loading from individual on-site waste treatment systems located on the lakefronts is not possible at this time because of the extensive variability between property ownerships. Factors like seasonal use, location of the treatment system, system maintenance, and the condition of older treatment systems makes accurately defining pollutant loading a challenge. The TMDL utilized literature to support the derivation of estimated loading to the lakes from on-site treatment systems. Because these systems are privately owned, access to inspect them is poor. Other, high technology assessment options do exist but these methods would also be hindered by variability between property ownerships. Use of other methods to better define this source may be employed in the future.

The Tenmile Lakes Basin Partnership (TLBP) and the Tenmile Lakefront Homeowner Association education and outreach efforts to landowners are high and should stay a high priority. These efforts are helping landowners to understand that poorly maintained and operated systems have direct effects on water quality, human health, and subsequent property values.

4. Commenter (2)
Please make note in document that TLBP and project partners are completing or conducting 5 out of the 9 necessary bullets. For 2 of the 9, funding has been removed.

Response
The TLBP monitoring program is currently focusing on many of the monitoring needs identified in the TMDL and WQMP. This monitoring program is in part funded by ODEQ utilizing CWA section 319 funding. Nine monitoring needs are specifically identified and the Basin Partnership is currently working on data collection related to six of these items. Sediment cores, bacterial sampling, and non-native fish population studies are not currently being implemented. ODEQ will continue to seek to support implementation of monitoring programs that will fill data gaps, assist in future modeling exercises, and provide long term trending information for this watershed.

5. Commenter (2)
Implementation Plan: Page 10, should amplify the section describing DEQs enforcement responsibilities with sediment control measures around the lakefront (lakefront development or voluntary) in conjunction with county and other local jurisdictions.

Response
The following language was added to the WQMP Chapter 7, Section 7.1.6, Compliance and Enforcement: "DEQ operates under federal and state laws delegated by the US Environmental Protection Agency, the Oregon legislature, and the Oregon Environmental Quality Commission (DEQ's rule-making and adjudicative body). Under this authority, the agency maintains compliance with environmental laws, such as water quality standards, through regulatory tools. First, DEQ emphasizes education and technical assistance because most businesses and individuals voluntarily comply with the laws. Regulatory compliance and pollution prevention create the best environmental results.

However, enforcement is still needed to deter those who don't take the initiative to achieve compliance on their own or who seek to avoid costs of lawful compliance. Enforcement is also needed to maintain fairness among those who do expend the resources and make the effort to comply with environmental law. For these reasons, DEQ remains committed to an effective, consistent, and visible enforcement program, in addition to its collaborative programs.

For additional information regarding ODEQ's compliance and enforcement programs please visit http://www.deq.state.or.us/programs/enforcement."

The following language was added to the WQMP chapter 4 section 4.1.1 Compliance and Enforcement: "A Land Use Compatibility Statement ("LUCS") signed by the local land use authority must also be submitted with a permit application, unless otherwise noted. For renewal applications, submittal of a LUCS is only required if major changes have been made at the facility or if there is no LUCS on file with DEQ.

The Land Use Compatibility Statement is the process used by the ODEQ to determine whether permits and other approvals affecting land use are consistent with local government comprehensive plans. Oregon law requires state agency activities that impact land use be consistent with local comprehensive plans. DEQ Oregon Administrative Rules (OAR) Chapter 340, Division 18 identifies agency activities or programs that significantly affect land use and must have a process for determining local plan consistency. A LUCS is required for nearly all DEQ permits, including those for stormwater discharges, and certain approvals of plans or related activities that affect land use.

A LUCS must be approved (signed) by the local City or County Planning Office after they determine if the proposed facility meets all local planning requirements. The LUCS is then returned to the applicant the signed and dated with findings of fact for any local reviews or necessary planning approvals

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In addition, the Department of Consumer and Business Services, Building Codes Division requires government approvals from the local planning jurisdiction, flood plain, and sanitation (ODEQ) approval prior to the issuance of a building permit. This assures that ODEQ has an opportunity to assess a site for the placement or evaluation of existing waste water treatment facilities.

Improving the coordination between the State Building Codes Division, the Local Land Use Planning entities, and ODEQ is needed to assure that land development is conducted in a manner that protects the environment. ODEQ will continue to work with these entities to improve coordination during land development activities."

6. Commenter (2)

Title should include "Lakes" i.e. Tenmile Lakes Watershed Water Quality Implementation Plan and Tenmile Lakes Watershed TMDL thus avoiding confusion with Tenmile Creeks throughout the state.

Response

The document has been revised to reflect a change in name from the Tenmile Watershed TMDL and WQMP to the Tenmile Lakes Watershed TMDL and WQMP.

7. Commenter (2)

On Page 126 there is an inaccuracy. There is a run-off of the City of Lakeside stormwater system that goes to North Lake. It is called The Bowron Creek. It needs to be listed or corrected in the document. You can say North and South Lake for a simple correction.

Response

The document has been revised to reflect a change in the following language in the WQMP, Section 7.1.2 and in the TMDL, Section 6.3.4; "The City of Lakeside storm water drainage is delivered directly to South Tenmile Lake and to North Tenmile Lake via Bowron Creek."

8. Commenter (2)
On page 106, disagreement with 3rd and 4th sentences. Prior to 1999, Lakeside Public Works has utilized deadheads. The statement that Lakeside drainages did not have wetlands is incorrect. They still have wetlands. The Public Works utilized what they called "dead-heads" which are wetlands. At the time when the study was done, those wetlands were nearly intact. Our drainage wetlands got dramatically impacted after 2000. Some of them are still functioning. We missed those wetlands in the TMDL or in the write-up.

Response
The TMDL states; "These areas (Lakeside drainages) did not historically have wetlands to the extent of some of the other catchments in the watershed."

The following language was added to TMDL Section 6.5.1.3; "Prior to 1999, the City of Lakeside Public Works Department utilized urban wetlands to manage stormwater runoff. These "drainage" wetlands are being further impacted as a result of land development and drainage maintenance projects. Protection and enhancement of wetland areas present in the urban landscape is critical to controlling stormwater runoff, protecting water quality, and achieving load reduction targets."

9. Commenter (2)
On Page 130, a bullet under the 3rd heading: Shutters Creek and city site should be added to better document water quality information with ISCOS. Basin Partnership will attempt to continue providing free monitoring.

