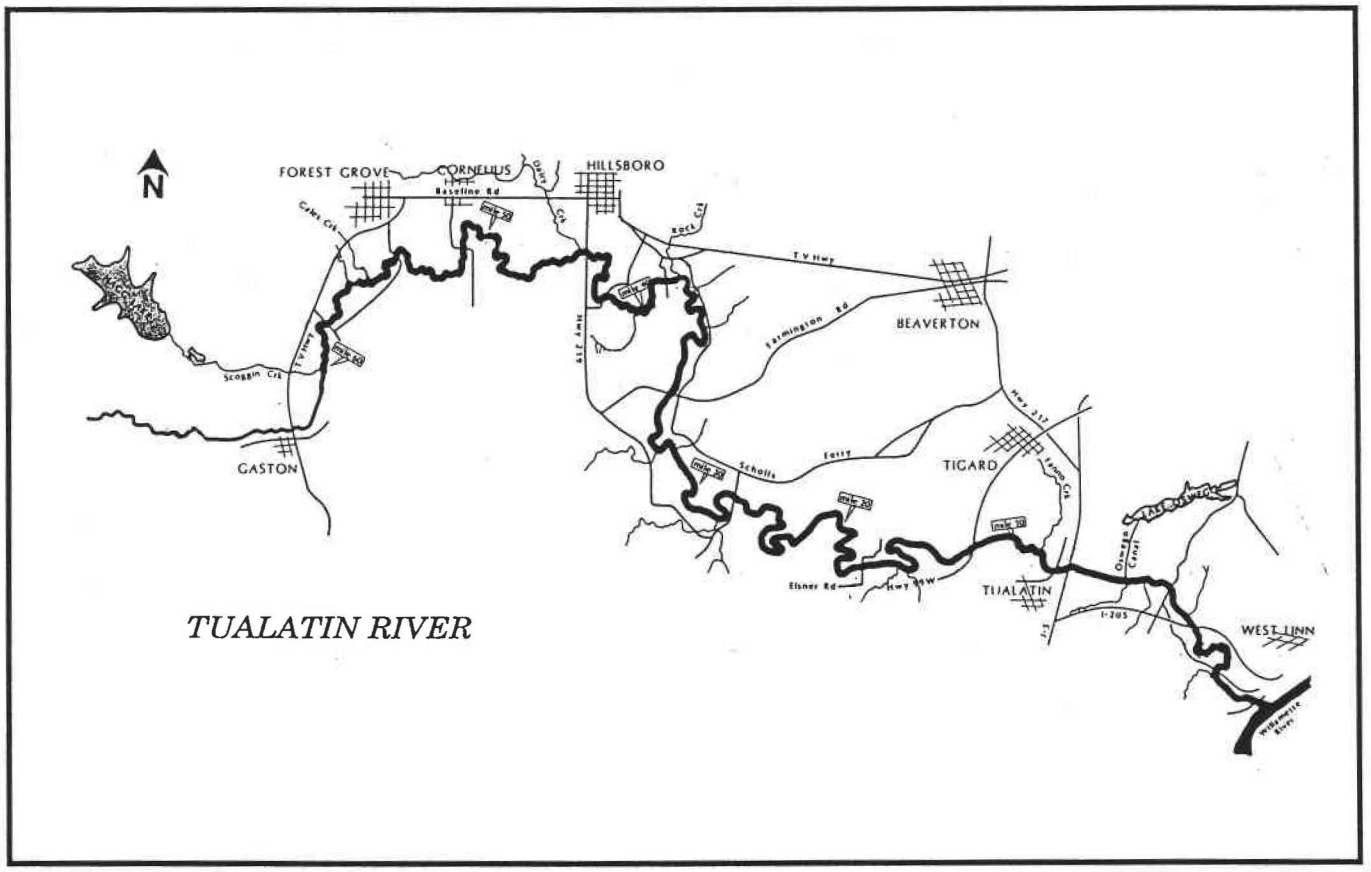
Response to Comments Received on the March 1993 Tualatin Water Quality Study Report



TUALATIN RIVER

August 1995

A Publication of the:

Oregon Water Resources Research Institute

TUALATIN RIVER BASIN SPECIAL REPORTS

The Tualatin River Basin in Washington County, Oregon , is a complex area with highly developed agricultural, forestry, industrial, commercial, and residential activities. Population has grown in the past thirty years from fifty to over 270 thousand. Accompanying this population growth have been the associated increases in transportation, construction, and recreational activities. Major improvements have occurred in treatment of wastewater discharges from communities and industries in the area. A surface water runoff management plan is in operation. Agricultural and forestry operations have adopted practices designed to reduce water quality impacts. In spite of efforts to-date, the standards required to protect appropriate beneficial uses of water have not been met in the slow-moving river.

The Oregon Department of Environmental Quality awarded a grant in 1992 to the Oregon Water Resources Research Institute (OWRRI) at Oregon State University to review existing information on the Tualatin, organize that information so that it can be readily evaluated, develop a method to examine effectiveness, costs and benefits of alternative pollution abatement strategies, and allow for the evaluation of various scenarios proposed for water management in the Tualatin Basin. Faculty members from eight departments at Oregon State University and Portland State University are contributing to the project. Many local interest groups, industry, state and federal agencies are contributing to the understanding of water quality issues in the Basin. This OWRRI project is based on all these research, planning, and management studies.

This publication is one in a series designed to make the results of this project available to interested persons and to promote useful discussions on issues and solutions. You are invited to share your insights and comments on these publications and on the process in which we are engaged. This will aid us in moving towards a better understanding of the complex relationships between people's needs, the natural environment in which they and their children will live, and the decisions that will be made on resource management.

RESPONSE TO COMMENTS RECEIVED ON THE MARCH 1993 TUALATIN WATER QUALITY STUDY REPORT

Comments by
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The Tualatin River Basin Studies are being done under a grant from the Oregon Department of Environmental Quality to the Oregon Water Resources Research Institute at Oregon State University. Published by the Oregon Water Resources Research Institute.

Tualatin River Basin Water Resources Management
Report Number 12

RESPONSE TO COMMENTS
TUALATIN WATER QUALITY STUDY

The pages which follow contain the authors responses to a series of comments that were received in response to "A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin," submitted to the Oregon Department of Environmental Quality (DEQ) on March 1, 1993. The authors are deeply indebted to the various people who commented on the report. Their comments have brought additional insights to the challenge of restoring water quality in the Tualatin River. It is the future to which these interested citizens, administrators, and scientists have contributed.

The comments listed in this document were received from three sources. They are treated in sections based upon those sources. In the first section are the comments that were shared during the March 15, 1993 public hearing hosted by the Department of Environmental Quality. This hearing was held in the Washington County Public Services Building, Neil Mullane, Hearings Officer. Seven people presented testimony. Those testifying are identified in Appendix A along with the official summary of the testimony.

The second set of comments is based on the written comments submitted in response to the DEQ invitation in association with the March 15 public hearing. Copies of the written comments are included as Appendix B of this document. Ten individuals and organizations prepared written comments. They are:

David Kliewer, Watershed/Stormwater Division Manager, City of Portland

Jerry Rodgers, Tualatin Basin Watermaster, Oregon Department of Water Resources

William Gaffi, Director Planning and Engineering Department, Unified Sewerage Agency

Roger May, President, Lake Oswego Corporation

Troy Horton, Chairperson, Friends of Cedar Springs

Donna Hempstead, Tualatin Basin Coordinator, Multnomah County

David Dagenhardt, Forest/Water Issues Coordinator, Oregon Department of Forestry

William Wersch, Concerned Citizen, Wilsonville

Leonard Stark, Concerned Citizen, Lake Oswego

The third set of comments was submitted by nonpoint water quality specialists in response to individual requests by the authors of the draft report. These persons were selected based upon their previous experience with water quality issues similar to those encountered in the Tualatin Basin or for other specific subject matter expertise that was thought to be helpful to the authors and to the DEQ.

The invited peer reviewers were as follows:

Lynn R. Shuyler	Nonpoint Source Coordinator U.S. Environmental Protection Agency Chesapeake Bay Program Annapolis, Maryland
Frank J. Humenik	Professor Department of Biological and Agricultural Engineering North Carolina State University
Terry J. Logan	Professor Agronomy Department Ohio State University
Howard R. Thomas	Head, Water Quality Staff West National Technical Center Soil Conservation Service, USDA
Dennis Lynch	Hydrologist U.S. Geological Survey Portland

Copies of the written comments received from the invited peer reviewers are included in Appendix C.

In the interest of brevity and to spare the reader unnecessary repetition, not all comments have received individual attention in this document. Comments that had been treated earlier were not repeated nor were those that suggested an editorial modification or other change for which discussion would not be instructive. All reviewers and persons who made comments should, however, be assured that their comments were read and given careful consideration. The authors of this report and all those who eventual benefit from the improved quality of the Tualatin River are indebted to the various reviewers and persons who commented.

RESPONSE TO COMMENTS
TUALATIN WATER QUALITY STUDY

Oral Comments Presented at the March 15, 1993 Public Hearing Hosted by the Oregon Department of Environmental Quality

1. Wants a clear problem description, accounting of what has been done, process goals, and an inventory of phosphorus sources. (Arvidson)

Every effort has been made to provide a complete report balanced with the need in the summary document to provide the material in a concise package. The problem description in the report frames the problem in two ways: the biological perspective and the phosphorus perspective. A complete accounting of what has been done is not specifically included. Pollution control efforts have been underway in the Tualatin for decades. This study recognizes the success of these previous efforts. Had not the urban areas adopted an aggressive sewage treatment strategy, were there not an intensive urban runoff management program, a forestry practices act, an agricultural erosion control program, and many other efforts underway; the quality of the Tualatin River would be far more severely degraded than what is currently experienced. There is no intention in this study to minimize the previous efforts but to analyze the current situation and to suggest a strategy or set of alternate strategies to move the Tualatin toward the established water quality criteria.

Although it would be desirable to have a reliable inventory of phosphorus sources in the basin, a reliable and precise inventory is not currently possible. The data suggest that during the summer months, there is more phosphorus in the river than a tally of the known point sources would suggest. This leads the investigation to conclude that there is a major inflow of phosphorus carried by subsurface water entering the stream or by interchange between the flowing water and the stream bottom materials. Winter runoff carried sediment may contribute to this latter situation. Additional research and testing has been proposed to further define the magnitude of these alternatives.

2. Have the previous water quality enhancement efforts in the Tualatin River Basin been successful? (Arvidson)

Although not specifically addressed in the report, there is ample evidence to suggest that the various organizations and agencies with water quality responsibilities have performed well and have been successful. Unfortunately, the negative impacts of development, population growth, intensive cropping, large animal numbers and the other activities within the basin have simultaneously changed the very nature of the river and have lessened the effectiveness of some of the natural purification processes that have historically contributed to water quality. The investment in sewage treatment upgrades, in erosion control, in urban runoff management and in more highly regulated forestry management have all improved the quality of the river. The paving of previously pervious surfaces, the filling of natural wetlands, the draining of agricultural lands, the construction of homes, businesses, and industrial development along the river have led to changes in the hydrology of the area that contribute to lower summertime flows, warmer water temperatures, increased nutrient concentrations, and longer residence time in the lower reaches of the channel. These latter impacts have contributed to the current water quality problems that this study is attempting to address.

3. The report could be improved with a discussion of what this particular report added to the Tualatin effort, overall. (Gaffi)

This report was addressed to the legislature who requested the report be prepared. It was intended to draw the available information together, to organize that information in a meaningful way, and to identify and evaluate alternative measures that could be taken to resolve the quality problems of the Tualatin River.

4. The entire report should undergo peer review. (Gaffi)

Peer review for the report has been obtained. The written comments of five nationally recognized water quality specialists are included in the Appendix C of this document. Authors responses to those peer review comments are included in this document. It is further anticipated that the final document will be subjected to

peer review by the DEQ.

5. Have other water quality problems such as temperature been considered? (Gaffi)

The data have been reviewed to consider toxicity. Temperature has been considered and it is appreciated that elevated water temperature contributes to the algae growth that is encountered. The remedial measures suggested would respond to the elevated temperature problems.

6. What would be the impact of additional flow from the Barney Reservoir? (Gaffi)

The impact of additional flow was considered in preparation of the report. That analysis served as the basis for the recommendation that flow augmentation should be considered in the short-term response to the Tualatin River problems.

7. Concern was expressed that best management practices are not currently being used for road construction projects. (Moore)

The report is very specific in indicating that whatever remedial actions are adopted, best management practices must still be employed in all matters of forest, agriculture and urban nonpoint sources of pollution. The USA has an aggressive surface water management plan in operation that will require continued oversight and enforcement if the objectives established for the Tualatin River are to be achieved.

8. There is a need for more, cooler, and cleaner water than is currently in the river. (Brosy)

The report is supportive of this comment. This thought provides the basis for the increased flow recommendation.

9. Algae are not a problem in themselves but the problem is the timing of the blooms. (Brosy)

It is hard to separate the algae from the bloom timing. The algae blooms contribute to the lowered dissolved oxygen measured in the

stream. The algae also provide a green to brown color of the water which is perceived as a problem. It is also clear that the growth of algae is a symptom rather than the cause of water quality problems. Contributing factors include nutrient (phosphorus) concentrations, storage time in the lower river pool, and water temperature. The long and short term actions proposed in the draft report were designed to respond to each of these contributing factors.

10. Opposition was expressed to the removal of the Lake Oswego diversion dam and to the location of a dam at Cherry Grove in Patton Valley. (Stark)

It is clear from this comment and from many other informal comments received that there would be considerable opposition to any change either to the Lake Oswego diversion dam or to the construction of a new water storage within the Tualatin Basin. Further, the application of the stream model indicates that there would be only marginal benefit involved in removing the --- boards on the Lake Oswego diversion dam. The reduction in residence time in response to this change does not cause a significant decrease in algae growth.

The construction of new water storage structures within the basin was proposed because of the clear need for additional flow during the summer period. The high cost of land acquisition and the perceived opposition to new reservoirs has diverted storage considerations to increasing the storage capacity in Hagg Lake or in the Trask River (Barney Reservoir). Either of these sites offer the possibility of additional water flow without the addition of a new reservoir and the dislocations associated with the construction of a new structure.

Written Comments Presented in Response to the March 15, 1993 Public Hearing Hosted by the Oregon Department of Environmental Quality

11. Report contains very little new and mostly unsubstantiated information. Report is very philosophical in tone. (Kliewer)

The contract to conduct the study charged the team to assemble and analyze existing information and based upon that analysis make recommendations to the Department of Environmental Quality, the Oregon Legislature, and the affected people as to how the Tualatin can be improved to meet the established water quality standards. It is unfortunate there is not a readily applied technical solution to the water quality problems of the Tualatin River but instead may require a re-examination of some more basic issues regarding economic development, land use planning, and population distributions.

Measurements have been cited when they were available to test concepts. Many concepts could not be tested in this way. The ideas are important, however, and serve to raise the questions that will define the issues.

Water quality, and what citizens want the Tualatin River to be, is an issue of values. This leads to the philosophical tone.

12. The authors of the report did not adequately coordinate with the Designated Management Agencies (DMAs) to determine what BMPs are being applied and the result of their application. (Kliewer)

The authors of the report acknowledge that they have not adequately met with the various DMAs nor have they fully acknowledged the application of BMPs in this summary report. The relatively limited time allowed for the completion of this study has restricted the opportunity for agency input, however, three public meetings were held at various locations within the basin. The purpose of these meetings was to gather public input and to better understand programs currently underway. Please see the response to related comment No. 2 above.

13. The tone of the report implies that BMPs are not being aggressively implemented in the urban areas. (Kliewer)

It was not the intent of the authors of the draft report to imply anything less than admiration for the BMP implementation efforts of the DMAs. The authors are aware that several surface water management activities are underway within the urban areas to reduce

nonpoint source pollution. The authors also acknowledge extensive investment and change have been undertaken in the agricultural and forested areas of the basin. Unfortunately these activities have not been sufficient to restore the quality of the river nor does the study indicate that their application will sufficiently reduce the nutrient concentrations, water retention time nor water temperature to sufficiently constrain the algae population. Thus the report supports a continued aggressive BMP application effort but further suggests that the changes made in the basic groundcover of the basin and the resulting hydrologic changes will require actions beyond BMP application to reach the water quality criteria established for the Tualatin River. See comment No. 2 above.