Response
Language was added to the WQMP, Section 8.7 and to the TMDL Section 6.11.1; Changes were made in the Baseline and Trend Water Quality Monitoring Needs for the Tenmile Lakes Watershed section. A fourth bullet was added under the Tributary sediment delivery heading to address urban areas. Shutters Creek was mentioned specifically under the second tributary sediment deliver bullet.

10. Commenter (2)
On page 10, ODA is in charge of noxious weeds. We need to push them and get that listed. Let's get them on the DMA board with the weeds.

Response
Language regarding the ODA Noxious Weed Control program was added to WQMP Section 4.2. WQMP Appendix D2 was added to provide information regarding the Oregon Noxious Weed Strategic Plan.

11. Commenter (2)
Page 67, ODA has their weed control program so make sure the editing is done on that page as well.

Response
Language regarding the ODA Noxious Weed Control program was added to WQMP Section 8.3.

12. Commenter (3)
Accuracy of the data presented. There are only a couple of lines, which I found, mentioning accuracy of data of 10% and you talked about 10% accuracy in your presentation. I feel that modeled water discharge data and some water quality models are only 25% to 50% accurate after these data have been put into the various models. I am familiar with Benson Creek and water records at that site are between 7% and 10% accurate, when there was continuous record. OWRD did not rate the accuracy of their records (that I know of) during the period of record that is in your report, so you had no idea how accurate the data was. A written statement showing the accuracy of data collected and the accuracy of the model results is needed.

Response
The following language was added to TMDL Section 5.1.1; "All field activities were described in a written sampling plan provided to all field personnel. Quality assurance protocols and analytical methods were detailed in a QA/QC plan submitted to the TLBP. Duplicate and blank samples were included among the routine samples as checks on the quality of the analytical results. Water quality data utilized for modeling met minimum QA/QC requirements as identified in the plan. Phytoplankton was collected as split samples with the lake water samples

The sediment ages and accumulation rates were calculated using the constant-rate-of-supply (CRS) model of Appleby and Oldfield with old age dates, using the method described by Binford (1990). Diatoms were analyzed according to protocols developed for the Paleoecological Investigation of Recent Lake Acidification (PIRLA) Program (Charles et al. 1990).

Additional information regarding data quality assurance requirements and procedures can be found at the following website http://www.deq.state.or.us/lab/qa/techdocs.htm."

This information is provided in response to this question without editing of the TMDL; Model calibration discussions are provided both in the TMDL section 6.3.3 and in Appendix A, Tenmile Lakes Nutrient Study, Watershed Modeling section. The level of SWAT model uncertainty was derived by examining the variability of the measured and inferred lines of evidence. The TMDL Margin of Safety Discussion in section 6.7 discusses and accounts for modeling uncertainty.

13. Commenter (3)
The possibility that the data presented will be taken as 'gospel'. Any report presented to the public has the risk of being taken literally. I appreciated your statement that the parameters given by the EPA will be updated as data collection closer defines those parameters. This report needs a statement in the Executive Summary, to the effect that the data provided is subject to change, as more data becomes available.

Response
A statement to this effect is present in the TMDL Executive Summary Section 1.4.1; Because TMDLs are an iterative process, additional data should be gathered over time to refine model calibration and to adjust reference loading targets as necessary to ensure the protection of beneficial uses.

14. Commenter (3)
The most accurate method of providing good streamflow data in a basin, with minimum expense, is to have 'benchmark gages'. In this case benchmark streamflow gages are continuous stage recording (and other parameters) sites that are representative of other streams in the basin. Data from a benchmark gage would provide unit runoff data that can be used to estimate discharge of other streams in the area. Unit runoff is a flow per area value, such as cfs per acre. Big Creek or Benson Creek would most likely provide a good representation of all the streams in the basin.

Response
WQMP, Section 8.7 and to the TMDL Section 6.11.1 identify monitoring needs and specifically identify the need for monitoring tributary sediment delivery through the establishment of a long term trend monitoring network for tributary total suspended solids (TSS) and flow measurement during storm events. Because these tributaries are not wadable during high flows establishing calibrated staff gages, which can be read and recorded at time of sampling, or the establishment of a continuous stage recording station are needed. Ideally representative stream(s) would be selected in order to maximize resources. Discussions are currently underway regarding the establishment of flow measurement locations in the Tenmile Watershed.

15. Commenter (4)
The Department of Forestry (ODF) appreciates the opportunity to comment on DEQ's Draft Tenmile Watershed Total Maximum Daily Load (TMDL). ODF regulates forest operations on both private and non-federal public lands (state, county and municipal lands) within the Tenmile Watershed and, as a designated management agency, coordinates with the Oregon Department of Environmental Quality (DEQ) to ensure attainment of water quality standards in the basin. Over 58% of the lands in the Tenmile Watershed are in a forested land use with 34% of the total land in the Elliott State Forest, 24% in industrial forest use, and 7% in what is described as "rural residential and small woodlot."

Under current Oregon Revised Statues, a forest operator conducting, or in good faith proposing to conduct, operations in accordance with best management practices are considered in compliance with State water quality standards. Reliance upon the Forest Practices Act best management practices to comply with the water quality standards provides a valuable service to the forest landowner by ensuring a measure of regulatory certainty, while also providing a mechanism for adaptive management to occur under the auspices of the Board of Forestry and Environmental Quality Commission processes. As a designated management agency, the ODF is committed to continuing to work with the DEQ to ensure the best management practices under the Forest Practices Act continue to

meet water quality standards to the maximum extent practicable, and to utilize such best management practices as the TMDL Water Quality Management Plan for non-federal forestlands.

Response
The ODEQ appreciates and respects our ongoing working relationship with ODF. We look forward to implementing this TMDL through the Forest Practices Act (FPA), the TMDL Implementation Strategy for Non-Federal Forest Lands (WQMP Appendix E), and as articulated in the Memorandum of Understanding between our two agencies (WQMP Appendix F).

16. Commenter (4)
In the Department's opinion, there continue to be significant technical and policy issues with the TMDL process and methodology in general, some of which apply to the Tenmile Watershed. Specifically, there are technical inaccuracies within the Tenmile Water Quality Management Plan that, if corrected, would help towards the development of a more credible plan. For example, the DEQ states that "data analysis developed to support the Tenmile [sic] Watershed total maximum daily load (TMDL) demonstrates that…..nonfederal forest lands contribute significantly to water quality impairment with the subbasin."(p.l33) In reviewing the documents the ODF was unable to locate the data analysis to support this statement, and in fact the DEQ's own description of the data analysis points out a lack of adequate data analysis to draw such a conclusion: "In general, TMDL modeling focuses on larger streams where fish use is more common. Modeling the first and second order streams has not been done [emphasis added] for TMDL. Because of the lack of analysis on smaller high gradient streams, potential monitoring or analysis….would be helpful ….to provide a better technical connection between BMP implementation and load allocations (LA) in such streams." (Draft WQMP, March 2006, p.145).

Response
The language in WQMP Appendix E, TMDL Implementation Strategy for Non-Federal Forest Lands Summary, paragraph 3 was edited and now states; The data analysis developed to support the Tenmile Lakes Watershed total maximum daily load (TMDL) demonstrates that urban, rural residential, agriculture, and non-federal forest land management activities all contribute to water quality impairment within the watershed to some extent.

The statement regarding the general TMDL modeling focus on larger streams where fish use is more common more directly relates to temperature TMDL development. The WQMP Appendix E was designed to provide a more generic discussion regarding the TMDL implementation strategy for non-federal forest lands and be flexible enough for use as an appendix in WQMPs throughout Oregon and for multiple parameters with minimal editing. This statement has been removed.

For this project, modeling focused on tributary loading to Tenmile Lakes. This assessment set sediment loads at the mouths of tributaries, at the point of delivery to the

lakes. TMDL Section 6.3.1.2 states; "Phosphorus concentrations and sediment yields were most intensively measured in lake tributaries Big, Benson, and Murphy Creeks. Modeling was then utilized to derive annual phosphorus and sediment loads for lake tributaries (catchments). Because mixed land use activities are present in close proximity, data sets did not provide sufficient rigor to allow the derivation of load allocations specific to individual land uses. Future monitoring efforts should seek to better define phosphorus and sediment loading from specific land uses (e.g. forested landscape, agriculture, rural residential)."

17. Commenter (4)
The DEQ is also encouraged to consider a reexamination of the water quality standards, specifically related to temperature, as there continues to be substantial concerns over the technical credibility and feasibility of the temperature standard and associated criteria. The resolution of these issues would help to better ensure a TMDL process that would garner a greater level of understanding, acceptance and support among the range of stakeholders in the Basin. Additionally, ODF is committed to working with DEQ to explore and develop alternatives that may be needed to address some of those issues. We suggest that we work jointly to develop a landscape shade modeling perspective with the assistance of the OSU College of Forestry. Recent work by the Coastal Landscape Analysis and Modeling Study (CLAMS) may allow us to look at a watershed and examine riparian shade conditions over time in aggregate across the watershed under different disturbance assumptions. Finally, given the recognition of the Forest Practices Act as the current statutory and policy framework for meeting water quality standards on non-federal forestlands, the ODF is supportive of the implementation plan for non-federal forestlands included as part of the Water Quality Management Plan. ODF is also committed to continuing to engage in substantive discussions with DEQ staff regarding TMDL model assumptions and possible water quality standard revisions that give more consideration to current scientific understandings of the dynamic nature of forest ecosystems.

Response
We appreciate the interest from ODF regarding the development and implementation of water quality standards as well as refining modeling tools. This comment speaks directly to the temperature standard, a standard not addressed in this TMDL. TMDLs are meant to be iterative and fine tuned through time, allowing for site specific conditions of a given waterbody. We look forward to continuing to work with ODF to improve the scientific understandings of the dynamic nature of forest ecosystems as we implement this TMDL.

18. Commenter (4)
Phosphorus--As part of the original Tualatin River phosphorous TMDL the Department sponsored a 1991 study, *Phosphorus and Forest streams: The Effects of Environmental conditions and Management Activities* (Salminen and Beschta 1991). A copy of the study is enclosed. This study concluded that: "Phosphorus responses to a range of forest management practices or factors affected by management practices (e.g., herbicides, sediment production, organic debris, fire retardants, forest age classes, fertilization, grazing) are reported in the literature. The use of herbicides, fire retardants, and fertilizers

may, in some instances, produce small and short-term increases in stream water phosphorus concentrations. However, most published studies indicate most forest management activities have only limited, if any, effects on instream phosphorus levels." It is also worth noting that ODF conducted several years of monitoring to determine variability in phosphorous loading in forested streams and to determine if the variability could be explained by a difference in forest management conditions (study results are enclosed). The overarching conclusion of this monitoring was that underlying geologic conditions were the driver in phosphorous levels in the monitored streams. Other conclusions of this watershed study were: The concentration of phosphorus can influence biological activity in water bodies; especially warm, exposed slow-moving streams and lakes prone to high levels of primary production by algae and other aquatic plants; Research and monitoring have shown little or no phosphorus response to even intensive forest management (Salminen and Beschta 1991); Phosphorus from predominantly-forested watersheds is the lowest in the United States even when they are actively managed; Natural inputs such as groundwater interacting with subsurface rock formations and needle and leaf fall from riparian vegetation have been shown to contribute to phosphorus loads; Non-point source control is needed across all land uses in a watershed to restore water quality limited stream segments. There is little if any research which investigates the basic hydrologic, chemical, and biological processes affecting water quality or inventory data on phosphorus specifically designed to address forest management impacts. Broad regional surveys showed that the more of a watershed in forest (rather than urban or agriculture), the lower the phosphorus concentrations (See enclosed study and references). Numerous small watershed studies (Alsea, Middle Santiam, and the H. J. Andrews watershed studies, for example) have been conducted in Oregon dealing with forest or range management. While many of these studies found that nitrogen concentrations in streams could be increased for a short time following disturbance, phosphorus concentrations generally were not measured or had modest if any response to management. For example, the Alsea study found no significant changes in orthophosphate concentrations (suspended phosphorus was not measured) for Needle Branch, which was clearcut to the stream and intensively burned The TMDL also states "[Phosphorus] [I]oading information specific to the forested landscape was not sufficient to define specific loads. [emphasis added] Future monitoring efforts should seek to better define current sediment loading from the forested landscape." (Draft TMDL, March 2005, p.58).