14. The report should include a more complete discussion of all the options considered and the anticipated impacts on the ecosystem. (Kliewer)

A series of detailed scientific analyses have been conducted in pursuit of this project. The result of those individual studies have been/or are being released. Those individual reports will contain some of the requested documentation. Every effort has been made to restrict the size of the summary report so it will be useful to policy makers and others assigned leadership responsibilities within the Tualatin Basin. Many of these people have little interest in reading the detailed technical information.

15. The report implies that sufficient information does not exist to make decisions on improving water quality in the Tualatin River. (Kliewer 1.1)

There is sufficient information to support the water quality steps that have been taken in the past to improve water quality in the Tualatin River. Improved sewage treatment and aggressive control of nonpoint source pollution has benefitted the river. These improvements have been reflected in the monitoring program. Next steps in the process have been proposed. Unfortunately learning should not stop at this point. There are water quality processes underway in the Tualatin Watershed that make it a unique situation and one worthy of an action program supplemented by continued learning.

16. This report should incorporate the results of the USGS study on the impacts of groundwater on the phosphorus loading of the river. (Kliewer 2.1)

Agreed. The results of the USGS study of the Tualatin Basin will be incorporated to the extent to which those results are released prior to the submission of this report.

17. What about the equilibrium effects on phosphorus concentrations. Is there enough phosphorus bound on sediment to promote algae growth even if further input were halted? (Kliewer 2.2)

The story of phosphorus transformations and equilibria is still incomplete. The analyses that were conducted do not indicate that a reduction of summertime phosphorus inputs, whether from groundwater or sediment transfer, would significantly reduce the frequency or severity of algae blooms. Additional flow, 100 cfs, would reduce those blooms, however.

18. The recommendation, "to engage the public in a long term planning process" should be a suggested long term action item as well as a short term item. (Kliewer 2.3)

Agreed.

19. The impact of Native Americans, African Americans and Asian Americans should be included along with EuroAmericans in discussing the changes to the Tualatin landscape. (Kliewer 9.1)

The legislation establishing this study specifically requested that the impact of development impacts be investigated since the time of EuroAmerican settlement. There is a document being prepared, however, that attempts a broader examination of development in the basin. The major landscape changes creating the water quality problems currently being faced are, however, largely related to landscape changes occurring since the 1840 arrival of early EuroAmericans.

20. The "Aquatic Health of the River" section seems to be

unsubstantiated opinion and not a "scientific document". (Kliewer 13.1)

There have been only limited biologic data collected along the length of the Tualatin River in an organized fashion and over a sustained period. In spite of this limited data it was considered critical that the report consider the biologic aspect of the Tualatin. The considered opinion of an experienced biological scientist frequently provides insights that would not come from unlimited chemical data.

21. What does, "A river is a functioning part of the landscape." mean? (Kliewer 13.2)

This statement means that the river is related to the landscape which surrounds it. Changes to the landscape will impact the way the river functions. In the case of the Tualatin, this means that paving of the landscape and draining the wet areas causes more rapid loss of winter precipitation, lower summertime streamflows, and greater opportunity for algae growth.

22. What kind of interaction is meant in the p 12 statement, "much more interaction of the River with its surrounding land."? (Kliewer 13.3)

This statement refers to the extensive area that was devoted to swamps and wetlands. As development has prompted the drainage of swamps and wetlands, the river has lost the benefit of both the water storage and summertime nutrient removal benefits of these features.

23. What is the intent of the term productivity in the page 13 statement, "For the last 150 years the Tualatin Basin has been central to development and productivity in the upper Willamette Valley."? (Kliewer 13.4)

In this case, productivity refers to economic productivity. The remainder of the paragraph identifies this productivity in urban and agricultural settings.

24. Is the author suggesting there is insufficient data to launch an action program in the page 14 statement, "Baseline biological data is needed across entire basin to assess present conditions as a basis for management."? (Kliewer 14.1)

The report does not promote a program of waiting while additional data are accumulated. It is important, however, that if progress is to be measured in terms of the biological health and integrity of the stream, then a sound baseline is essential. See also Item 20 above.

25. Explain the meaning of + and - signs on Figure 2. (Kliewer 18.1)

A positive signs mean that if you move in the direction of the arrow the block to which you are moving will increase with an increase in the box you just left. A negative sign means that the box to which you are moving will decrease with an increase in the block which you just left.

26. Figure 2 indicates the only sources for available phosphorus is "Fertilizer Use" and "Released Phosphorus from Sediment". What about other sources? (Kliewer 18.2)

Figure 2 is clearly incomplete. It was presented to provide a demonstration to which the various factors affecting water quality are interrelated. It also shows that relatively isolated actions such as fertilizer use on an agricultural field is not an isolated action.

27. What is the importance of, "Diurnal oxygen fluctuations should be of lower amplitude."? (Kliewer 2.01)

Low dissolved oxygen concentrations adversely impact fish survival; reducing the fluctuations has the affect of increasing dissolved oxygen concentrations when they are otherwise at their lowest value.

28. The last paragraph on page 20 leaves the impression that increased turbidity would be beneficial for the reduction of

algae production. (Kliewer 20.2)

Water clarity does promote algae growth due to greater light penetration. The paragraph does not suggest that we should increase turbidity, but does suggest that if the stratification were disturbed, bringing less turbid water to the surface, increased algae production might result.

29. The authors of the report have no basis to say, "Urban pollution prevention and abatement measures will need to be intensified if long term remediation is to result."

In a water quality limited stream, particularly one for which the major pollutant inputs are of a nonpoint source nature, it can be expected that nonpoint pollution control measures will be applied in each of the contributing areas. The sampling programs conducted to date indicate this is clearly the case for urban areas.

30. Why is the alternative, free flow of the lower river (removal of the Lake Oswego Dam not included in the section "Change In-stream Processes" on page 23? (Kliewer 23.1)

There are two reasons. (1) In meeting with the various public groups in the Tualatin Basin, it became clear that removal of the diversion structure had high political cost. (2) In applying the stream quality model, it became clear that removing that structure would not be sufficient to meet the water quality criteria.

31. Table 1 indicates that based on the initial simulations, the 0.07 mg/l phosphorus concentration limit cannot be met. (Kliewer 28.1)

As indicated in the text, the model had not been calibrated at the time the values included in Table 1 were calculated. Subsequent calibration and verification indicates that supplemental flow will be necessary to reduce the phosphorus concentration to approximately 0.07 mg/l.

32. Although the point sources and surface nonpoint sources can be most easily controlled, if they are small compared to the

subsurface sources; further control of these readily controlled sources may not achieve the desired results. (Kliewer 28.1)

Agreed, however, the usual philosophy of pollution control is to control those sources amenable to control. Those sources for which control is not currently available or is otherwise difficult to require will generally follow at a later date.

33. Please clarify the last sentence in subsection which states, "Because the demands for improved water quality stem from downstream urban areas, the costs of control may be fully or partially offset by increased benefits to local citizens."

The statement is an attempt to state that because the downstream residents have espoused an interest in improved water quality, they may be willing to invest in pollution abatement measures to achieve those benefits. No revenues were mentioned.

34. No scientific substantiation is presented to support stream corridor modification as a means to a healthy watershed. (Kliewer 35.1)

Extensive verbiage is invested in describing the changes to the overall watershed and particularly that portion of the watershed along the river and its tributaries. There is a strong relationship between this stream corridor and the quality of a river. The historical perspective is sufficient to recognize that this damage to the stream corridor is impacting the quality of the river and further that this damage can be reduced by changing the way stream corridor decisions are made. ASCS has now approved a stream corridor management practice for the WQIP activity.

35. Define "healthy" in the context of, "A healthy watershed is a cohesive ecosystem ..." (Kliewer 35.2)

A healthy stream is one in which the stream is supporting the beneficial uses, including providing aquatic habitat and a suitable environment for the diversity of plants and animals that would inhabit that section of stream without the adverse impact of human

activities. It is clear from this definition of a healthy stream that such a stream is linked to the watershed surrounding it. It is not reasonable to expect a healthy stream in a ravaged watershed. A healthy watershed includes the healthy stream and the contributing drainage area in a condition that preserves the aquatic habitat.

36. Please provide additional details on the in-stream aeration units described on page 37 as costing in the order of $150,000. (Kliewer 37.1)

The response to the technically feasible option of adding mechanical treatment devices in the lower portion of the Tualatin River received a resoundingly negative reaction from both the regulatory community and to the public as well. Having treatment units within the river was regarded as being akin to using the river as a treatment device instead of dealing with pollution at the sources. Thus, this option was not pursued to a more detailed design level.

37. The information presented in this report is speculative or philosophical at best and provides no scientific bases for developing a recommendation. (Kliewer 41.1)

This report and the supporting material represents the product of several peoples considered judgement and an attempt to assist the Department of Environmental Quality in programs to enhance the quality of water in the Tualatin River. To brand recommendations of continuing the nonpoint load management efforts, seek additional summertime flow and to broaden the public involvement as speculative or philosophical suggests that a more simplistic answer was sought. It is unfortunate that the symptoms exhibited by the Tualatin River do not have easy nor simple solutions. There is no "end of pipe" technology that will suddenly make things better.

39. Soil permeability should be considered as another important factor in determining the quality of runoff water. (Kliewer 41.1)

Agreed

40. The comment in the second paragraph of the watershed health section on page 14 suggests that high flushing charges have been decreased. Development has more likely made peak discharges higher and of shorter duration. (Rodgers 1)

Agreed. The development of the Tualatin Basin, including removal of considerable wooded area, draining of wetlands, addition of soil drains and numerous other development activities has most likely increased wintertime flows and decreased summerflows. This change has complicated the management of the river. Historic use of the river as a transportation route supports this logic.

41. Long travel times in the Lake Oswego Dam portion of the river are related to the low natural gradient in that reach. Although removal of the dam would reduce the travel time through this reach, stream velocity would still be very low. Mr. Rodgers then presented flow velocity measurements and discharge rates at Elsner Road that show the average velocity to be approximately 0.1 ft./sec. when the flow rate was 175 cfs. These readings were taken when the dam was not in place. (Rodgers 2)

This comment is very helpful. It helps explain the importance of water quality control in the Tualatin compared to more typical rivers in which flow velocities might be expected to be in the range of 1 to 3 ft./sec. The velocity of the lower Tualatin reaches is more similar to a lake than a river environment. Long detention times, low velocities, adequate nutrient concentrations and clear water combine to provide a nearly ideal environment for algae growth.

42. The reference to Hagg Reservoir in Section 1 on page 21 is incorrect. The correct names are Hagg Lake or Scoggins Reservoir. (Rodgers 3)

Correction acknowledged.

43. It is noted that irrigation efficiency can be increased through better scheduling. While this is probably true, the extra releases made from Scoggins Reservoir is now counted as natural flow in the flow management model. If TVID becomes

more efficient in scheduling and discharge from the Reservoir is reduced, additional water will be needed to maintain minimum flows. (Rodgers 4)

Agreed

44. There are two additional methods of increasing summer flow, p. 31:

    e. Improve river regulation. Cutting off unauthorized use would leave this water in the river.

    f. The lease or purchase option of existing water rights. There are institutional and social hurdles to cross, this is one of the prime strategies in most basins of the state to increase summer stream flows. (Rodgers 5)

These options are noted.

45. Information is sparse with which to describe the early environmental conditions in the Tualatin River Basin. We recognize the difficulty in determining what conditions might have existed in the early 1800's. (Gaffi G1)

This information is both difficult to find and more difficult to interpret. Two supporting reports describing the historical issues are included as part of the products of this project. These documents suggest that development has had major impacts on both the quantity of summer flow in the Tualatin River and in the quality of that flow. Removal of wetlands, dense vegetation, and installation of drainage facilities have reduced the ability of the watershed to capture and store rainfall. Thus, if there is less water captured and stored, there is less available to release during the dry period of the year. With less stored water available during the summer, runoff from limited summer rainfall receives less dilution therefore greater impact on aquatic organisms.

46. High quality and thorough peer review is important to the credibility and critically important to this effort to advance our understanding of water quality management. (Gaffi G2)

Peer review has been conducted and the results are being made available. See also Comment No. 4.

47. The models that are being adapted to the Tualatin River Watershed as part of this project should be calibrated, validated and otherwise substantiated to the greatest degree possible before the output is used as a basis for water quality regulatory policy changes. (Gaffi G3)

Agreed. The models are to be used as tools to better interpret the water quality processes underway. Models are not a substitute for process knowledge nor are the outputs of model application any more valid than the extent to which the science can be documented and the processes predicted.

48. The U S Geological Survey (USGS) and the Unified Sewerage Agency (USA) should be acknowledged as the source of most of the data available to the contractors. (Gaffi S1)

Agreed.

49. The paragraph on page 6 describing the role of nonpoint sources of phosphorus should be edited to reflect the understanding that now that the point source of phosphorus has been removed, the nonpoint contributions become more evident. (Gaffi S2)

Agreed

50. The land use transitions in the Tualatin Basin have been native to agriculture or forestry to suburban to urban. The point being that urban development most often transformed already disturbed landscapes rather than those that were "natural". (Gaffi S3a)

The challenge to this project is to identify a procedure to improve the quality of water in the Tualatin River during the low flow season. The authors have tried to spend as little tim as possible in assigning blame for any specific development decisions of the past.

51. The report attributes the algae problem to the number of people living in the Tualatin Basin without adequate support for the statement. The report also needs to consider the dilution provided by treated sewage and reduced erosion that accompanies long-term urban vs agricultural land use. (Gaffi S3b)

It was the intent of the authors to attribute the algae problem more broadly to both population growth and economic development. These activities include paving of permeable surfaces, rapid routing of water to the stream, drainage of swamps and wetlands, increased use of fertilizers, intensive irrigation, increased numbers of domestic animals having access to the stream, etc. The urban population is to be commended for its vigorous response to the need for pollution abatement and the willingness to support aggressive environmental protection programs, however there remains a major challenge in restoring a "natural" stream in a highly developed watershed.

The impact of the highly treated domestic sewage is to provide a source of dilution water during the low flow season. This impact has been incorporated into the modeling approach. Similarly, the differences in urban and agricultural land uses have been considered in predicting the frequency and nature of runoff carried pollutants.

52. The first paragraph on page 14 states that agricultural, forestry and urban uses have fragmented the landscape. It should be noted that the loss of the pristine environment occurred prior to urbanization. (Gaffi S4)

The pristine Tualatin Basin environment was breached as early as 1850. As we have populated the area, we have attempted to tame the area and make it a more comfortable and economically rewarding area. In that process we have encountered costs that we were not anticipating. Currently, we are encountering another of these in the form of water quality deterioration.

53. Regarding page 14, Watershed Health. Our data show an average stream maxima closer to 70 F. (Gaffi S5)

You are correct, the average stream maxima are closer to 70 F. The information presented on page 14 is in error and will be corrected. There is still an important issue, however. As the riparian areas along the Tualatin and its tributaries have been cleared of trees and other overhanging vegetation, the loss of shading has caused an increased temperature. There is inadequate data currently available to fully assess the impact of this temperature increase, but the increase is clearly one of compounding the algae growth issue. Warmer temperatures tend to promote more rapid algae growth. This is an area in which additional data, which could be obtained at relatively low cost, would substantially improve the targeting of remedial efforts.

54. Suggest that a description on how to use Figure 2 be included as part of the legend. (Gaffi S6)

Agreed

55. The model results included in the March Report were produced before the models had been fully validated and calibrated. The final report should only include output produced by a calibrated and validated model. (Gaffi S7)

The March report was based on the best information available at that time. Since then, considerable additional calibration and validation has been completed. The final report will include the best information available. In addition, the final report, like the draft will attempt to alert the reader to areas of uncertainty where they exist.

56. The discharge of water from the Barney Reservoir began in 1970, hence any potential introduction of exotic species from the Trask River into the Tualatin River has already occurred. (Gaffi S8)

The final report will be changed to reflect this information although biological changes of this kind can have a long lag time.

57. It appears the authors have erroneously mixed total and ortho phosphorus concentrations in reaching the conclusion of the

first sentence of the last paragraph on page 32. (Gaffi S9)

The purpose of that sentence was to indicate that even if it were possible to affect a fifty percent reduction in the P load from the major upstream tributaries and from Fanno Creek, this alone would not be sufficient to bring the river into compliance with the current concentration limits at the Stafford Bridge sampling point.