Response

We appreciate the opportunity to review the scientific studies provided by ODF. Many of these studies relate to streams and phosphorus and do not address in detail sediment and phosphorus in a lake environment. Where these studies specifically mentioned lake environments, however, they infer that phosphorus delivered in sediments may result in adverse water quality impacts. It is consistent with the result from DEQ's analysis that, Oregon's lakes are sensitive to sedimentation (filling) and the subsequent release of phosphorus sorbed to sediments.

Please look at the end of the RTC for and attachment with some pertinent references taken from the literature provided by ODF.

As you commented, "The concentration of phosphorus can influence biological activity in water bodies; especially warm, exposed slow-moving streams and lakes prone to high levels of primary production by algae and other aquatic plants" Tenmile Lakes are water quality limited by both nuisance levels of algae and aquatic weeds. In the Tenmile Watershed nuisance algal blooms in the lakes have been directly linked to the available phosphorus. In addition, accelerated sedimentation results in reduced lake depth and provides area for nuisance weed colonization and growth.

As many of the studies ODF provided also identified, there is a need for additional monitoring. ODEQ looks forward to working with ODF to identify future monitoring needs in order to determine if and how much sediment and phosphorus loading comes to Tenmile Lakes from the forested landscape.

This TMDL did not define phosphorus load allocations for tributaries but rather focused upon a target for phosphorus in lake waters. DEQ will review all available scientific studies and water quality data again during future reviews of this TMDL.

Oregon's lakes are sensitive to sedimentation (filling) and the subsequent release of phosphorus sorbed to sediments. Available phosphorus in lakes is directly linked to nuisance algal bloom. Accelerated sedimentation results in reduced lake depth and provides area for nuisance weed growth. ODEQ looks forward to working with ODF to design future monitoring efforts to better define the level of sediment and phosphorus loading to Tenmile Lakes from the forested landscape.

19. Commenter (4)
Given the existing ODF study and monitoring results, it would be better to conclude that a load allocation for private forestlands is not supported at all. From a policy perspective, we believe the known sources of phosphorous above natural background levels that need to be addressed in the TMDL are well known. To allocate a load to forest management is a non-transparent policy choice to mitigate the known sources.

Response
Ten Designated Management Authorities (DMAs) were identified in the Tenmile Lakes Watershed Water Quality Management Plan (WQMP). Each of these entities has jurisdiction over an activity conducted in the watershed that has impacts or has the potential to impact water quality. As DMAs, each of these entities are required to develop a Water Quality Implementation Plan (WQIP) or review and revise their existing water quality related management activities and authorities in response to this TMDL and WQMP.

Each of these known sources has been asked to conduct activities that will reduce sediment and phosphorus loading to Tenmile Lakes. ODEQ disagrees that inclusion of the management entity responsible for oversight of Oregon's Forest Practices Act and the management of the Elliott State Forest is inappropriate. Nonfederal forest lands comprise 58% of the landscape in this watershed, thus including them in this assessment was appropriate.

The literature provided by ODF for ODEQ review indicated that the effects of sediment transport into lakes can result in the storage and release of phosphorus through time. The studies also infer that the effect of sediment delivery on lake water quality had not been adequately quantified in the studies you provided. ODEQ encourages ODF to continue to work with other DMAs, in partnership, to implement monitoring programs while continuing to implement activities to reduce sedimentation and the accelerated filling of Tenmile Lakes. Data collected between now and the review of this TMDL, scheduled for five year intervals, would be a valuable asset and could help refine loading scenarios and sources.

20. Commenter (4)

ODF and private forest managers' role in implementing the Oregon Plan for Watersheds would be more accurately described as a partnership, wherein the landowner community took the initiative and continues to demonstrate a strong ownership for their non-regulatory measures; as opposed to ODF 'encouraging' landowners to apply measures whenever and wherever possible. In fact, private forest land managers have contributed over 70% of private investments reported to the Oregon Watershed Enhancement Board to date. The private forestry community's Oregon Plan non-regulatory measures are not intended to 'be more protective' than rules. Non-regulatory measures provide alternate means to meet rule objectives, accelerate reaching a desired future condition (especially where historic practices have been a factor), or to test assumptions about what might work more efficiently. The private forestry community is currently considering a suite of potential new measures and updating existing measures, however, it is premature to list these. Once thoroughly considered, new or different ideas may emerge that provide an even better outcome (Draft WQMP, March 2006, pages 22, 51 and 144).

Response

Edit made to WQMP Section 4.3.1 Paragraph 4 now states; In addition, voluntary measures have been developed by the landowner community as part of the Oregon Plan for Salmon and Watersheds as part of the Private and Community Forest Program. These non-regulatory measures provide alternate means to meet FPA rule objectives and are designed to accelerate reaching a desired future condition or to test assumptions about what practices might work more efficiently. The private forestry community is currently considering a suite of potential new measures and possibly updating the existing voluntary measures

Edit made to WQMP Section 4.3.3 last sentence now states; ODF is expected to continue to work in partnership with landowners to implement OPSW voluntary measures, where these measures will result in the enhancement of fish habitat and/or water quality.

The following language was added to WQMP Section 7.2.3; In addition to implementing and enforcing the Forest Practices Act, ODF, BOF, and private landowners are involved in implementing the Oregon Plan. ODF Stewardship Foresters work in partnership with private land owners to implement voluntary measures to enhance streams and accelerate reaching a desired condition.

The Oregon Plan for Salmon and Watersheds represents a major effort unique to Oregon to improve watersheds and restore endangered fish species. Private forest land managers have contributed over 70% of private investments reported to the Oregon Watershed Enhancement Board to date. The Oregon Plan is a major component of the demonstration of "reasonable assurance" that this TMDL and WQMP will be implemented.

Edit made to WQMP Appendix E, Voluntary Measures section; ODF will continue to work in partnership with willing land owners to identify opportunities to implement Oregon Plan voluntary measures to further control sediment loading.

21. Commenter (4)
The TMDL states sedimentation is not addressed (Draft TMDL, March 2006, p. 32); then goes on to address it.

Response
ODEQ was not able to ascertain where the TMDL document stated that sedimentation is not addressed (reference not found on page on page 32). As stated in TMDL Section 4.3.4 "This TMDL identifies sediment load allocations for lake tributaries and targets interim load reductions for tributary sediment loads, sediment accrual rates (SAR), and total phosphorus in lake waters. These parameters tie directly to lake filling, a primary driver for the expansion of nuisance weeds and to the delivery of phosphorus via sediments."