58. Urban land use may cover 21 percent of the basin (p 33, last paragraph), however, "urbanization" as used in comprehensive land use plan covers 17 percent of the basin. (Gaffi S10)

Agreed

59. Dairy Creek has relatively little urban use as compared to agriculture and forestry (p 36). (Gaffi 11)

Sentence will be corrected.

60. Regarding the final paragraph on page 36, The only "public lands" are located at Forest Grove and Jackson Bottom. There is no public land in between. These areas are relatively small compared to the amount of floodplain between them. (Gaffi 12)

This comment suggests that efforts to restore a viable riparian corridor will not be easy nor will it prove inexpensive.

61. A thorough discussion of the potential negative impacts from removal of the Lake Oswego diversion dam should be included. There could be some substantial long term social and environmental impacts that need to be mentioned. (Gaffi 13)

Based upon a consideration of the costs (economic, social and political) and of the projected benefits which were minimal, the proposal to remove the splash boards that facilitate diversion to Lake Oswego was dropped from consideration as a likely alternative. The affect of the removal of these boards was very slight. The benefits of the other short term alternatives were sufficiently more attractive that this alternative has been dropped from final consideration.

62. The recommendation that there is a need to engage the public in a long-range planning process needs further clarification and is not supported by any analytical findings. (Gaffi 14)

The recommendation is based on the observation that the water quality problems of the Tualatin are relatively subtle in terms of cause and the remedies will involve major changes by a large population. A decision to restore significant lengths of stream corridor involve major costs. To actually store and treat surface runoff would also represent significant costs. Decisions of this magnitude represent major public policy issues and should be preceded by a participatory educational process. The recommendation seems a necessary one.

63. The final section, "A Learning Approach to Organizational Behavior" offers interesting commentary on management philosophy but may seem to the readers to be somewhat remote from the principal focus of the report. Would this topic be better suited for a free standing project report?

This final section is clearly an alternate perspective from the remainder of the report. If the perspective is important it needs to remain in the summary report. Note comments 37 and 99.

64. The report provides no methodology or justification for its conclusions about the beneficial or adverse impacts on the river from removing the Lake Oswego Corporation's diversion dam or lowering the dam's flaps. (May 3.1)

See Item 30 and 61 above.

65. There is no discussion about the impact of potential solutions on the Lake Oswego Dam from the perspective of water quality, power generation, hydrology or ownership of waterfront property. (May 3.2)

The specific charge to the OSU/PSU team was to examine alternatives to improve water quality in the lower reaches of the Tualatin River. If that is accomplished either in the short or longer term, that improved quality of water is what will be diverted into the

Lake Oswego Canal. Similarly, as more water is sought to decrease the hydraulic residence time in the Lower Tualatin pool, the Lake Oswego hydraulics is only improved.

66. The report classifies tampering with the Lake Oswego diversion dam as a temporary or stopgap measure. We concur. (May 3.3)

67. The Lake Oswego Corporation agrees that increasing flow by an additional 100 cfs during the summer months would be a good idea. (May 3.4)

68. The report does not adequately address the history of the diversion dam and its beneficial uses, nor the historical vesting of the Lake Oswego Corporation's rights to use the waters from the Tualatin. These issues may be beyond the scope of the report. (May 3.5)

Agreed

69. The BMPs in the Forest Practice Rules should be included in the discussion on page 6. These practices have been implemented in the basin since 1972. (Dagenhardt p1)

Agreed, that reference will be included.

70. The reference to "slash dams" in the last line on page 13 was probably meant to be "splash dams". (Dagenhardt p1)

Agreed

71. The statement in the first paragraph on page 14 suggesting that fragmenting the landscape degrades stream function needs more explanation. The correlation is probably not clear to the nonacademic reader. (Dagenhardt p2)

Agreed

72. Suggests that the paragraph beginning at the bottom of p 21 should include a description of how the Forest Practice Rules have long provided BMPs for forest land management. (Dagenhardt p2)

Statement will be added.

73. The discussion of alternate strategies for the control of phosphorus delivery from forested areas should be made more specific to the Tualatin Basin.

Agreed, statement will be added.

74. The recommendation on p 39 for "the most ecologically oriented forestry practices" requires further explanation to be of greater usefulness.

Agreed, statement will be added.

75. The report does an excellent job of defining the problem, illustrating alternative solutions and most importantly pointing out the need for public education. (Wersch)

Comment gratefully accepted.

76. The principle question on the Tualatin River is water quality, particularly the phosphorus source(s). The second paragraph on p 1 implies that water quality issues were not addressed within the project. (Hempstead p3)

Water quality issues were the focus of the study. The paragraph on page 1 attempts to set the historical perspective.

77. We suggest that the term "nonpoint source" be restricted to storm water transported pollutants. Groundwater is a totally separate phosphorus source and should be identified as such. (Hempstead p3)

Unfortunately both storm water transported and groundwater transported phosphorus are important in the Tualatin Basin and both must be treated simultaneously.

78. Stream habitat improvement and wetland mitigation activities are important to the overall health of a river system. Unfortunately, wetland mitigation usually means construction of new wetlands which involves a maze of regulatory issues.

The report should provide some insight into the regulatory issues. (Hempstead p4)

Any process that has the potential to reduce algae growth in the Tualatin River sufficiently to meet the water quality criteria will be longterm in duration, involve significant cost and will likely involve a series of regulatory issues. Hopefully, alternatives will not be eliminated because they require institutional adjustment in their implementation.

79. Figure 2 on page 18 implies that algae growth in the Tualatin River cannot be controlled. (Hempstead p4)

Figure 2 shows that the supply of phosphorus as well as available light influence algae blooms in the river. In addition, water temperature, nitrogen availability and hydraulic residence time also influence algae growth. Rather than indicating that algae growth cannot be controlled, this figure identifies some of the factors that must be considered in reducing the frequency and severity of algae blooms.

80. This report presents pollution abatement alternatives which have been suggested before. The greatest reductions in nonpoint source pollution will most likely be attributed to changes in public activities rather than any structural changes. (Hempstead p4)

Correct, this study failed to identify any unexpected low-cost, easily implemented and guaranteed solutions. What it does is carefully identify the processes necessary and provide a framework for a continuing process to restore/maintain the river.

81. It appears that public involvement and information is not stressed enough under the alternatives associated with source control and restoration. (Hempstead p4)

Public involvement is acknowledged as a major factor in nonpoint pollution control particularly in an urban and suburban environment. Each of the strategies recommended has and will continue to have a public involvement aspect. The final section of

the report specifically addresses the education issue in proposing that not only is education critical but also suggests that making some provision for a public-institutional memory is also an important component of an eventual solution.

82. The designated management authorities (DMAs) have a large number of BMPs currently in place and programs underway to further those efforts. The report should describe these activities already underway and present an estimate of their effectiveness where data are available. (Hempstead p4)

See response to comments 2, 12 and 13 above.

83. Riparian buffer strips are currently being implemented within the Tualatin Basin as a part of controls on new development. Restoration of stream corridors in existing development will be difficult and highly dependent on public information and involvement. (Hempstead p4)

According to recent conversations during the June 10 DEQ Hearing, there is less than complete compliance with the stream corridor concept even in the new developments. It is recognized that this is an expensive option in existing developments.

84. The alternative of "Changing the In-stream Processes" is inappropriate and counter to our goal which is to achieve a "natural river". (Hempstead p5)

Agreed, see Comment 36.

85. Assuming a fifty percent phosphorus removal at a particular point on the river does not represent a true alternative unless the mechanism for achieving that reduction has been developed. (Hempstead p5)

The fifty percent reduction in phosphorus loading was used as an example to demonstrate that efforts to reduce the summertime phosphorus loads in the tributaries were not likely to achieve phosphorus concentrations that would constrain algae growth. Assuming a fifty percent reduction was regarded as generous.

86. It seems that water conservation should have some merit . Have the impacts of conservation been quantified? (Hempstead p5)

Water conservation has the potential to serve in the same way as additional storage that under current allocation provisions, conserved water would be retained in the reservoir and not released as low flow augmentation. From an irrigation and municipal water supply perspective, releasing that water would be akin to wasting it. See also Comment No. 44.

87. We doubt that diverting water from the Willamette River is a viable option. Further, we are trying to achieve restoration of the Tualatin River watershed. (Hempstead p5)

The analysis supports your conclusion that diversion of water from the Willamette River is not a viable option. It is considerably less attractive than diversion from the Trask River. In addition to an additional source of summertime flow, the report further supports your concept of watershed restoration.

88. The matter of phosphorus entering the streams via subsurface inflows during the summer months deserves additional attention. (Hempstead p6)

Agreed. This is an important matter and will necessarily be part of any long term solution to the Tualatin water quality problem.

89. There are more than three urban surface water management practices (p 33, paragraph c). See the DMAs management plans for details. (Hempstead p6)

Agreed

90. The "Take No Major Action" option is poorly stated and overlooks the major investments made by the DMAs and the achievements that have been made. (Hempstead p6)

Agreed. The DMAs have launched public information programs that have highlighted the plight of the Tualatin River. The citizens served by USA have funded major water quality initiatives that have contributed to lessening the phosphorus load as well as the load of

other pollutants. The intent of the report is not to indicate that the current strategy has failed, been ill advised or otherwise inappropriate; but to indicate that if the water quality criteria are to be met that some additional activities will be necessary.

91. Public information and participation programs have been established to involve the public in the decision making process. The report should reflect these on-going activities. (Hempstead p6)

Agreed

92. The long term activities presented in the report have been considered previously and will probably reduce algae blooms within the Tualatin Basin if they can be implemented. We would suggest that more consideration be given to the economic and implementation aspects of these alternatives. (Hempstead p7)

The long term alternatives are currently being evaluated in terms of their economic, social and political cost. Those analyses will be included in subsequent reports.

93. Many discussion groups, workshops and seminars have been sponsored in the Portland area as part of the long term learning approach. (Hempstead p7)

This will be noted.

94. Washington County has recently approved a zoning change to allow a commercial office building to be constructed along with a pond. This approval is seen as one which compromises the ability of the flood plain to do its water quality restoration job. (Horton)

This comment recognizes the importance of protecting watershed features that store and treat water if water quality is to be protected. Land use decisions are critically important in the nonpoint pollution control efforts.

Requested Peer Review Comments

95. The draft report is a very good piece of work considering the time available. (Shuyler)

96. The assumption of a 50% reduction in PO_4 loading may be a little more than can be reached with NPS control measures unless there are major changes in the land use. (Shuyler)

A most optimistic value was assumed to check whether, according to the models, taking those steps would lead to a resolution of the algae bloom problem. It was concluded, based on this analysis, that reducing the summertime PO_4 loading would not be sufficient to meet the water quality criteria unless coupled with some other remedial action.

97. Develop some form of controllable load for the project and base reduction goals on that load. Your groundwater P load is going to make load reductions much more difficult. (Shuyler)

Agreed, but this is most likely a DEQ action to be taken in the future.

98. A full nutrient management plan should be developed for both agricultural and urban lands. Complete nutrient management plans are more effective than individual nutrient plans. (Shuyler)

See Comment No. 97.

99. The comprehensiveness and technical content of the report is good and supports both the long and short-term conclusions. The final section on "A Learning Approach to Organization Behavior" is excellent and should help both technical and general audiences better understand the comprehensive and long-tern process that must occur for improved water quality. (Humenik)

Gratefully accepted.

100. Too much emphasis is given to just phosphorus control. (Humenik)

The TMDL process for which the DEQ is responsible identifies phosphorus loadings as the basic criterion which has not been met. Phosphorus was also identified as the potentially controlling nutrient. Thus as we worked to meet the needs of the DEQ, phosphorus control became the overriding concern. As Dr. Humenik indicates, it is very possible that it will not be possible to control algae blooms to a sufficient degree by limiting phosphorus concentrations. The advise of Dr. Humenik to limit all nutrients would seem to be sound.

101. The statement at the top of Page 2 states that algae growth requires a high concentration of nutrients. This may not be true for phosphorus. There is no basis for the statement that a 50% phosphorus reduction is needed to control algae growth. (Humenik p3)

The statement at the top of page 2 will be modified to indicate that algae growth is related to a supply of nutrients and an adequate light source. Increased nutrient concentrations stimulate algae growth as does light. Thus, longer detention times in the quiescent pool during the summer will promote algae growth.

102. The final line on page 2 is very good. It seems very important to inform the public that it took a long time to degrade these waters and correspondingly, it will take a long time to restore them. (Humenik p3)

Gratefully received.

103. The statements on page 5 of the report which acknowledge the various uncertainties is very good. (Humenik p3)

Accepted.

104. The comprehensive evaluation of landscape changes on page 9 is very good. (Humenik p4)

Accepted.

105. To state that the net effect of these landscape changes has been to increase the concentration of phosphorus and thus

algal blooms is too simplistic. (Humenik p4)

It is certainly true there are other factors involved, but it would seem that to have made landscape changes that increased the opportunity for soil erosion, to have increased the impervious surface area, to have added additional nutrients in the form of commercial fertilizer, and to have reduced the amount of wetland and riparian vegetation has increased the concentration of nutrients (phosphorus) in the stream during periods of low flow.

106. To infer on page 11 that algae only grow in quiet pools is inappropriate based on our experience in the Chowan River. (Humenik p5)

Agreed. Sentence will be made more explicit.

107. The paragraph on page 11 is a good statement of the comprehensive approach that must be taken. (Humenik p5)

Agreed.

108. The sentence at the end of the second paragraph on page 13 is a good one, "We need to think in terms of cumulative effects, rather than evaluating each individual action separately." (Humenik p5)

Agreed.

109. Overall, your information evaluation is good and the important actions have been technically justified and presented in the short and long term actions. (Humenik p8)

Accepted gratefully.

110. Overall, this is one of the best written reports of its kind I have read in a long time. I plan to keep it and use it as a model for my students. (Logan p1)

Thank you.

111. Is there any interaction between OSU and Dr, Jarrell and his

study of P sorption-desorption by Tualatin Basin soils? His work suggests that natural levels of dissolved P from these soils may be higher than recommended levels in the river. (Logan #1)

There is frequent interaction between the OSU/PSU researchers and Dr. Jarrell.

112. What will be the effect of increased flow rate in the river on sediment resuspension, bank erosion, turbidity and P transport. These can all affect algae growth. (Logan #2)

During the summer period when flow augmentation is suggested, the flow velocities in the lower Tualatin are quite low and an additional 100 cfs will have minimal effect. We anticipate only minimal impact due to this increased flow other than the projected decrease in residence time and perhaps a lowered temperature.

113. What is the impact of current and planned wastewater treatment on P loadings? (Logan #3)

Dr. Logan was unaware that during the May 1 through October 31 the two discharging sewage treatment plants remove in excess of 90 % of the phosphorus. They do not, however, treat stormwater runoff.

114. No mention was made of on-site waste disposal in the watershed. How effective are the septic tanks in P removal? Is there a plan to bring everyone in the watershed into the sewer grid? (Logan # 4)

There are certainly septic tanks in the basin. There are also other phosphorus sources such as the animals both in CAFOs and in the smaller operations. It is also impractical to bring all the population into the sewer system. There will continue to be P sources in the watershed.

115. Measures to reduce agricultural P losses should include a program of soil testing to make sure farmers are not over fertilizing. The relationship between soil test results, yield goals and P fertilization needs to be emphasized. The best way to manage nonpoint source P is not to apply it in the first

place. (Logan #5)

These opportunities are being pursued and promoted in the agricultural community.

116. What is the research base on utilization of dissolved groundwater P by riparian vegetation? Are some species more effective than others. (Logan #6)

Riparian vegetation will certainly use some P, however, the major contribution of riparian vegetation is to increase groundwater infiltration, to trap solids carried in overland flow and to prevent erosion of the soils in the immediate vicinity of the stream.

117. What are the relative unit area P loads from the forest compared to more intensive land uses? Could eroded sediment from the forested areas serve as a sink for dissolved P from agricultural areas? Is suspended sediment in the river primarily a sink or source of dissolved P. (Logan #7)

During the summer season, the unit area P loads from the forested and the agricultural areas are quite low. Runoff producing storms are infrequent. The sediment load of the Tualatin River is low compared to midwestern streams with which Dr. Logan is familiar. We do not know the full story of the interaction between stream sediment and phosphorus in the Tualatin River.

118. The authors of this report have done an excellent job providing background on the phosphorus water quality problem and zeroing in on the actions which effect it in the Tualatin. (Thomas, p1)

Gratefully accepted.

119. Changes in agriculture and forestry practices can decrease the amount of nonpoint phosphorus. (Thomas p1)

Accepted.

120. The decrease in nonpoint phosphorus discharge from most

agricultural and forestry practices can be determined. Evaluate the impact of each reduction. Among the techniques to reduce phosphorus discharges are: reduce fertilizer application, number of lagoons needed, reduce erosion, restore riparian vegetation, change forestry practices, preserve or restore wetlands, control urban growth and fertilizer application, control septic tank installation, and pave less. (Thomas p2)

Many of these practices have been adopted. Others are being studied and evaluated. Thus far, most of the regulatory efforts have been devoted to the major phosphorus sources.

121. Urban growth is not confined to the lower reaches of the basin. Ranchetts and subdivisions are being constructed throughout the basin. Much of this is on previously timbered areas, with shallow soils and frequently with slopes in excess of 15 %. (Thomas p2)

Agreed.

122. The only long-term solution to significantly reduce phosphorus concentration during the summer months is reservoir storage and release. Other actions will have a small impact on water quality. (Thomas p2)

Accepted.

123. Controlling urban growth is probably the most important long-term action needed to control phosphorus loading. (Thomas p3)

Accepted.

124. This report does not give us much new information. (Lynch p1)

This effort was not a research study. The research with which this reviewer is involved certainly brings him into contact with large quantities of information relative to the Tualatin River. It would be most surprising if there was information about which he was unaware.

125. Wetlands are not always nutrient sinks, particularly on a seasonal basis. All wetlands do not behave alike. (Lynch s2)

Agreed.

126. Historically, the largest algal blooms occur in the Tualatin River during June. Algal control scenarios need to consider the June through September period. (Lynch s6)

Accepted.

127. If we revert back 150 years, water storage in the landscape may increase flooding and make much agricultural land unfarmable. (Lynch s11)

The history of the Tualatin Basin clearly suggests that much of the lowland was not farmable as we currently practice agriculture. As we have tamed the area, we have made it more "friendly" to human habitation and economic gain, however, it is appropriate that we understand that certain water quality processes were disrupted in that trade.

128. There is no evidence to suggest that problems are intensifying. In fact, summer water quality has probably improved in the last two years. (Lynch s15)

With the initiation of post secondary sewage treatment at the two sewage treatment plants, the data would suggest rather clearly that the phosphorus load has decreased the past two years.

129. "Biological recovery" of the basin is not practical unless humans leave. The presence of farms, urban areas, and forest harvesting precludes a "recovery." (Lynch s19)

Accepted as a point of view.

APPENDIX A

SUMMARY OF ORAL TESTIMONY

N. Mullane
Hearings Officer
Draft Report

DRAFT DRAFT DRAFT

TUALATIN WATER QUALITY STUDY PUBLIC HEARING COMMENT SUMMARY

BACKGROUND

The Department of Environmental Quality held a public hearing on March 15, 1993 to solicit comment on the work being completed by Oregon State University and Portland State University in the Tualatin Basin. The study was required by the 1991 Legislature. The DEQ was required to contract a study to complete work outline in a legislative bill. The bill required that a hearing be held on or before March 15, 1993 to review the progress being made by the study consultants.

A hearing was held at the Washington County Public Service Building, Monday, March 15, 1993. Neil Mullane was Hearings Officer. Robert Baumgartner assisted.

The hearing opened with the Heargings Officer describing the purpose of the meeting to receive comments on the summary report produced by the OSU/PSU study team. Dr. Ron Miner, OSU, gave a brief recap of the study and answered questions from the participants.

The Hearings Officer then opened the formal portion of the hearing and took oral testimony and recieved written testimony. Below is a list of those people providing testimony at the hearing or submitting written testimony. Following the list is a summary of the oral testimony and attached is the written testimony.

TESTIMONY WAS RECEIVED FROM THE FOLLOWING PEOPLE/GROUPS

Oral Testimony

Brett Arvidson, 11725 NW Damascus, Portland, Or. 97229

Bill Gaffi, Unified Sewerage Agency

Dan Wilson, Tualatin Valley Irrigation District, Forest Grove

Jack Brosy, 10935 Hazelbrook Road

Leonard Stark, Lake Oswego

Donald Burdick, Lake Oswego Corp., 434 Ridgeway Road, Lake Oswego, OR. 97034

Willy Moore, Fans of Fanno Creek, 8440 SW Godinn Ct., Garden Home,

Written Testimony

1. Dave Kliewer, Watershed/Stormwater Division Manager, City of Portland

2. Jerry Rodgers, Tualatin Basin Watermaster

3. William Gaffi, Unified Sewerage Agency of Washington County

4. Roger May, President, Lake Oswego Corporation

5. Troy Horton, Chairperson, Friends of Cedar Springs

6. John E. Jackson, Unified Sewerage Agency of Washington County

7. Donna Hempstead, Multnomah County

8. David Degenhardt, Oregon Department of Forestry

9. William Wersch, Concerned Citizen

10. Leonard Stark, Lake Oswego, March 15, 1993

11. Leonard Strak, Lake Oswego, April 2, 1993

SUMMARY OF ORAL TESTIMONY

Brett Arvidson - Wanted to see a clear description of the problem added to the report. This would be followed by a discussion of what has been done. He also felt that a description of the process goals and whether they are can be obtained. He felt that an inventory of the various Phosphorus sources should be included. The report also should describe the effectiveness of the steps taken to date. It was his understanding that chl a was very high this year. What does this mean? Have we been successful or not?

Bill Gaffi - Complimented OSU/PSU on their work. He felt the report could be improved with a discussion of what this particular report added to the Tualatin effort overall. He realized that there was limited resources and time concerns in trying to produce what was outlined in the legislation. Mr. Gaffi new that the computer component was peered reviewed and felt that the whole report should undergo peer review. He wanted to know is people had considered other potential water quality problems such as stream temperature and what impact the Barney Reservoir would have.....

Willy Moore - Discussed the concerns of his group with the urban best management practices being used for the Olsen Road construction. He described what he considered to be a significant water quality problem created by the road construction activity.

Jack Brosy - Mr Brosy discussed the need for more water, cooler and cleaner than what is currently in the river. He talked about increasing reservoir capacity. It seemed to him that USA had done a great job and alae were not a problem in themselves but it was the timing of the blooms.

Leonard Stark - Mr. Stark is a long term resident of the Tualatin Basin. He gave discussed the history of several different waterbodies. He was opposed to the removal of the Lake Oswego dam and the placement of a dam at Cherry Grove in Patton Valley.

Don Burdick - Recognized the difficulty of preserving beneficial uses. Was very negative on the suggestion of lowering the river level with the dam removal option. He wanted to see more work on identifying farming practices and implementing them to see what their impact would be.

Dan Wilson - Mr. Wilson had just received a copy of the report and he preferenced his remarks by saying that these were his initial impressions and that he would follow it up with written testimony later. He discussed the water allocation at Hagg Lake and the contractual arrangements on this water. He felt that the current system was very efficient and that the agriculture irrigation practices were very good in the basin. He was concerned as to who would be paying for whose benefit. He new people wanted to decrease Phosphorus loading and using phosphorus application methods that placed it near the plants. He also felt the irrigation practices being used in the basin also limited the amount of phosphorus getting to the river.

WRITTEN TESTIMONY IS ATTACHED

APPENDIX B

WRITTEN TESTIMONY SUBMITTED TO THE DEPARMENT OF ENVIRONMENTAL QUALITY

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

1120 S.W. Fifth Ave., Room 400, Portland, Oregon 97204-1972
(503) 823-7740, FAX (503) 823-6995

March 31, 1993

Mr. Neil Mullane
Oregon Department of Environmental Quality
881 S. W. Sixth Avenue
Portland, Oregon 97204

Subject: Comments on Oregon Water Research Institute report titled A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin

Dear Mr. Mullane

The subject report is a very good philosophical presentation on what has happened and what needs to be accomplished on the Tualatin River. This report does not present any scientific bases for any of the recommended alternative for both long range and short range. The following is a list of comments we wish to submit into the record.

GENERAL COMMENTS

a. Non-product report with very little new and mostly unsubstantiated information and opinion. Again very philosophical in tone. There is no indication or statements on the purpose of this report.

b. It is apparent that the author of this report did not coordinate with the urban area Designated Management Agencies to determine what non-point BMPs are being implemented and what effect are being obtained. The tone of the report implies that BMPs in the urban area are not aggressively being implemented.

c. The title of this report indicates scientific evaluation of alternative pollutant control strategies. There should be a discussion of all hydrologic options including changes to the operation of Lake Oswego's diversion structure, and the hydraulic and geomorphic impacts to the ecosystem. This report leaves the impression that the conclusions and recommendation are based upon speculation and not scientific evaluation.

SPECIFIC COMMENTS:

Page 1:

1.1 last sentence:
It appears that the authors are indicating that sufficent information still does not exist to make educated decision on improving the water quality on the Tualatin River.

Page 2:

2.1 9th line down " *The magnitude of this decrease....*"
This sentence indicates that conclusions cannot be made regarding the balancing of phosphorous loading due to lack of information on subsurface flows. Subsurface flows could be a major source of phosphorous. USGS is currently studying the impacts of groundwater on the phosphorous loading. This report should incorporate the results of the USGS study.

2.2 9th line " *It appears to be difficult to decrease nonpoint ...* "
What about the equilibrium effects? Even if phosphorus sources are eliminated there is enough stored up phosphorus in sediment to be entrained into the water column.

2.3 last line "*...to engage the public in long term planning process.* "
Is this within the expertise of the author to recommend. We agree with the conclusion, However this may not be the most authoritative source. Instead of a recommended short term action program it should be a suggested long term program.

2.4 last line " *While these short term actions will slow further deterioration...*"
Long term planning process is presented as a short term action. Long term planning itself does not slow water quality deterioration. This should be clarified.

Page 9

9.1 1st sentence " *The landscape of the Tualatin River Basin has undergone extensive change since the initiation of EuroAmerican settlement ...*"
There was extensive changes occurring in geological terms before the EuroAmerican settlers arrived. The use of the term EuroAmerican indicates the lack of diversity in the development of the Basin. Suggest you include Native Americans, AfricanAmericans and AsianAmericans.

Page 13

13.1 entire section " *IV AQUATIC HEALTH of the RIVER* "
This section is poorly written with redundancy of information and series of nonsequiturs that do not hang together. This section appears to be unsubstantiated opinion and not a "scientific documentation".

13.2 2nd line " *A river is a functioning part of the landscape.* "
What does this mean?

13.3 12th line "... *much more interaction of the River with its surrounding land.* "
What kind of interaction?

13.4 2nd to last line " *For the last 150 years the Tualatin Basin has been central to development and productivity in the upper Willamette Valley.* "
Please explain what is the intent of the term productivity. Are you refering to economical or ecological productivity?

Page 14
14.1 5th line " *Baseline biological data is needed across entire basin to assess present conditions as a basis for management.* "
Again the author is indicating that there is not enough information to establish an appropriate management program for the Tualatin Basin.

Page 18
18.1 Figure 2
Explain what the significant is in the +'s and -' signs.

18.2 Figure 2
This figure indicates that the only source for available phosphorus is through "Fertilizer Use" and "Released Phosphorus from Sediment" . What about the natural background sources such as groundwater and decay of plant material.

Page 20
20.1 5th line of Section 5 " *Diurnal oxygen fluctuation should be of lower amplitude.* "
Once it's at a lower amplitude then what?

20.2 last paragraph
The basis of this paragraph is to discuss the impact light has on algae, however it leaves one with the conclusion that increased turbidity would be beneficial for the reduction of alga's production.

Page 21
21.1 2nd line
Typo error change from ...*on manageable*... to **of** manageable.

Page 22
22.1 last sentence of Section 2 " *This process will need to be intensified if long term remediation is to result.* "
The process implied in this sentence is urban pollution prevention and abatement measures. In discussions with other Designated Management Agencies (DMAs) within the Tualatin Basin, the author(s) of this report did not seek DMAs contribution regarding their efforts for implementing various water quality programs. The author has no basis for such a comment.

Page 23
23.1 Section 4 *Change In-stream Process*
Why is the alternative "free flow of the lower river" (removal of the Lake Oswego diversion dam) not included in this section?

Page 28
28.1 Table 1
This table indicates that with the initial simulations of strategies, it appears that the .07mg/l phosphorus loading cannot be met.

Page 31
31.1 2nd to last line " *The point sources and surface nonpoint sources can be* ***most readily*** *controlled...*"
They can be most readily controlled but are they significant compared to the subsurface nonpoint sources? If the point and surface nonpoint sources are 10% of the current loading and subsurface is 90%, a 100% reduction of the point and surface nonpoint sources is still only a 10% reduction overall.

Page 34

34.1 last sentence of subsection c " *Because the demand for improved water quality stems from downstream...*"

Please clarify this sentence. Are you indicating that cost for improving the water quality can be offset by increased revenue from downstream benefits and what are the increased benefits to local citizens that would offset the costs?

Page 35

35.1 general comment

No scientific substantiation is presented to support Stream corridor modification as a means for a healthy watershed.

35.2 1st sentence " *A healthy watershed is a cohesive ecosystem...*"

Define the term "healthy". What parameters indicate that a river is healthy or not?

Page 37

37.1 9th line " *the construction costs for each unit would be in the order of $150,000 ...*"

What are the units? There would be quit a difference in the feasibility depending on the number of units required i.e. one bubble per mile vs. one diffuser system per 100 ft.

Page 39

39.1 *Recommended Short Term Actions*

The information presented in this report is speculative or philosophical at best and provides no scientific bases for developing a recommendation.

Page 41

41.1 second to last sentence of Section 3 " *the amount of pervious surface"..."determine the amount of infiltration vs. the amount immediate runoff..* "

This report (recommendation) should consider the permeability of the soils as another important factor for determining water quality of runoff.

The information and recommendations being presented in this report by Oregon Water Research Institute will be critical for future perception on the ability to manage the Tualatin River's water quality. We again stress the need for scientific support for recommended action to ensure the highest level of success for the least potential community's cost.

As one of the Designated Management Agencies, we are available to discuss and work with your consultants to ensure a holistic view on the benefits, impacts and practicalities of recommended strategies outlined in this report. If you should have any question or require clarification on comments please contact myself or Mr. Stephen Hawkins at 823-7768

Sincerely

Dave Kliewer
Watershed/Stromwater Division Manager

Oregon
WATER
RESOURCES
DEPARTMENT
Watermaster

April 1, 1992

TO: Neil Mullane
Department of Environmental Quality

FROM: Jerry Rodgers
Tualatin Basin Watermaster

RE: OSU/PSU Tualatin Basin Report Comments (3/1/93)

Page 14: Section 2; Watershed Health; Paragraph 2; The comment that high flushing charges have been decreased seems contradictory to earlier statements. The Scoggins Reservoir drainage is less than 10% of the Tualatin Basin with a corresponding limited capacity to control Tualatin River flooding. By separating alluvial floodplains and wetlands from normal flood recharge through diking or wetland drainage, it seems more likely that peak flows are now higher but shorter in duration than historically. Hydrographs on urban streams with a high percentage of impervious surfaces show this spiking runoff pattern with intense short duration peaks during storms. Summer flows are also reduced by limited stream bank or wetland storage capacity.

Page 19: Section 4; Long travel times are also related to the natural low gradient in the Lake Oswego diversion dam reach. The dam is built on a natural rock outcrop that controls the river elevation. While removal of the dam would reduce travel time through this reach, stream velocity is still naturally very slow. Listed below are velocity readings in feet per second taken at the Elsner Road (Schamberg Bridge) gaging station by this office when the dam was not in place. What this chart shows is that the natural river velocity at a summer flow level of 175 cfs would be about 0.1 feet per second in the Oswego diversion dam pool.

Date	Ave. Velocity	Discharge in CFS
02/04/92	1.48	3888
03/19/92	0.22	337
05/06/92	0.35	583
12/02/92	0.58	1129
01/07/93	0.76	1695
02/10/93	0.53	952
03/19/93	0.96	2354

Page 21: Section 1; Hagg Reservoir is incorrect. The correct names are Hagg Lake or Scoggins Reservoir.