22. Commenter (4)
The TMDL acknowledges the episodic nature of sediment inputs on one hand; then expresses sediment as a yearly figure on forestlands.

Response
TMDL Section 6.2 discusses seasonal variation and critical conditions associated with sediment loads. The TMDL acknowledges the episodic nature of sediment delivery in Section 6.2.1 and Section 6.2.2. The TMDL modeling basis is described in Section 6.2.1 "Data collection for use in the Tenmile Lakes Watershed TMDL assessment occurred between 1998 and 2001. This data was utilized to calibrate a predictive model. The largest pollutant loading event which occurred during this period happened in November 1998, during a storm event where 6.44 inches of rain fell in a five day period. This event represented a 2-year rainfall return interval, a relatively moderate event representing a rainfall event expected to occur 98% of the time on a yearly basis. More data will need to be collected over time to verify pollutant loading rates through a wider representation of rainfall events.

Predictive modeling for the Tenmile Lakes Watershed TMDL was conducted for the five year period 1990 through 1995 when weather was rather mild. There were only two discrete occurrences where monthly rainfall exceeded twenty inches during this period. The predominant storm events ***represent the two to five year return interval*** *range for this area. These are storm events which have a 95-98% chance of being exceeded in a given year.'*

TMDL Section 6.3.3.1 states; "The SWAT model was calibrated to individual storm flows which had occurred during the period of data collection. The calibrated model was then utilized to extrapolate pollutant loading for actual daily flows over a five-year period (1990 -1995)."

Sediment loads and load reduction targets were based upon modeling products for this five year period. Larger episodic events, known to increase sediment delivery, were not modeled for sediment loads. As stated above, more data will need to be collected, over time, to verify pollutant loading rates through a wider representation of rainfall events.

Because sediment loading was determined to be above the anthropogenic levels, even at the relatively normal magnitude storms which occurred over the modeled five year period, load reductions were developed to target these "frequent" rainfall return intervals. This approach focuses on controlling sediment during routine storm event as a starting point, with continuing efforts to quantify and abate sediment loading occurring during larger magnitude storm events.

23. Commenter (4)
A comparison of the Tenmile and Alsea watersheds is made and assumptions drawn with no acknowledgement that the Alsea study reflects pre-BMP results. One can make the case that increased sediment occurred prior to BMPs, and current BMPs are believed to have reduced this by more than 50 percent, so forest lands should already be achieving their targets (though because it takes a long time to move sediment to the lowlands, this may take some time before it can be observed). BMPs are in place, and it will take some time to observe changes at the bottom of the watershed. .

Response
The Alsea study was only utilized as part of the reference condition determination and as such only the baseline (pretreatment) dataset was utilized. The pretreatment data set represented landscape conditions prior to road building and timber harvest. The fifteen year study conducted in the Alsea River Watershed ultimately did examine sediment production under a variety of land management and hydrological conditions. The study provides a significant data set which represents conditions both prior to forest management, and after forest management.

The ODEQ recognizes that it can take some time to observe changes at the bottom of the watershed resulting from benefits realized from the implementation of improved management practices and that it can take time to move sediment from high gradient areas to the lowlands.

24. Commenter (4)
Given DEQ's own assessment of available data and analyses, it would be more accurate to state that currently information does not exist for non-federal forest lands, in the context of load allocations, and additional monitoring and analysis would be needed before such determinations could be made.

Response

TMDL Section 6.3.1.2 states; "Phosphorus concentrations and sediment yields were most intensively measured in Big, Benson, and Murphy Creeks, tributaries to Tenmile Lakes. Modeling was then utilized to derive annual phosphorus and sediment loads for lake tributaries (catchments). Because mixed land use activities are present in close proximity, datasets did not provide sufficient rigor to allow the derivation of load allocations specific to individual land uses. Future monitoring efforts should seek to better define phosphorus and sediment loading from specific land uses (e.g. forested landscape, agriculture, rural residential). "

TMDL Section 6.6.5 states; "Watershed wide excess loading of both sediment and phosphorus has been identified in this TMDL. Loading capacity and allocations were identified specific to tributaries with mixed land use (forestry, agriculture, and rural residential). Loading capacity and allocations were not identified specific to land use because the uses often overlap or are in close proximity to each other (agriculture pasture land on one side of the stream and forest lands on the other side of the stream) Loading allocations for urban sources were discretely defined. Lakefront sources were discussed. The level of uncertainty regarding this assessment is small and restoration efforts to reduce watershed wide sources of sediment and nutrients are technically warranted. There is ample opportunity to refine pollutant reduction targets as watershed conditions improved through time. Pollutant controls will be needed from all watershed sources and basin wide sediment abatement activities are crucial."

TMDL Section 6.11.1 states the need for additional water quality monitoring to quantify tributary sediment delivery during storm events and has been edited for clarification. The third bullet, Tributary Sediment Delivery, item # 3 now states;" …. to better quantify sediment loading within streams at land management interfaces (Elliott State Forest boundary and at the private forestry and agriculture land interfaces, etc.)"

WQMP Sections 4.3.3 and 7.2.1 (Basin Specific Rule) have been edited for clarification and now state; ODEQ encourages ODF to conduct monitoring to better define sediment loading from private and state forests in the Tenmile Watershed. ODF is expected to continue to conduct BMP effectiveness monitoring as funding allows as part of their ongoing programs.

WQMP Section 8.1.2 has been edited for clarification and now states; Suggested monitoring needs for the watershed and region as funding allows are:

- *Effectiveness Monitoring on FPA in small type N and intermittent streams*
- *ODEQ encourages ODF to conduct monitoring to better define sediment loading from private and state forests in the Tenmile Watershed*

WQMP Section 8.7 has been edited for clarification and the third bullet, Tributary Sediment Delivery, item # 3 now states;" …. to better quantify sediment loading within streams at land management interfaces (Elliott State Forest boundary and at the private forestry and agriculture land interfaces, etc.)."

25. Commenter (5)

These following three comments refer to the Draft Tenmile Voluntary WQ Implementation Plan. This is a document developed by the Tenmile Lakes Basin Partnership. Similarities exist between the document prepared by the TLBP and the WQMP developed by ODEQ. As such, some language was clarified in the Tenmile Lakes Watershed TMDL and WQMP in response to these comments.