Page 30: b; It is noted that irrigation efficiency can be increased through better scheduling. While this is probably true, the extra releases made from Scoggins

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Reservoir to make up for shortcomings in the accounting of actual irrigation water used is now counted as natural flow in the flow management model. If TVID becomes more efficient in scheduling and thereby reducing their releases, additional water would be needed by USA to maintain their minimum flow requirements at Farmington.

Additional methods of increasing summer flow:

Page 31: e; Improving river regulation would help summer flows. Cutting off unauthorized use would leave this water in the river. As the office responsible for river regulation, we are seeking more efficiency in regulation, but are not yet at the level desired.

f; The lease or purchase option of existing water rights was not included. Although there are institutional and social hurdles to cross, this is one of the prime strategies in most basins of the state to increasing summer stream flows.

Thank you for the opportunity to comment. Please send copies of future reports as they become available.

CC: R. Miner OSU
T. Paul WRD

UNIFIED SEWERAGE AGENCY OF WASHINGTON COUNTY

April 1, 1993

Robert Baumgartner
Water Quality Division
Oregon Department of Environmental Quality
811 SW 6th Ave.
Portland OR 97204

Dear Mr. Baumgartner:

Please accept this letter as our written comments on the report, A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin. These comments are in addition to our oral testimony in the public hearing conducted by DEQ on March 15, 1993.

General Comments

1. Early environmental conditions: We appreciate the efforts by the contractors to describe early environmental conditions of the Tualatin River Basin. Information is sparse on the topic so we recognize the difficulty in determining what conditions might existed in the early 1800's.

2. Peer review: High quality and thorough peer review is important to the credibility of any scientific investigation and critically important to an effort such as this which strives to advance our understanding of a very complex and emerging area of water quality management.

We understand that the project contract provided for peer review and that the funds have been diverted to other tasks needing additional support. With the intense water management discussions on-going in the basin and the significance of the conclusions and recommendations put forth in the report, the credibility of the report is vital and will be greatly enhanced with an in-depth peer review.

Even though the report supports some of the strategies currently being implemented or planned by USA, a thorough peer review will allow these strategies to be pursued with confidence. These strategies include adding low phosphorus flow from reservoirs to the river during specific times of the year to both reduce the time algae is in the system and to dilute enriched groundwater inputs.

3. One of the more significant opportunities to enhance the report relates to the presentation of the models. The reader of the report is left with the impression that the application of the models is fully

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complete. It is our understanding, however, that calibration of one of the models is still ongoing. We have not seen any documentation on the status of the other model. Substantial risks would therefore appear to attend utilizing the output of these models to develop reallocations of total phosphorus loads in the basin until both models have been calibrated, validated and demonstrated to accurately predict water quality conditions in the Tualatin River Basin.

Specific Comments

1. Introduction, page 5, second paragraph. We would appreciate recognition that the US Geological Survey (USGS) and USA provided most of the data to the contractors.

2. Introduction, page 6, third paragraph, sentence that begins "Now, during the summer months...". We suggest that the sentence include the concept that background phosphorus contributions can now be seen in the river since removal of the point source of phosphorus.

3. Page 10, last paragraph. We agree that urbanization has played a role in changing the character of the basin, as well as forestry and agriculture activities. However, the reader should be reminded that the sequence of development in the basin was timber and agriculture with urbanization moving on to lands previously occupied by timber and agriculture. The majority of the lands in the basin changed from pristine conditions to being developed by agriculture and forestry, not urbanization. We believe that the majority of the damage done to the environment (lose of wetlands, wildlife habitat, stream flows) occurred prior to conversion to urban uses.

The document suggests that the algal problem is a product of the number of people living in the Tualatin Basin without providing analytical support for that conclusion. Even though it is probably a fair generalization to say that population growth is a major stressor on our natural environment, conclusion cannot be drawn as to the effects of urbanization on algal problems in the Tualatin River without examining: The dilutional effects of treatment plant effluent, the impacts of low phosphorus out of basin and stored water discharges to the river and the reduced erosion that accompanies long term urban vs. agricultural uses.

Once calibrated, the models developed in the study may offer valuable insight into this complex set of influences.

4. Page 14, first paragraph, first complete sentence. We suggest that this sentence be revised to include the following thought.
Urbanization has certainly fragmented the landscape beyond that previously resulting from agriculture and forestry. It should be recognized however that the loss of the pristine landscape occurred

prior to urbanization.

5. Page 14, Watershed Health, first paragraph. Our data shows that "average stream maxima" is closer to 70 F. If the report's statement is true, there would be less aquatic life than we now see.

6. Page 18, Figure 2. Suggest that a description on how to use the chart be included as part of the figure legend.

7. Page 25, Development of Models. The description in this section is inaccurate based on our knowledge of the status of model development. See General Comment #4. Table 1 of this section should not be included since these values were presented as "very preliminary" by the contractor in a recent project management meeting. Due to the potential decisions and impacts that can be derived from data such as this, we suggest the report only include data that has been produced by a calibrated and validated model.

8. Page 30, second paragraph, fourth sentence. This statement is inaccurate. Any risk of introduction of exotic species via the discharge of Trask River water into the Tualatin River occurred in 1970 when the Barney Reservoir project was completed connecting the two basins.

9. Page 32, last paragraph. We suggest that the first sentence of the paragraph be reviewed for accuracy and rewritten. It appears that the author has erroneously mixed ortho-phosphorus and total phosphorus data to reach the conclusion as written.

10. Page 33, last paragraph. Urban land use activities may cover 21 percent of the basin. However, "urbanization" as recognized by the comprehensive land use plans covers 17 percent of the basin.

11. Page 36, second paragraph, first sentence. Dairy Creek has relatively little urban uses as compared to agriculture and forestry.

12. Page 36, last paragraph, second sentence. The only "public lands" are located at Forest Grove and at Jackson Bottom. There is no public land in between. These areas are currently undergoing wetlands restoration. However, these areas are relatively small compared to the amount of floodplain in between these two areas.

13. Page 37, Changes in Instream Process. We suggest a thorough discussion of the potential negative impacts from removal of the Lake Oswego diversion dam be included in the section. There could be some substantial long term social and environmental impacts that need to be mentioned here.

14. Page 39, Engage the Public in a Long-Term Planning Process. This section needs to better clarify the need for long-term planning in light of the current intensive 4 year effort to provide long term solutions to this basin. The conclusion offered in the first sentence of the section may be true but is not supported by any analytical findings and therefore appears to be based more on a political rather than scientific conclusion. The section attempts to raise a legitimate question as to the relationship between land use and carrying capacity of the river but fails to offer well founded insight into this question.

Resource constraints are and should remain appropriate considerations in land use planning and we hope that the tools created in this project and by the USGS will provide a means to assess such constraints.

15. Page 43. While this section offers interesting commentary of management philosophy, may seem to readers to be somewhat remote from the principal focus of the report. Would this topic be better suited for a free standing project report?

In summary, it appears that the study and the analytical tools it presents offers the promise of advancing our understanding of this very complex river system. Certain of the study conclusions are presented, however, in a manner that clouds the distinction between philosophical perspectives and scientific findings. For some readers this may seriously detract from the usefulness of the document. We therefore encourage the authors to be clear as to the support or rationale for various conclusions.

It is our hope that the above comments are constructive and contribute to the quality of the final report. We have appreciated the participatory approach the contractors and the Department have brought to this important effort. If you have questions, please contact John Jackson at 648-8644.

Sincerely,

William C. Gaffi

William C. Gaffi
Planning & Engineering
Department Director

/bk

Lake Oswego CORPORATION

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April 1, 1993

Mr. Robert Baumgartner
Water Quality Division
Department of Environment Quality
811 SW Sixth Avenue
Portland, OR 97204

Re: Lake Oswego Corporation's Response to the Interim Report of Strategies for the Tualatin River

Dear Mr. Baumgartner:

Lake Oswego Corporation wishes to respond to the "Recommendations For Alternative Pollution Control Strategies for the Tualatin River Basin" dated March 1, 1993, prepared by the Oregon Water Resources Research Institute (the "committee"). As the authors stated, this is not an academic exercise. This is an important problem.

1. Perspective. For the record, Lake Oswego Corporation and its predecessors in the ownership of Oswego Lake have exercised stewardship of Oswego Lake for over 100 years. The Oregon Legislature authorized the diversion dam on the Tualatin River in approximately 1874, making our reservoir (the lake) possible, and establishing the legal and practical linkage between the Tualatin River and Oswego Lake.

Lake Oswego Corporation represents the interests of several thousand households in its stewardship of the lake. The fundamental purpose of that stewardship is the protection of Lake Oswego Corporation's water right and the reservoir in perpetuity. That purpose has not changed despite rapid urbanization. The Corporation has observed with great concern the transformation of the Tualatin into its present condition. You will appreciate that with 100 years of perspective, the Corporation does not seek short-term solutions.

In its role of stewardship, Lake Oswego Corporation has also studied the issues facing your committee in the context of Oswego Lake. The Corporation has expended over $100,000 in the last five years examining water quality and the impact of the condition of the Tualatin River on the health of the lake. The Corporation's testing and treatment expenditures to counter algae blooms have increased in proportion to nutrient pollution, particularly phosphorous. Water treatment expenditures in 1992 exceeded $45,000. The Corporation has also expended considerable sums, exceeding a quarter of a million dollars in the last five years, excavating silt from the main canal linking the Tualatin River and our reservoir, and from the bays of the lake fed by streams and storm water systems.

You will appreciate that the Corporation and its shareholders are ultimately on the receiving end of the water quality impacts of urbanization in western Clackamas County and in Washington County. Our lake is being overwhelmed by water quality conditions upstream of our diversion. Our shareholders are of the view that our lake functions as a tertiary treatment facility, returning markedly cleaner water to the Willamette River Basin than diverted.

Like your committee, Lake Oswego Corporation appreciates the Unified Sewage Agency's recent efforts to reduce TMDLs in response to the Consent Decree arising from the lawsuit by environmental interests. The improvement of water quality in the Tualatin River is encouraging.

2. General Response to the Report. After these substantial expenditures and months of review by the Corporation's board, the overriding consensus of our Corporation is that the health of the lake is significantly dependent upon the health of the Tualatin River. But the lake itself is a very complex hydrological and biological system. Your experts frequently point to the need for further study (pp. 1, 5 and 14 for example). The Lake Oswego Corporation is in the same position with respect to the lake. Regrettably, after exhaustive study, the Corporation's board has developed a healthy skepticism about the predictability of nature's response to man made changes.

Our general response therefore, is succinct. Our stewardship of the lake compels us to firmly resist solutions which have the flavor of short-term panaceas, which have

unpredictable results on Oswego Lake, or which compromise the Corporation's water right.

3. Specific Comments. We have the following specific comments on the report of the committee. We understand the background of the report and we appreciate the effort that it reflects. We agree with its accent on hard fought, long-term solutions.

But we have not had an opportunity to consult with our technical advisors. We reserve the right to comment after further review and to object to any aspect of the report as a result of those consultations and other impacts that may arise.

3.1 The report makes interesting reading. But on occasion, as the committee itself admits, the committee lurches into the political arena and leaves science behind.

Perhaps the best examples are the one paragraph summaries on pages 35 and 37 describing the effects on any critical issues other than reducing TMDL, arising from removing the Corporation's diversion dam or lowering the dam's flaps.

The committee provides no methodology or credible justification for its conclusions about the beneficial or adverse impacts on the Tualatin arising from this action, including hydrology, recreational potential, economic impact or other matters. We question the assumption that negative economic effects of tampering with the diversion dam are short-term and will be overcome at a future date. The report would better reflect its limited scientific basis if it simply deleted the comparison of cost analysis, or if it affirmed that the committee did not seek to study or balance the beneficial or adverse impacts on the Tualatin, abutting land owners or Oswego Lake resulting from this strategy.

3.2 Oswego Lake has roughly 1/4 of the storage capacity of the Hagg reservoir and has considerable surface area. And yet there is no discussion whatever about the impact of these potential solutions on our reservoir, from the perspective of water quality, power generation, hydrology, or ownership of waterfront property.

3.3 The report classifies tampering with the diversion dam as a temporary or stopgap measure. We concur.

Our management of the lake and the advice of our consultants have convinced us that what is flowing into the lake, and what has been deposited in the lake over the last 40 years, is creating our water quality problem. The Corporation's annual efforts to control algae blooms, and to remove silt are triggered for the most part by what the Corporation draws from the Tualatin.

The alternative of changeing the diversion dam does not address that issue. Moreover, tampering with a century old diversion dam is a short-term event. It has taken nearly a century of urbanization, at a particularly accelerating pace in the last 40 years, to bring these problems with the Tualatin to the public's view. Tampering with the diversion dam only buys a little time on a long historical continuum, at costs which the committee does not and cannot define.

Altering the diversion dam's functions should not be a substitute for direct attention to the origin of the pollution.

The closest analogy is the impact of automobiles and their emissions on our environment. It would be easy to reduce emissions by developing and building more freeways to decrease idling and commuting times, thereby increasing the "flow rate." But as others have recently pointed out, with that strategy Los Angeles should have been an environmental paradise.

Urbanization continues relentlessly. Without a broader sharing of responsibility, it is only a matter of time before freeways clog and air becomes more polluted. Sharing of responsibility means using taxes to build alternative mass transit solutions, or using other alternatives which effectively find solutions at the origin and share the burden, including equipping automobiles with emission control devices.

The analogy to the Tualatin is direct. Increasing flow rate does not correct the origins of the problem. Urban areas must assume increasing responsibility to install storm water systems which are effective, and to assure the proper functioning of existing storm water control devices. Agricultural practices in the Tualatin basin may require BMP for nutrient runoff. Our priority should focus on additional control of phosphates at their origins, as the committee

recommends. Many of the longer range solutions suggested by the committee the Corporation heartily endorses.

3.4 The Corporation agrees that increasing flow by an additional 100 cfs during the summer months would be a good idea. We do not understand the impact of that effort on the diversion dam or the other hydrological or biological effects on the river. We believe that warrants more study.

3.5 The report does not adequately address the history of the diversion dam and its beneficial uses, nor the historical vesting of Lake Oswego Corporation's rights to use waters from the Tualatin. These issues may have been beyond the scope of the committee's report. But the Lake Oswego Corporation's rights to use the clean waters of the Tualatin are no less important than USA's rights to use the Tualatin for discharges.

First, as noted above, the Oregon Legislature authorized the construction of the diversion dam as early as 1874. It was built by the Kellogg Brothers who operated steamships on the Tualatin, and by Oregon Iron and Steel Company, the Corporation's predecessor in title to Oswego Lake. Oregon Iron and Steel operated a foundry and certain logging operations.

The proposed dam served two purposes. First, it made the Tualatin regularly navigable. The Tualatin served steamships for a time for timber transport and passenger purposes. We expect that with appropriate water quality controls, the navigability of the Tualatin for recreational canoeists, boaters, etc., is substantially enhanced by the diversion dam.

The second, equally important purpose was the diversion of water for the creation of the Oswego Lake reservoir and the generation of electrical power. The Corporation's water right including use of its reservoir, was formally adjudicated in 1958, retroactive to 1906 for the purpose of power generation. It is one of the oldest vested water rights in the Willamette River basin. The Corporation's present generator has operated continuously since 1911.

The rights to install the diversion dam, to divert water, to create a reservoir and to generate power are fully vested property rights. We expect the appropriate

agencies to respect them. The Corporation will take whatever legal and political measures are required to defend those rights.

If it were even legally possible to tamper with the diversion dam, we believe that tampering is politically inappropriate and myopic. It relieves a broad region of the pain and focus necessary to attack long-term issues arising from urbanization. Tampering with the diversion dam provides a short-term solution, and no more. It allocates responsibility for clean up to the victim, and not to the originator of pollution.

To summarize, the Lake Oswego Corporation found this report stimulating reading, and concurs with its emphasis on long-range solutions. The authors of the report freely admitted that substantial additional study is required and that long-term solutions are necessary. The Lake Oswego Corporation concurs. Those solutions must be analyzed for their affects on the lake and the rights of Lake Oswego Corporation. The Lake Oswego Corporation vigorously objects to any tampering with or change in use of the diversion dam or its water right.

We appreciate the opportunity to comment. We look forward to continuing our work with other parties interested in the Tualatin's restoration.

Very truly yours,

Roger May
President

RM:krc

Friends of Cedar Springs
"Preserving Our Quality of Life"

Bob Baumgartner
Water Quality Division
Ore. Dept. of Environmental Quality
811 SW Sixth Ave.
Port., Ore 97204

Dear Bob, 3/31/93

This letter is intended to be part of the public comment for the study on the health of the Tualatin river. Our concern revolves around a situation in process on a tributary of the Tualatin.

We are concerned about a portion of Johnson creek that is located on old Barnes road near where Washington County is putting in a new Barnes Road extension (map enclosed). There is a triangle of land owned by Paul Choban.

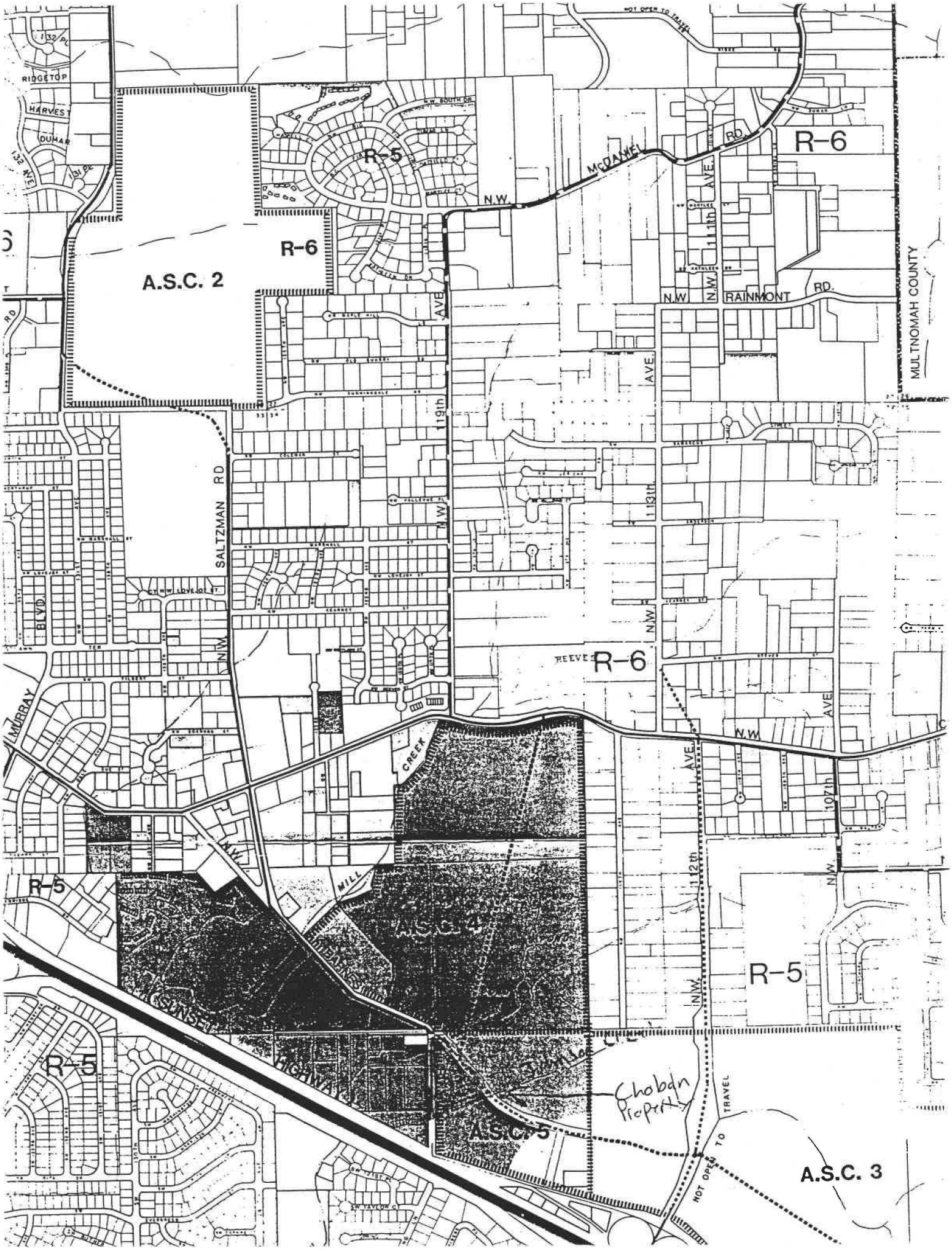
This land is classified as a one hundred year flood plain. It is important land in terms of cleansing pollutants. The zoning on this land has just be changed so that the owner can develop a commercial office while at the same time digging out the lower part of this flood plain for a pond.

The net effect of this will be to seriously compromise the ability of this flood plain to do its natural cleansing job. This is a precedent that if allowed to occur will have harmful and long term effects on the quality of water entering the Tualatin river.

We feel that one important element of a plan to keep the Tualatin river as clean as possible must incorporate what is happening to the waters that are draining into the Tualatin.

Sincerely,

Troy Horton
Chairperson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R-6
A.S.C. 2
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A.S.C. 5
A.S.C. 3
Chobdn Property
MULTNOMAH COUNTY
McDANIEL
RAINMONT RD.
SALTZMAN RD
MURRAY BLVD
SUNSET HIGHWAY
NOT OPEN TO TRAVEL
N.W. 111th AVE.
N.W. 113th AVE.
N.W. 112th AVE.
N.W. 107th AVE.
N.W. 119th AVE.
MILL CREEK

MULTNOMAH COUNTY OREGON

DEPARTMENT OF ENVIRONMENTAL SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190TH AVE.
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March 30, 1993

Mr. Robert Baumgartner
Oregon Department of Environmental Quality
Water Quality Division
811 S.W. 6th Avenue
Porland, Oregon 97204

Subject: Comments on the OSU Tualatin River Basin Report

Dear Mr. Baumgartner:

We have reviewed the OSU report entitled, "A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin," prepared for DEQ by a joint team of the Oregon Water Resources Research Institute and Oregon State University. Our specific comments are attached as part of this letter, for a total of ~~six~~ seven pages.

In general, we were disappointed at the lack of effort made in reviewing and incorporating the work completed by the Tualatin Basin designated management authorities (DMAs) over the past years. This work represents the majority of information which has been collected on the Tualatin Basin and is probably the best information resource available.

We were particularly dismayed at the inclusion of the DMAs ongoing activities as a "no action alternative." The Tualatin Basin DMA's have invested considerable public resources in developing and implementing management plans for controlling both nonpoint and point sources of phosphorus. Neither the expenditures nor the achievements have been "limited" as presented in this report. Rather, significant strides have been made in public awareness, BMP research, and nutrient reductions in the Tualatin River.

We would strongly urge DEQ to direct their research team to work closely with the DMAs

in developing and evaluating alternatives for the Tualatin River. Extensive coordination and cooperation between the DMAs, DEQ, and the scientific team is required if effective and implementable alternatives are to be developed.

Please contact me at (503) 452-1088 if you have questions.

Very truly yours,

LARRY F. NICHOLAS, P.E.
County Engineer/Director

Donna G. Hempstead
Tualatin Basin Coordinator

March 30, 1993

Formal Comments by Multnomah County on the Report entitled;

"A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin,"
prepared by
Oregon Water Resources Research Institute and Oregon State University
for the
Oregon Department of Environmental Quality

The following paragraphs contain comments by Multnomah County on the subject report. In general, the report failed to present the ongoing activities of the designated management authorities (DMAs) within the Tualatin Basin. The format and presentation of this report implies that nothing has been done to date in controlling nutrient sources to the Tualatin River. Many of the alternatives presented within this report have already been implemented within the basin. This should be stated as such. Essentially no detail is presented on the implementation and economic costs associated with the structural alternatives such as flow augmentation or removing the Lake Oswego Dam. The political and fiscal reality of the proposed alternatives are equally important elements of a truly feasible alternative and should be addressed.

The comments presented in the following paragraphs are organized based on major heading with paragraph references.

INTRODUCTION

page 1, paragraph 2.

The principle question on the Tualatin River is water quality, particularly the phosphorus source(s). This paragraph implies that water quality issues were not addressed within the project.

page 2, paragraph 3.

We suggest that the term "nonpoint source " be restricted to storm water transported pollutants. Groundwater is a totally separate phosphorus source and should be identified as such.

HISTORICAL PERSPECTIVE

page 11, paragraph 2

Steam habitat improvement and wetland mitigation activities are important to the overall health of a river system. Unfortunately, wetland mitigation usually means construction of new wetlands which involves a maze of regulatory issues. The report should provide some insight into the regulatory issues.

NATURE OF THE PHOSPHORUS IN THE TUALATIN RIVER

page 18, Figure 2

This figure implies that algae growth in the Tualatin River cannot be controlled. Is this what OSU is implying?

ALTERNATIVES AVAILABLE IN RESPONSE TO THE PHOSPHORUS/ALGAE PROBLEM

General Comment

This section presents alternatives which have been suggested on numerous occasions in the past. Little detail is presented on how these alternatives will be implemented or the associated costs. Specific detail on these factors will shed some light on the political and economic feasibility of these alternatives. It also appears that public involvement and information is not stressed enough under the alternatives associated with source control and restoration. The effectiveness of any nonpoint source program is highly dependent on the public's awareness of the issues and changing public attitudes and behaviors concerning nonpoint source pollution. The greatest reductions in nonpoint source pollution will most likely be attributed to changes in public activities rather than any structural solutions.

Decrease the Phosphorus Load

The basic premise of a TMDL is reducing the pollutant loads into the receiving water. This alternative is already being implemented throughout the Tualatin Basin by the designated management authorities (DMAs). A wealth of detailed information is available in the form of management plans which describes the activities and BMPs currently being implemented to reduce nonpoint source phosphorus loads. This report should present specifics on what activities are available and an estimate of their effectiveness (where data is available).

Restore the Stream Corridor

Riparian buffer strips are currently being implemented within the Tualatin Basin as part of controls on new development. Restoration of stream corridors in existing development will

be difficult and highly dependent on public information and involvement.

Change the In-stream Processes

This alternative seems to fly totally against what we are trying to achieve which is a natural river which can support beneficial uses. Installing mechanical equipment for aeration to improve "treatment" efficiency sounds like the Tualatin River is one very large treatment lagoon.

DEVELOPMENT OF MODELS

General Comment

The selection of models for the Tualatin Basin appears to be appropriate; however, the data requirements for these models may outstrip available data sources leaving the results open for interpretation.

In addition, the assumptions made related to pollutant loadings and the effectiveness of various BMPs is critical in developing and evaluating alternatives. An assumption of 50 percent removal of phosphorus inputs at a particular point on the river does not represent a true alternative unless the mechanism for obtaining those reductions has been developed. Groundwater sources are equally important in evaluating effective alternatives for controlling algae bloom in the Tualatin River. To date, the groundwater has not been quantified and the alternatives presented do not address impact of groundwater sources. Consequently, a model developed to evaluate the alternatives is only partially effective.

ANALYZING THE ALTERNATIVE STRATEGIES

Increase Summertime Flows

It seems that water conservation should have some merit under this alternative. Have the impacts of conservation been quantified?

page 31, paragraph c, Divert water from the Willamette River

We doubt that this represents a viable option. A watershed management plan which is based on water diversions between watersheds does not appear to be the true essence behind what we are trying to achieve which is restoration of the Tualatin River watershed. This should be based on returning the river to as near its "natural" condition as possible.

page 32, paragraph c, Alter agricultural practices to reduce phosphorus delivery

In the second paragraph, the following statement is made, "Indications from summer concentrations in the tributaries are that most phosphate comes in subsurface water." It

seems that this statement deserves more attention within this report since it is obviously a major factor in algae bloom in the Tualatin River, particularly during the regulated summertime period when very little runoff occurs. An effective strategy for managing phosphorus loads into the Tualatin River must address all sources.

page 33, paragraph c.

There are considerably more than three urban surface water best management practices. The writer should review the DMA's management plans for more ideas.

Take No Major Action

The presentation of this so called alternative of "pursue present pollution load reduction strategies" reveals the limited effort that the researchers at OSU and the Oregon Water Research Institute made in reviewing the ongoing surface water management programs throughout the Tualatin Basin. The next sentence states "this approach has limited costs" which must mean that the millions of dollars spent by USA on their wastewater treatment facilities to remove nutrients and the surface water management programs implemented by the DMA's are "limited costs."

The Tualatin Basin DMA's have invested considerable public resources in developing and implementing management plans for controlling both nonpoint and point sources of phosphorus. Neither the expenditures nor the achievements have been "limited." Rather, significant strides have been made in public awareness and BMP research. We do not believe that this represents a no action alternative. We would strongly recommend the research team spend adequate time reviewing important resources which exist outside of the academic environment.

RECOMMENDED SHORT TERM ACTIVITIES

page 39, paragraph 3, Engage the Public in a Long-Term Planning Process

Public information and participation programs have been established to involve the public in the decision making process. Citizen advisory committees have been established to provide input to the DMA's on the issues which should be considered with improving water quality within the Tualatin Basin. This report should reflect these on-going activities.

RECOMMEND LONG TERM ACTIONS

The activities presented within this section have been presented and discussed on numerous occasions. The biggest road block faced by the DMAs has been implementation of the programs and policies for surface water management. The list of recommended long term actions will in all probability improve water quality and reduce algae bloom within the

Tualatin Basin if they can be implemented. That is a big "if" considering the current economic and political atmosphere. We would suggest that more effort be devoted to reviewing the economic and implementation aspects of these alternatives. A recommended management plan should contain elements which have been developed with technical, economic, and policy issues included.

page 43, A Learning Approach to Organization Behavior, paragraph 3

Many discussion groups, workshops, and seminars have been sponsored in the Portland area which address water quality and watershed management. Advisory groups composed of local citizens and representatives from various aspects of the community have been formed to work with public officials in addressing water quality and storm water issues. The OSU team should discuss ongoing activities with the DMAs.

Oregon

DEPARTMENT OF
FORESTRY

STATE FORESTERS OFFICE

"STEWARDSHIP IN
FORESTRY"

General File 6-0-8-132

April 1, 1993

Robert Baumgartner
Oregon Department of Environmental Quality,
Water Quality Division
811 S.W. 6th Avenue
Portland, Oregon 97204

Dear Bob:

Thank you for the opportunity to comment on the March 1 report of the Tualatin River study contracted by DEQ to Oregon State University and Portland State University.

In its title and Introduction, this report names its purpose as one of bringing together and analyzing available information on water quality and the Tualatin River's condition. However, the report is notably lacking in references or analysis of the available information on forest management and phosphorus. A 1991 report on the effects of forest management on phosphorus in streams is Phosphorus and Forest Streams: The Effects of Environmental Conditions and Management Activities by Salminen and Beschta of Oregon State University. The results of 1991 and 1992 water monitoring in the forested areas of the Tualatin basin are available from the Oregon Department of Forestry and were supplied to the report's authors. Finally, the forestry best management practices (BMPs) used in the basin are available in the Oregon Forest Practice Rules. The Department of Forestry would be pleased to supply additional copies of this information to the study group.

The following are specific pages where the report should address available information.

On page 6, in the first paragraph, the BMPs in the Forest Practice Rules should be included in the discussion. These BMPs for controlling erosion and limiting activity in and around streams to protect water quality have been implemented in the basin since 1972.

On the last line of page 13, the reference to slash dams probably was meant to read splash dams.

2600 State Street
Salem, OR 97310
(503) 378-2560

On page 14, in the first paragraph, the statement that fragmenting the landscape degrades stream function needs more explanation. The correlation is probably not clear to the nonacedemic reader.

On page 21, beginning with the last line and continuing to page 22, the description of forest land management effects applies to all land uses, not just forestry. This discussion should describe how the Forest Practice Rules have long provided BMPs for forest land management.