Page 17—Implementation Plan Status—several, more recent documents are guiding our fish management to a greater degree than the 1991 Basin Plan, due to broad changes that have been made in native fish management in those 15 years. The Wild Fish Management Policy, touted as "new" in 1991, has been replaced by the Native Fish Conservation Policy (NFCP) in 2002. The Oregon Plan for Salmon and Watershed was developed in the late 1990's, out of the Oregon Coastal Salmon Initiative. An Oregon Plan "Coastal Coho Assessment" was completed in 2005, compiling the latest information from multiple state agencies on the viability and sustainability of native coho populations. A draft Oregon Native Fish Status Report is now available, which describes the current status of Oregon's native fish species. Under current development is the State of Oregon's Coastal Coho Conservation Plan, which involves all natural resource agencies including DEQ. These guiding documents, as well as the results of intensive Oregon Plan monitoring of native fish and their habitats, are much more relevant to the management of Tenmile Basin native fish stocks than much of the information and strategies in the 1991 Basin Plan.

Response
The information in the WQMP, Section 4.6.2 has been edited to reflect the information below;

ODFW developed the Tenmile Basin Fish Management Plan in 1991. This plan serves to guide the management of a variety of fisheries and their habitats. The information and strategies in this 1991 Basin Plan address both introduced and native fishery management issues and objectives.

Several, more recent documents are also guiding ODFW fish management strategies related to salmonid species. These plans include the 2002 Native Fish Conservation Policy (NFCP), the Oregon Plan for Salmon and Watershed (late 1990's), the Oregon Plan "Coastal Coho Assessment" (2005), and the draft Oregon Native Fish Status Report. The State of Oregon's Coastal Coho Conservation Plan is currently being developed. These guiding documents, as well as the results of intensive Oregon Plan monitoring of native fish and their habitats, are relevant to the management of Tenmile Basin native fish stocks. .

26. Commenter (5)
Table 4—again this document identifies the 1991 Basin Plan as our Implementation Plan (see comments immediately above.) (Also, it lists ODFW as "Oregon Dept. of Wildlife").

Response
Update language was integrated in response to comment # 25. The information in the WQMP Section 4.6.2 has been edited.

27. Commenter (5)
Implementation Plan Tables (back of document)—the implementation plan tables in the back of the document refer to a "Biomanipulation Study" with regard to non-native fish. I could not locate a description of this study in the document, so I'm not sure what it entails or its feasibility.

Response
Reference to ODFW monitoring has been updated in TMDL Section 8.5 and WQMP Section 6.11.1 to clarify the need for a study to determine non-native fish population levels. This information will be utilized to assess biomass and subsequent nutrient loading from the non-native, introduced fishery. Determining population levels will assist in quantifying extent of impacts to the lake algal communities that can result from preferential grazing of zooplankton by these fish species.

28. Commenter (5)
Page 134—Table 50—should be "Oregon Dept. of Fish and Wildlife."

Response
Edit made to document. Change made to Table 50 at the bottom of the column titled ***Designated Management Agency*** *from "Oregon Department of Wildlife" to "Oregon Department of Fish and Wildlife."*

29. Commenter (5)
Page 22—coho escapement exceeded 10,000 fish in recent years: 11,039 for 2001; 13,861 for 2002;.

Response
The following language was added to TMDL Section 3.1.2; Coho escapement numbers increased in 2001 to 11,039 and in 2002 to 13,861 (pers. Comm., Mike Gray, Coos Bay District Biologist).

30. Commenter (5)
Table, Page 23—coho escapement estimates for 1995-2004 averaged 7,400. (higher than listed in TMDL) Winter steelhead—hatchery stock was re-founded around 1999-2002, using strictly Tenmile unmarked adults as broodstock. We now consider it to be a "localized" broodstock. Rainbow trout—managed as a "put and take fishery" but some holdovers do survive; some are caught at 17" length and greater within the next few years after stocking. Yellow perch were absent from the lake for several decades following the rotenone treatment; they re-appeared in 2000 in annual gillnet lake sampling, and are now re-established. Hybrid bass observations have nearly disappeared. The last observation of a hybrid bass by ODFW staff was in 2004. Smallmouth bass have appeared in Eel Lake, apparently from illegal introduction. Confirmed in 2005 by ODFW District

electrofishing. ODFW fish Division records indicated that kokanee were stocked in Eel Lake in 1968, in Clear Lake in 1967, and in Saunders Lake in 1967. In the absence of suitable spawning habitat, and through evidence collected in annual sampling with gillnets and/or electrofishing, we have no indication that they were self-sustaining to present. Anglers today often mistake coho smolts for "kokanee." I wouldn't use the term "currently" when quoting the Tenmile Basin Plan (1991)—that's 15 years old. Bluegills are abundant, but may not be the most abundant fish at present (also stated on page 24). We don't have a current population estimate, although we conduct annual gillnet sampling for relative abundance at index sites. In some years, other species are more abundant than bluegill in our gillnet samples. The various warmwater fish populations have fluctuated significantly in recent years, which is typical.

Response

The following language was added to TMDL Section 3.1.2; Coho escapement estimates for 1995-2004 averaged 7,400. Winter steelhead hatchery stock was re-founded around 1999-2002, using strictly Tenmile unmarked adults to develop "localized" broodstock. Rainbow trout are managed as a "put and take fishery". Some are caught at 17" length and greater within the next few years after stocking and some holdovers do survive. Yellow perch were absent from the lake for several decades following rotenone treatment but they re-appeared in 2000 in annual gillnet lake sampling, and are now re-established. Hybrid bass observations have nearly disappeared with the last observation of a hybrid bass by ODFW staff was in 2004.

Smallmouth bass have appeared in Eel Lake, apparently from illegal introduction and their presence was confirmed in 2005 by ODFW District electrofishing. ODFW fish Division records indicated that kokanee were stocked in Eel Lake in 1968, in Clear Lake in 1967, and in Saunders Lake in 1967. In the absence of suitable spawning habitat, and through evidence collected in annual sampling with gillnets and/or electrofishing, there is no indication that they were self-sustaining to present.

Bluegills are abundant, but no current population estimate is available. Annual gillnet sampling for relative abundance at index sites is conducted but it is not possible to derive lake population estimates from this information. The various warmwater fish populations have fluctuated significantly in recent years, which is typical based upon both population dynamics and the current sampling methodology.

The TMDL Section 3.1.2.1 reference to Bluegill as the most abundant fish at present has been removed.