On page 33, the alternative strategies for control of forest practices that may deliver phosphorus is so general as to be misleading about the potential for further controls. Taking the proposed measures point by point, it is important that the report recognize that there is virtually no controlled burning in the basin. Wildfire prevention efforts in the basin have precluded any significant burned over acreage from that source. In addition, the effects of fire on phosphorus in streams is inconclusive at best. Second, yarding and slash piling/scarification are currently regulated by BMPs to prevent erosion into waters. Third, road design and drainage maintenance are also regulated by BMPs. Fourth, the majority of harvesting studies reviewed in the Phosphorus and Forest Streams report show no change in phosphorus concentrations due to clearcutting. Finally, riparian areas are managed with BMP rules to control the effects of harvesting. These BMPs include maintaining stream vegetative cover and bed and bank stability regardless of tree removal. Tree and and other vegetative cover retention is required on stream reaches that provide fish habitat or domestic use water. These BMPs are currently being reviewed to provide refined practices to further limit disturbance of water temperature, aquatic habitat, and wildlife habitat. The studies reviewed in the Phosphorus and Forest Streams report do not identify harvesting of riparian areas as a source of phosphorus. In summary on all these points, the Tualatin report should more accurately describe the potential of the alternatives listed and recognize the long-standing implementation of BMPs in the basin.

On page 39, in the first paragraph, the recommendation for "the most ecologically oriented forestry practices" requires explanation if it is to be useful. Its vagueness demonstrates further the report's failure to analyze the available information and existing forest management BMPs being enforced in the basin by the Department of Forestry.

Sincerely,

Dave Degenhardt

David Degenhardt
Forest/Water Issues Coordinator

DD

29457 Glacier Way
Wilsonville, Oregon 97070
Res: (503) 682-2154

April 7, 1993

Mr. Bob Baumgartner
Water Quality Division
Oregon Dept. of Environmental Quality
811 S. W. Sixth Ave.
Portland, Oregon 97204

Dear Mr. Baumgartner:

Please extend my thanks to Ed Sales for sending me a copy of the draft report on Tualatin River Basin.

The report does an excellent job of defining the problem, illustrating alternative solutions and most importantly pointing out the need for public education.

I recognize that the DEQ is not in the business of product promotion or marketing, but could your agency and/or other city-county agencies use a product which addresses non-point source pollutant problems in urban areas?

Over the past year I have developed and road tested an automobile product which retains oil, grease, antifreeze and engine discharge for controlled disposal. Wide public use of such a product would eventually eliminate the oil and grease in parking lots, curb-side parking areas, home driveways and garage areas.

Successful public agency and municipal use of this product on fleet and service vehicles could prove to be an educational tool and contribute to public awareness of pollutents in stormwater runoff. Interested public agencies which would like to road test a non-point source pollution control product should call or write the address above.

To date Fred Wright, Jr., Unified Sewerage Agency has expressed an interest and awaits road test results. Your comments or suggestions are appreciated.

Best Regards,

William A. Wersch

William A. Wersch

FRIDAY APRIL 2, 1993 ①

5050 S.W. CHILDS ROAD

LAKE OSWEGO, OREGON

97035-8026

ROBERT BAUMGARTNER

OREGON DEPARTMENT

OF ENVIRONMENTAL QUALITY

WATER QUALITY DIVISION

811 S.W. 6TH AVENUE

PORTLAND, OREGON

97204

DEAR MR BAUMGARTNER:

MY COMMENTS ON

TUALATIN RIVER WATER

QUALITY STUDY DUE

FRIDAY FRIDAY APRIL 2, 5:00 P.M. '93

I ATTENDED THE PUBLIC

HEARING (A CHANCE TO COMMENT

ON) MONDAY MARCH 15TH 7:00 P.M.

AT HILLSBORO WASHINGTON

COUNTY PUBLIC BUILDING 155 N. 1ST

I TURNED IN 12 COPIES

OF MY 3 PAGE INPUT TO THE

BOARD. YOU MUST HAVE SOME

ON RECORD? IT WAS IN MY

THANK YOU FOR THE
REPORT SUBMITTED TO OREGON
DEPARTMENT OF ENVIRONMENTAL
QUALITY DATED MARCH 1, 1993
LOT OF USEFUL INFORMATION
CONTAINED IN THIS DOCUMENT.
(COMMENTS TO FOLLOW IN THIS
INPUT)

THEN I ATTENDED PUBLIC
MEETING THURSDAY, JANUARY 14, 1993
HELD AT SOUTH SALEM HIGH SCHOOL
WITH DEPARTMENT OF ENVIRONMENTAL
QUALITY PERSONNEL.

I PUT WRITTEN INPUT TO
WRITTEN TESTIMONY TO CHAIRMAN
CHERNOFF OF THE HEARING
BEFORE THE TIME THE HEARING STARTED
GIVING A DISCUSSION WITH QUESTIONS
AND RESPONSES, CONTACT MAIL
MULTNOMAH 229-5284 FOR
FURTHER EXPLANATION.

BOTH OF THESE MEETINGS
AND HEARINGS FOR FURTHER
EXPLANATION. I SPOKE ON
QUESTIONS QUESTIONS WHAT CAME
UP FOR AN EXPLANATION.

IN BOTH CASES THESE (3)

SHOULD BE ON MINUTES OF

OF RECORD JUST ASK!

SUCH AS (1) TO ENCHANGE

THE SUMMERTIME FLOW AND

(2) DECREASE THE PHOSPHOROUS

LOAD IN RIVER - TUALATIN

(3) O.D.O.E. ? OTHER

CONCERN, PROJECT AND

OBJECTIVES SO FURTHER

INFORMATION CONTACT

NEIL MULLANE 229-5284

BOEING WORKS IN THE

OREGON STATE 734-4022.

NOW WILL GO BACK TO

(REPORT MARCH 1, 1993)

GOING THRU BY PAGES

(FORWARD) AN IMPRESSIVE

LIST OF PARTICIPATORS, AND

MAJOR INPUTS CAME FROM 14

OUTSTANDING ENGINEERS FROM

UNIVERSITIES. AND SPECIAL

ASSISTANCE WITH FIVE MEN

HEADING SPECIAL AGENCIES SUCH

AS SEWERS, U.S.G.S., IRRIGATION DISTRICTS

THAT IS WHY WE (YOU) HAVE

SUCH GOOD SPECIAL INFORMATION.

THEN WITH TWO FINE COLLEGES TO CHOOSE AND BIG YOU UP, MICHIGAN STATE, PORTLAND STATE THEN THE GUIDANCE OF D.E.G. AND STAFF TO GET HIM THE INFORMATION UP AND HOLD THE MEETINGS AND SET OUT INFORMATION AND KEEP THE PUBLIC INFORMED

I THINK IT WOULD BE FITTING TO EXPRESS MY INVOLVEMENT WITH TUALATIN RIVER - I GREW UP ON THE BANKS OF THE TUALATIN FOR SOME FIFTY YEARS HAVE LIVED AT THE PRESENT ADDRESS ON THE SAME ACRES THAT GOES SOUTH FROM CHILDS ROAD SOME THOUSAND FEET TO THE CENTER OF TUALATIN RIVER. ALWAYS LOVED THE RIVER FISHED IN IT AND DRANK FROM THE RIVER YEARS AGO. IT WAS CLEAR THEN THE WILD BOTTOM WILLIS ST LOUIS THE WAY IT IS GREW UP ON RANCHO CREEK IN BIG WILD

POLITICALLY HAVE BEEN INVOLVED IN THE RIVER WAS "WAY BACK" MAYBE FORTY? WHEN TIMBER WAS KING AND TALK TO STRAIGHTEN OUT THE RIVER COURSE AND LINE THE BANKS WITH RIPRAP AND CONCRETE (CALIFORNIA STYLE)

THEY HAD TO BUY A RIGHT OF WAY FIRST THEN FIND A PLACE TO DISPOSE GENERAL DIRT COULD BE USED FOR FILLING, COST KILLED PROJECT

(1) INVOLVED WITH WASHINGTON COUNTY CLEANING UP THE RIVER. EXPANDING OUT IN UNINCORPORATED COUNTY SOUTH OF CLACKAMAS COUNTY A BIT IN TILLAMOOK AND CLACKAMAS & POLK

THESE MEETINGS WITH THE CHAIRED BY THE VERY CAPABLE BONNIE L. HAYS CHAIRWOMAN OF WASHINGTON COUNTY

(2) CLACKAMAS COUNTY SURVEILLE WITH IN MANAGEMENT. (GET SO MUCH COUNTY)

(3) CLACKAMAS COUNTY BOARD OF COMMISSIONERS. DEVELOPMENT ISSUES REGARD

(4) LAKE OSWEGO DEVELOPMENT AND CREATING POLLUTION THEIR POLLUTION

(5) AND CITY OF RIVERGROVE

(MY THOUGHTS AND TO — 6

HELP TO HELP THE RIVER ALGY.

(1) FIRST THOUGHT ALWAYS EVERY BODY IN THE WATER SHED OF TUALATIN RIVER SHOULD HELP PAY THE COST TO CLEAN UP THE RIVER THAT WOULD BE EVERY HOUSE HOLD BUSINESS ROADS INCLUDING PARKING LOTS ETC. ON PRORATION BASES.

(2) THE "GASTON" DAM SHOULD NEVER BE BUILT WOULD DESTROY THAT BEAUTIFUL AND PRODUCTIVE VALLEY. AND FLOOD OUT CHERRY GROVE THE WATER WORKS AT BARNEY FALLS

(3) NEED MORE STOMACK SPACE IN STEEP CANYONS NOT DEVELOPED

(4) TRASK RIVER COULD BE EXCHANGED SIPHONING OVER THE MOUNTAIN

(5) NEHALEM RIVER IS A POSSIBILITY SHOULD BE STUDIED

(6) VERY DEFINITELY, PRESERVE AND DEVELOPED ARE WET LANDS

(7) MORE NATURAL AREAS BE PRESERVED. THEY HOLD RUNOFF WATER

(8) DON'T REMOVE THE OSWEGO DAM. THAT IS FALSE ECONOMY

(9) NEW AND BIG ISSUE TO TAKE WATER FROM WILLAMETTE LOOK AT THE EARTH QUAKE MAP RIGHT ON FAULTS

GOD BLESS TO ALL
HAPPY TRAILS

NOTE: FEEL FREE TO COPPY AS INTENDED
WHICH IS TO COPPY PIC
STAY COPPY FREE IN

HIKE POST

MONDAY MARCH 15, 1993

DEPARTMENT OF ENVIRONMENTAL QUALITY - (TUALATIN RIVER)
811 S.W. SIXTH AVENUE
PORTLAND, OREGON. 97204-1390
DEAR D. E. Q. BOARD:

A CHANCE TO COMMENT ON PUBLIC HEARING ON THE TUALATIN RIVER WATER QUALITY STUDY.
TONIGHT MONDAY MARCH 15, 1993 HILLSBORO AT 7:00 PM ROOM 105 WASHINGTONS COUNTY PUBLIC SERVICE BUILDING 155 N. FIRST STREET 97124 HILLSBORO, OREGON.

THANKS FOR YOUR LETTER OF MARCH 2ND (ELIMINATION) AND NOTIFICATION ON THE TUALATIN RIVER BASIN MARCH 1, 1993. BY OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY.

I CAN JUST "ASSUME" THAT WILL BE LOCATED ON RETURN (2) LETTERS SENDS IN APRIL 1994.

I HAVE GIVE HIM TODAY QUOTE OR LIES" TO HEAR WHAT WHAT HAS TO SAY. HAVE HAD A CHANCE TO GO THRU THIS BOOKLET

BUT WANT TO HAVE A CHANCE
TO ADDRESS WRITTEN COMMENTS
BY 5:00 PM APRIL 2, 1993
ADDRESS TO ROBERT BAUMGARTNER.

MY INVOLVEMENT IN TUALATIN
RIVER SHOULD BE ON RECORD AT
WASHINGTON COUNTY RECORDS AND ALSO
SCREENED WITH MULTNOMAH CLACKAMAS COUNTY
AS WASHINGTON COUNTY WORKED
THAT COMMITTEE TO CLEANING UP
THE TUALATIN CHAIRED BY THE
VERY CAPITABLE AND VERY NICE
PERSON TO WORK WITH THE
CHAIRPERSON OF WASHINGTON COUNTY
BOARD OF COMMISSIONERS FOR
MANY OF YEARS BONNIE L. HAYS.
FEW COMMENTS OR NONE
ONE BIG POINT I ALWAYS
STRESSED EVERY BODY ON THE
TUALATIN RIVER WHEN SHIP
SHOULD HAVE PAY FOR CLEANING
UP THE RIVER. WE ARE ALL GUILTY
OF POLUTION IN ONE WAY OR
ANOTHER. THIS FE CLUDES
WASHINGTON COUNTY CLACKAMAS COUNTY
MULTNOMAH COUNTY. BIT OF YOU AND

YAMHILL COUNTY, BUT OR
TILLAMOOK COUNTY TOO. ON AN
EQUAL PHOTO WITH BIKES. WITH
BUSINESS, STORES PARKING LOTS AND
HIGHWAYS. ANOTHER WITH STATE HIGHWAYS

THAT IS WHERE THE BASIC
"3 CC" PIN HOOK HOLD SITTING ON.

THAN I COMPLAINING
FOR SQUALLIN AND NOW STORAGE
DAMS AND RESERVOIRS BE BUILT
IN STEEP CANYONS WHERE LITTLE
OR DANGER BE DONE TO THE
ARCHITECTURE OR ESTABLISH CITIES.

THAT IS WHY I WAS NOT
FLOODING THE TUALATIN RIVER
PROPOSE DAM ABOVE GASTON. WOULD
WIPE OUT ALL THAT BEAUTIFUL
VALLEY AND CHERRY GROVE.
AND INTERFERE WITH WATER
WORK AT BIRNEY FALLS.

SEARCH FOR LOW WATER
FROM THICK RIVER POSSIBLY
NESTUCCA RIVER. AND WILLAMETTE TO.
NOW AN ELECTRICAL COUNTY TALK
OF RIVER OTHER DAM WOULD BE
MORE HARM THAN GOOD. SINCERELY THANKS
GOD BLESS [signature] LEONARD G STRNAD / 639-
5050 SW CHELLIS RING LAKE OSWEGO 97035-8026 / 2807

FEDERAL EMERGENCY MANAGEMENT AGENCY
COPIES AS NEEDED

APPENDIX C

WRITTEN COMMENTS RECEIVED FROM INVITED PEER REVIEWERS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
Chesapeake Bay Program Office
410 SEVERN AVENUE
ANNAPOLIS, MARYLAND 21403

May 28, 1993

Dr. Benno P. Warkentin
Director
Oregon Water Resources Research Institute
Oregon State University
Strand Agriculture Hall 210
Corvallis Oregon, 97331

Dear Dr. Warkentin

I have reviewed the draft report on the Tualatin Basin and find that you have done a very good piece of work in the limited time available to your group.

I think the assumption of a 50% reduction P04 may be a little more than can be reached with NPS control measures unless there are major changes in the land use. We in the Chesapeake Bay have taken a little different approach. We established a controllable load from nonpoint sources and took a reduction based on this controllable number. Our controllable load comes for the type of a watershed model that your are in the process of developing. We use a base year load, which is an average of loads from a four year model run. We use 1985 as our base year, which is our land use base year for the model. From this base load we subtract a load generated by the model using all land uses in forest cover. This gives us the load generated by man's activity. In our case the goal is set a 40% reduction of TN and TN. The model indicates that doing everything we can do for NPS (a so called limit of technology) only gives us a 42% reduction in TN, with similar results for TP. We would need to make major land use changes to get higher reductions or have better technology based BMPs for NPS.

I would strongly recommend developing some form of controllable load for your project and basing reduction goals on that load. I am surprised at your groundwater P load, but your area is much different than ours. This is going to make reductions much more difficult than just dealing with surface runoff sources of P.

In your alternatives for agriculture, you discuss reductions in the phosphorus application rates, this should be done with a full nutrient management plan to ensure a balanced application of the nutrients that the crop will actually use. Also, urban nutrient management could help reduce your loads. You are correct in

looking at irrigation water management and animal waste management. Is sewage sludge being applied to agricultural lands in the project area? If it is, it should be under a nutrient management plan along with all other sources of nutrients.

Once you get the watershed model calibrated for use in the entire basin, you will be able to look at many different control alternatives and the resultant water quality. I assume that you are including point sources as an input to your transport model. During the calibration period you should be developing cost data, on a per acre basis, for NPS controls and by treatment processes for the point sources. These two data sets will allow you to compare costs for both NPS and point source control options. This will also allow you to compare the total costs and the cost per pound of reduction for various scenarios as you develop implementation strategies for the entire watershed. We have found this very helpful in understanding where we have control options and what they may cost.

I think your are on the right track and I wish you well with the remainder of your work.