31. Commenter (5)

Page 25—the final paragraph of that sentence refers to adult salmon, when the juvenile life history is most affected. The lakes are just a migratory corridor for adult salmon. The portion of the salmonid life history that is impacted is juvenile rearing in the lakes. Reimers (1989) hypothesized that "nomad" coho fry that migrated down to the lakes from streams above were no longer able to survive to any great degree, mostly due to the change in fish species composition in the lakes. Juvenile salmonids that travel through the

lakes in their final winter of rearing and pass through the lakes to the ocean are still apparently successful. They are passing through the lakes at a period of time when water temperatures are cool and predator feeding rates are low. Also, larger salmonid smolts tend to be more pelagic in the open water of the lake, whereas the "nomad fry" in their first summer tend to be more shoreline/shallows-oriented, where predators are more common. Salmon smolts that utilize the lakes prior to moving out to the ocean attain a relatively large size as compared to stream-reared coho smolts. This size advantage in the ocean appears to provide a survival advantage, keeping the lake system one of the most stable and healthy coho populations along the Oregon Coast, albeit at a reduced number compared to historic run sizes. [Reimers, P.E. 1989. Management of wild and hatchery coho salmon in the Tenmile Lakes system. Information Report #89-5. Oregon Dept. of Fish and Wildlife. Portland.]

Response
The following language was added to TMDL Section 3.1.2.1; "It appears that juvenile salmon are significantly outnumbered by non-native fish populations in Tenmile Lakes. Reimers (1989) hypothesized that "nomad" coho fry that migrated down to the lakes from streams above were no longer able to survive to any great degree, mostly due to predation resulting from the change in fish species composition in the lakes. The implications of this native salmon verses warm water predatory fish imbalance, and the potential implications on nuisance algae blooms, suggests that further assessment is warranted in this watershed.

Juvenile salmonids that travel through the lakes to the ocean in their final winter of rearing are still apparently successful. They are passing through the lakes at a period of time when water temperatures are cool and predator feeding rates are low. Also, larger salmonid smolts tend to be more pelagic in the open water of the lake, whereas the "nomad fry" in their first summer tend to be more shoreline/shallows-oriented, where predators are more common. Salmon smolts that utilize the lakes prior to moving out to the ocean attain a relatively large size as compared to stream-reared coho smolts. This size advantage in the ocean appears to provide a survival advantage, keeping the lake system one of the most stable and healthy coho populations along the Oregon Coast, albeit at a reduced number compared to historic run sizes."

32. Commenter (5)
Page 45- Eutrophication – as pointed out, eutrophication is a natural progression for lakes, occurring over long periods of time in an unaltered environment. Work by Eilers and others, especially with regard to SAR, have shown that an unaltered upper watershed (post WWII) and lake nutrient inputs are accelerating the rate of lake shallowing and eutrophication. The change in fish species composition in the lakes may be contributing to eutrophication, but may also be benefiting as a result of eutrophication. Exotic plant species may also be contributing to the accelerated rate of eutrophication.

Response
We agree that eutrophication is part of a natural progression in lakes. The TMDL assessment indicates that the rate of eutrophication has accelerated in Tenmile Lakes. As

the lake gets shallower through sedimentation, more habitat is present for exotic plants species to colonize. The change in fish species in the lake has likely added to the biomass (nutrients cycling in the lake) and has likely altered the algal community composition as a result of preferential grazing on zooplankton. Because non-native fish species can benefit from habitat with cover, these fish species are benefiting from the increased weed growth. In this way non-native fish species can benefit from the eutrophication of the lakes.

33. Commenter (5)
Page 135—Table 51—the Implementation Plan listed for ODFW (Tenmile Basin Fish Mgmt Plan—1991) is still in place, but a number of things have changed that make parts of the Basin Plan out of date. Hatchery coho releases have been discontinued; coho salmon were Federally listed for a time; harvest of coho was discontinued in the Basin. The age of the Basin Plan should be considered when using it as a reference. (See discussion below, regarding Implementation Plan Status).

Response
The information in the WQMP Section 4.6.2 has been edited as described in the response to question 25. No change was made to table 51 because the 1991 Tenmile Basin Fish Management Plan is the most current multi species management plan for this watershed.

The information in the WQMP Section 4.6.3 has been edited and now states; "ODFW will be asked to address these issues in the context of the Fish Management Plan for the Tenmile Lakes Watershed. One venue for accomplishing this task might be to update the 1991 Tenmile Basin Fish Management Plan."

34. Commenter (5)
References—the references include Dambacher, et al. (1999), a modeling of the effects of exotic fish introductions into Tenmile Lakes. One of the conclusions of that study was that with the complex nature of the food webs now in existence in the lakes, management options and control are limited. Attempts to manipulate the system by manipulating one species can have negative or reverse effects to the intended.

Response
The following language was added to TMDL Chapter 3, Paragraph 2; Because of the complex nature of the food webs now in existence in the lakes, management options and control are limited. Attempts to manipulate the system by manipulating a single species can have negative or reverse effects to those intended.

35. Commenter (5)
While the Basin Plan was Commision-adopted, and some of the basic tenets of the plan are still in effect, the Basin Plans are meant to be re-visited and updated periodically, a task that ODFW has not had the resources to do in light of the above-mentioned efforts. On Page 46, the table indicates that ODFW would evaluate our Fish Management Plan by the latter half of 2008. ODFW will need to determine the feasibility of re-opening our Tenmile Basin Plan for potential revision in the next two years. With regard to coho

salmon, the basin plan will be reviewed for consistency with the coastal coho conservation plan and revised as necessary; once the conservation plan is adopted (Nov-Dec 2006).

Response
ODEQ is asking that ODFW begin the process wherein non-native fish population studies would be conducted and to then use this information to update a multi species plan for the Tenmile Watershed. The current multi species management plan for Tenmile Watershed is the 1991 Tenmile Basin Fish Management Plan. We realize that this task is resource dependant and we are hopeful that these tasks can be elevated in priority as a result of this TMDL and WQMP. ODEQ commits to support ODFW, as possible, to initiate these tasks.

36. Commenter (5)
The following excerpts from the NFCP may help to explain the relationship between the Basin Plans and the NFCP: 635-007-0505 Cooperative Recovery Planning

(11) In implementing the Native Fish Conservation Policy and consistent with the Oregon Plan, the Department will encourage the development of complementary policies and plans by other state and federal regulatory agencies and tribes that supports a unified conservation effort.

(12) The Commission shall revise existing fish management basin plans as necessary to support the implementation of Native Fish Conservation Policy conservation plans. The Commission shall make appropriate revisions to affected fish management basin plans when the Commission approves the corresponding conservation plan. Pending approval of a specific conservation plan, the conservation of native fish populations shall be guided by fish management basin plans. However, if adherence to such basin plans will likely prevent the affected populations from meeting the Native Fish Conservation Policy interim criteria described in 635-007-0507, then the interim criteria will be used by the Department to guide the conservation of native fish populations. For those populations without basin plans, the Department shall use the Native Fish Conservation Policy interim criteria described in 635-007-0507 to guide the conservation of such populations.

Response
Because of the adverse impacts that non-native fish populations can have on water quality ODEQ is requesting that ODFW consider updating the Tenmile Basin Fish Management Plan. ODFW may want to suggest other planning venues into which to incorporate the management of non-native fish present in Tenmile Lakes. For example, ODFW may find this process to be valuable as a tool to better understand and manage native fish, and to implement the Native Fish Conservation Policy.

37. Commenter (5)
Thank you for the opportunity to comment on the Draft TMDL, WQMP, and WQ Implementation Plans. If you have questions regarding our comments, I would be happy to discuss them with you.

Response

ODEQ appreciates the comments provided by ODFW. We look forward to the continuation of a productive working partnership as we begin to implement the Tenmile Lakes Watershed TMDL and WQMP.

Attachment 1

(Response 18 References)

The study titled PHOSPHORUS AND FOREST STREAMS: THE EFFECTS OF ENVIRONMENTAL CONDITIONS AND MANAGEMENT ACTIVITIES states;

- *Page 9 - Results of studies in lake sediments suggest that under anaerobic conditions sediments may release phosphate, while under aerobic conditions phosphate is held in sediments (Mortimer, 1971).*

- *Page 16 - Holton et al. (1988) indicate that the fraction of total phosphorus carried as dissolved load in a stream is small in comparison to that carried as particulate matter, most of which moves during high flows.*

- *Page 16 - The authors concluded that the correlation between orthophosphorus and total suspended sediment loads implies that orthophosphorus enters the stream as particulate organic matter or bound to soil. Stumm and Morgan (1970) report that sediments can act as reservoirs of phosphorus; the amount of phosphorus in the aqueous phase being only a fraction of that in the solid phase.*

- *Page 19 - Particulate phosphorus that is moved downstream to areas of different pH or redox potential may be converted back to the dissolved form.*

- *Page 19 - Because particulate phosphorus moves primarily during high flows, it is necessary to intensively sample during the times when sediment concentrations are fluctuating to accurately estimate particulate phosphorus export.*

- *Page 19 - Nalewajko and Lean (1980) reviewed the literature concerning the exchange of phosphorus between water and sediments in lakes. Under anaerobic conditions sediments generally release phosphorus, while under aerobic conditions phosphorus is held in sediments…..*

- *Page 22 - The primary physical factors affecting phosphorus uptake appear to be those that increase the retention time of water flowing through a section of stream, which increases biological uptake time.*

The study titled EFFECT OF ENVIRONMENT ON PHOSPHORUS IN STREAMS states;

- *Page 66 - Chemical and physical processes in lakes may influence phosphorus concentrations of out flowing streams. For example, soluble phosphate can accumulate in oxygen-poor lake bottoms through decomposition of plankton, and reduction of iron precipitates containing phosphates (Stumm and Morgan, 1970). Larsen and Mercier (1976) report that phosphorus retention by lakes is dependent on lake volume and shape, and phosphorus inputs. Retention can vary from zero to 90% of the total phosphorus load. In southern Ontario Province,*

Dillon and Kirchner (1975) found that lakes acted as phosphorus traps, causing downstream decreases in expected phosphorus loads.

- *Page 92 - Sullivan (1985), after reviewing the literature on forest management effects on water quality in the Pacific Northwest, concluded that the most significant problem is the impact on sediment export (Examples from; Fredriksen, 1970; Brown and Xrygier, 1971; Swanston and Swanson, 1976; Beschta, 1978). Most increases in sediment from forest lands are road related (Fredriksen, 1970). Poor road location or construction can result in increased mass failures on steep slopes (Dyrness, 1967; Swanston and Swanson, 1976). Drainage ditches and road surfaces are additional sources of sediments (Reid, 1981). Improved forest management practices, as required by Oregon's Forest Practices, can reduce erosion and sedimentation (Beschta, 1978; Fredriksen and Harr, 1979; McCashion and Rice, 1983). However, there is still concern that cumulative sediment impacts may occur as forest watersheds are progressively harvested (Swanson and Fredriksen, 1982; Geppert et al., 1983).*

These studies conclude;

- *Page 145 - The interaction of aqueous phosphorus concentrations and sediment is complex. However, in most situations phosphorus is tightly sorbed by sediment particles. The net effect of phosphorus sorption by stream sediments is to convert dissolved phosphorus to fine particulate phosphorus. During periods of high stream flow, the amount of dissolved phosphorus export is relatively small in comparison to the amount carried with inorganic sediments and/or organic matter.*

- *Page 155 - Increased sediment production, particularly in steep terrain, has been identified in numerous studies as a significant problem associated with forest disturbance. However, rarely in the scientific literature is the sedimentation concern expressly tied to potential changes of instream phosphorus concentrations. Based on information from historical watershed studies, many of the current forest practices have been implemented to reduce or minimize accelerated sediment production. However, few watershed scale research programs have been undertaken to evaluate the relative success of these forest practices.*

- *Page 157 - Phosphorus represents a small portion of the mineralogical composition of rock types. However, because stream concentrations are also generally low, a mass balance calculation of phosphorus export from forest watersheds will indicate a substantial amount of phosphorus is carried by sediment. The vast majority of this phosphorus is contained within the mineral lattice of the sediment and hence is "unavailable" for solution. Furthermore, phosphorus tends to be readily adsorbed to the surfaces of sediment particles. Because most sediment transport occurs during the winter - months in the Oregon Coast Range, the importance of such transport to summertime phosphorus*

concentrations in the Tualatin River may be of little significance. However, the phosphorus/sediment dynamics of stream systems in the Pacific Northwest, and elsewhere, has received little research attention.