Sincerely Yours,

Lynn R. Shuyler
NPS Coordinator

F. Humenik

EVALUATION OF REPORT ON WATER QUALITY IN THE TUALATIN BASIN

The comprehensiveness and technical content of the report is good and supports both the long and short-term conclusions. The final section on "A Learning Approach to Organization Behavior" is excellent and should help both technical and general audiences better understand the comprehensive and long-term process that must occur for improved water quality.

My major concern with the report is that too much emphasis is directed to just phosphorus control. The report does well in presenting an overall evaluation in a very comprehensive manner. Therefore, the repeated and almost exclusive attention to phosphorus, in many sections, as the cause and method for solution stands out in even greater contrast.

The dilemma of determining the limiting nutrient for algal production has been an area of controversy for many years. The short time for response precludes me from looking into the literature of the 1960s when several articles were written concerning the limiting nutrient which discussed phosphorus, nitrogen including the ability for atmospheric nitrogen fixation and carbon limitations based upon water alkalinity or carbonate availabilities. The Journal of Water Pollution Control Federation had several good articles discussing potential limiting nutrients for algal growth or those nutrients which would be the easiest to remove to reduce algal blooms. These articles as well as experiences with Lake Erie, Lake Tahoe and other nutrient-rich waters led to the conclusion that no one nutrient should be emphasized as the mechanism for limiting algal growth.

Your Report 898 presents good literature from the 1970s on P as the limiting nutrient (pg. 5) and concentration levels that support nuisance blooms (pg. 21). However, the issues manuscript note that more than nutrient availability affect algal abundance. Therefore, I still feel it is short sighted to place so much emphasis on phosphorus and set a TMDL that only considers phosphorus, especially when Report 898 notes, "Both ammonia and phosphorus were

factors limiting water quality (pg. 1). Extremely low levels of phosphorus are sufficient for algal growth. Report 898 notes these levels may be similar to background levels (pg. 21).

The phosphorus in bottom sediments of eutrophic waters is able to sustain massive algal growths. (Conflicting information on river bottom sediment and yearly flushing resulting in no carryover of bottom sediment). Atmospheric nitrogen fixation cannot be limited. Carbon diffusion rates can limit algal bloom dynamics but not overall algal growth. Therefore, the best strategy seems to be a comprehensive approach to limit all nutrients in an effort both to reduce the rate of eutrophication and minimize algal blooms.

We had experience in this area in North Carolina with the Chowan River Basin which seems somewhat similar (differences in rainfall, flow and sediment buildup for nutrient recycling) to the Tualatin Basin in that there were high inputs of nitrogen and phosphorus, the lower end of the River near the Albemarle Sound has long detention times, and flow rates are low. In fact, one of the major oppositions for transferring water from Gaston Lake to Virginia Beach was that the reduction in flow would aggravate water quality problems in both the Roanoke River and Albemarle Sound. A comprehensive nutrient reduction program has been implemented including elimination of all municipal discharges by land application of treatment plant effluent.

In summary, my greatest concern with the report is the rather unilateral emphasis on phosphorus when later sections of the report allow that absolute oxygen depletion and sediment are problems (and ammonia in Report 898). To state that control of phosphorus will reduce eutrophication and eliminate algal blooms may be making an unachieveable promise which will affect continuing public support and not be consistent with the final chapter on "A Learning Approach to Organizational Behavior." It would seem better to stress that runoff and ground water inputs of phosphorus, nitrogen, sediment and oxygen demand as well as a changed hydrology represent the minimum suite of parameters that caused the problem, and thus correction of at least these concerns over the long term will be required to restore water quality.

(If phosphorus is coming from ground water from agricultural areas, then more long-term emphasis must be placed on nutrient management than TMDL for P).

Page-by-page comments are:

Page 2. It is noted that algal growth requires high nutrients and that the extra flows will dilute the phosphorus concentrations to control algal growth. In many instances algal growth is not dependent upon very high nutrients, especially phosphorus, and thus to say that the dilution of phosphorus will control algal growths may be misleading and building expectations that cannot be realized. It also seems inappropriate to state that a 50% reduction in phosphorus would be required to decrease algal growth because relationships between nutrient concentration and algal growth are very difficult. The final line on this page is very good, "Beginning to engage the public in the long-term planning process." It seems very important to inform the public that it took a long time to degrade these waters and correspondingly it will take a long time to restore them through a very comprehensive pollution abatement strategy.

Page 5. The sentence, "All the alternatives have costs and benefits, some of which are included here and some of which must be weighed by the decision makers in the political process that includes values held by people involved," is very good. The sentence in the following paragraph, "This needs to continue, because there are unanswered questions in the phosphorus supply to algae and in how the nonpoint source phosphorus reaches the stream" is very

good. These uncertainties must always be emphasized to technical and general audiences. (Report 898, page 2, states P is 85% from point sources and 15% nonpoint sources; then page 23 notes that virtually all P that makes way into surface waters is carried there by water, primarily overland flow, and pages 25 and 32 state 70% from agriculture. I think Dr. Miner said high amount of P was in ground water from agricultural areas???).

Page 6. Noting that management practices put in place must consider agricultural and urban activities including stormwater management is very good in approaching the problem on a comprehensive basis or noting that total watershed management is necessary. Recognition that ammonia from point sources presents an oxygen demand adds further emphasis to the need to control ammonia, and in fact, all forms of nitrogen. Just because "ammonia is controlled by oxidation to nitrate" does not mean it does not result in eutrophication and stimulation of algal blooms.

Page 9. The comprehensive evaluation of landscape changes is very good.

Page 10. To state that the net effect of these changes has been to increase the nutrient level of phosphorus and thus algal blooms is too simplistic and not consistent with the comprehensive approach taken elsewhere in the document to evaluate the total basin. A more comprehensive approach on nutrient inputs and management seems more appropriate for developing a long-term program that will protect water quality.

Page 11. To infer that algae just grow in a quiet pool is inappropriate based upon our experience in the Chowan River. The algal blooms or nuisance aquatic weeds could move upstream into more rapidly flowing waters. The total paragraph on page 11 is a good statement of the comprehensive approach that must be taken.

Page 13. Once again the need to control ammonia is noted. The sentence at the end of the second paragraph is good and should provide the theme for this total report, "We need to think in terms of cumulative effects, rather than evaluating each action separately."

Page 14. The section on Watershed Health is very good and again emphasizes the comprehensive approach that must be taken. I question the sentence, "A shift from blue-green algae in 1976 to filamentous diatoms in 1987 may be indicative of improved water quality during that period" because many factors determine predominant algae and different species can predominate in blooms in different years. (Issues manuscript under Aquatic Biota gives more complete explanation and allows that regardless of algal type public perception may not change).

Page 15. The reference to Wetland Restoration needs further discussion, at least the degree of wetland restoration. It seems proper to expand this important information as a separate paragraph under Section VI entitled, "Restoration" on page 16.

Page 19. As noted, phosphorus can be recycled in the river system and bottom sediments may contain enough phosphorus to support algal

blooms for many years. (Bottom sediment or algae on bottom surfaces would support phosphorus recycling [issues draft]). (Report 898, pg. 20) Therefore, emphasis should not just be directed to phosphorus but to a comprehensive pollutant reduction strategy.

Page 20. Certainly phosphorus limitation and light limitation can reduce algal blooms, but it seems unwise not to mention all of the other factors involved.

Page 21, second sentence, first word. Possibly should be of. The acknowledgement that "although considerable progress has been made over the past decade in reducing the amount of point source phosphorus entering the Tualatin, these reductions have not been sufficient to substantially change the algae dynamics" further emphasizes the need to not make statements or build expectations concerning relationships between phosphorus control and algal blooms.

Page 25. It is good you used existing computer models and are not advocating the development of new models.

Page 26. It is good that the models deal with both nitrogen and phosphorus and that impervious segments or runoff control are also noted as important in reducing nutrient inputs.

Pages 27 & 28. It is hard to understand the relative locations of places along the river, possibly because Figure 1 is missing. This is the first reference to flashboards. I don't totally understand what vertical averages are when you say these results are vertical

averages. Correspondingly for Table 1 I do not totally understand the statement overdepth. In Table 2 why does increased flow increase phosphorus at Elsner and then decrease phosphorus at Stafford. It is noted on page 21 that increased flow provided by discharge from Hagg Reservoir would dilute phosphorus concentrations. Why is there such a difference between Elsner and Stafford for all model alternatives? (Is this evidence for P coming from ground water from agriculture?)

Page 31. Again when speaking about point and nonpoint sources, it would be best to be very comprehensive in dealing with all of the inputs and all of the sources. Are there septic tanks in this watershed.

Page 32. Better support for this overall project may result if equal emphasis is put on treating the source as well as reducing the effect by dilution. I still don't see documentation or explanation for the statement, "Simulated loadings and in-stream processes suggests that halving phosphorus loads would decrease phosphorus concentrations 50 percent at the Elsner and only 6 percent at Stafford (with reference to page 28). I am not sure what point is being made in the last three sentences on that page. Nevertheless, a combination of actions will be required over the long term including BMPs, increased flow and restored hydrology.

Page 34. To indicate that phosphorus should not be taken out of this system continuously definitely sends the wrong signal concerning the

storage and recycling of phosphorus and thus the effect that it would have on algal blooms, especially in quiescent pool areas. (Unless high spring flows remove all P while temperatures are too low for algal growth).

Page 37. Allows that absolute oxygen depletion is a problem.

Page 39. As noted earlier, I agree with all the recommended actions but feel they should be presented in a way that maximum reduction of all pollutants over the long term is the primary strategy.

Page 39. The statement, "Decisions of this magnitude are not made quickly nor without intensive study. Now is the time to initiate that process." should be more directive of the tone of the rest of the report rather than the perception that it is simply a matter of implementing TMDL for phosphorus and then water quality problems will be eliminated.

Page 41. The statement under Section 3, "Managing agricultural lands for maximum infiltration is another component, and land use planning for maximum pervious surfaces in urban areas is snother" is an illustrative of my suggestions to be more comprehensive in recommending treatment strategies - unless ground water P from agriculture is problem.

Page 43. Again, this section is excellent in setting a long term, comprehensive approach that educates and involves stakeholders.

I feel your information evaluation is good and the important actions have been technically justified and presented in the short and long-term actions. The major review evaluation continues to be better utilization of supportive information you have assembled to recommend a

combination of actions or, in fact, a strategic phasing of all the recommended actions for comprehensive source reduction enhanced by flow supplementation, stream corridor modification and restoration. (It is most important to understand systems to be controlled to properly use good information assembled!).

REVIEW

A Report To Collect Scientific Data And Provide Evaluation And Recommendations For Alternative Pollution Control Strategies For The Tualatin River Basin

Oregon Water Resources Research Institute
Oregon State University
Corvallis, Oregon

Review Prepared By

Dr. Terry J. Logan
Agronomy Department
The Ohio State University

Overall Review

I found this to be one of the best written reports of its kind I have read in a long time. It was clearly written and the reader will easily identify the major points, conclusions and recommendations. I plan to keep it and use it as a model for my students. The state-of-knowledge of phosphorus (P) biogeochemistry is well understood by the authors and is applied appropriately to the Tualatin Basin. By the way, I had the opportunity to tour the Tualatin last winter with Dr. Wes Jarrell of the Oregon Graduate Center and to discuss with him his and other P studies in the watershed. This certainly made it easier for me to review the report. I could find no fault with the report's methodology, conclusions and recommendations for P management of the watershed. The alternatives are clearly identified, and I support the ideas expressed in Section XI on Total Quality Management by which all parties in the watershed can be educated on the alternatives and be brought to consensus for action. I believe that flow augmentation must be a major part of any long or short term strategy, because reductions from non-point source reduction, even if achievable, produce limited effects and will be countered by growth and more intensive land use in the watershed. My first hand view of the watershed suggests that this landscape would benefit from aggressive development of riparian areas, floodplains for storage of storm-flow sediments, and wetlands. Some of the long term measures should be approached through the use of field pilot studies. This is particularly true of riparian areas and wetlands.

Specific Comments

1. It was not clear if there has been any interaction between OSU and Dr. Jarrell on his study of P sorption-desorption by Tualatin surface and subsurface soils. His work suggests that natural levels of dissolved P from these soils may be higher than recommended attainment levels in the River.

2. What will be the effect of increased flow rate in the River on sediment resuspension, bank erosion, turbidity and P transport? These can all affect algae growth.

3. It was not clear from the report what the impact of current and planned wastewater treatment will be on P loadings. Does the plant treat all sewered flow, including storm runoff? Does the plant have a P removal system, and if so, to what concentration, 1.0 or 0.5 mg P/L? Is sewage sludge recycled by land application within the watershed, and if so, what effect will this have on P loadings?

4. No mention was made of on-site waste disposal in the watershed. Are there septic tanks and how efficient are they in P removal? Is there a plan to bring everyone in the watershed into the sewer grid?

5. Measures listed on pg. 32 to reduce agricultural P losses should include an aggressive program of soil testing and education to make sure growers are not overfertilizing. The relationship between soil test, yield goals and P fertilization needs to be emphasized. The best way to manage non-point source P is not to apply it in the first place.

6. What is the research base on utilization of dissolved ground water P by riparian vegetation? Are some species more effective than others?

7. What are the relative unit area P loads from the forest compared to more intensive land uses? Could eroded sediment from the forested areas act as a sink for dissolved P from agricultural areas? Is suspended sediment in the River primarily a sink or a source of dissolved P?

United States
Department of
Agriculture

Soil
Conservation
Service

West National Technical Center
511 N.W. Broadway, Room 248
Portland, Oregon 97209-3489

May 18, 1993

Benno P. Warkentin
Professor of Soil Science
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Your staff has done an excellent job providing background on the phosphorus water quality problem and zeroing in on the actions which effect it in the Tualatin. I hope these comments will generate some additional discussion and be considered down the road in your evaluations.

Review comments on the project report in the Tualatin Basin:

The question is not whether changes in agriculture and forestry practices can decrease the amount of nonpoint phosphorous, but, how much? Agricultural practices which decrease the phosphorous load include proper management of confined animal feeding operations, cropland, orchards, and nurseries. Reducing fertilizer application can be quantified and be related to the total load in the river system. How much impact it will have during low summer flows can be identified. From your evaluation, it appears that flow augmentation is needed during the summer to have any measurable effect on the phosphorus water quality parameters, particularly in the lower reaches.

Page 2, line 9. This should be rewritten. The magnitude of the decreases for most practices can be determined, even though the complete separation of the components of phosphorous making up subsurface flow have not been determined.

Identify the incremental changes that can be made in P reduction in the agricultural, forestry, and urban sectors, and evaluate the downstream impact. Don't worry about quantifying each component of the natural baseline.

Identify the decreases which can be easily quantified.

- Some reduction in 12 million pounds of fertilizer used in agriculture.

- Number of lagoons needed to control runoff and livestock waste.

- Reduction in erosion and sediment carried to the stream.

- Acres of restored riparian vegetation.

- Changes in forestry practices - one-half the area.

- Acres of wetland preserved or restored.

- Control of urban growth and fertilizer application to lawns and gardens; control of septic tanks; paving.

Page 5, paragraph 3. Complete the land use discussion. Using information from other parts of the report, it appears that 50 percent of the area is in forest production, 21 percent is urban, and 42 percent is farmed. This would leave what percentage in water and other.

Page 6, paragraph 2. On page 34, it states that a 70 percent reduction of the total phosphorus load during the summer will occur by installation of the USA sewage treatment plant. Page 25, does your analysis and model runs use this assumption? The final evaluation of water quality below the sewage treatment plant may have to wait until new monitoring data is available.

Page 33, Section C. Urban growth is not confined to the lower reaches of the river. Urban development in the form of ranchetts and subdivisions is occurring to the tops of the watershed. In the last 10 years, paving, septic tanks, confined livestock, vineyards, nurseries, and homes are going in almost everywhere. Bull Mountain, Chahalem Mountain, Cooper Mountain to just name a few. This is on previously timbered areas, with shallow soils and slopes exceeding 15 percent in a lot of cases.

Page 41. Based on your analysis, I think the only long-term solution to significantly reducing phosphorus concentration during the summer months is reservoir storage and releases. If the total phosphorus load during the summer has been reduced 70 percent by installation of the sewage treatment plant, other actions will have a small impact on water quality, particularly in the lower reaches.

With about 30 inches of the annual rainfall coming during October to March, it is not likely that relatively minor changes in storage in the natural landscape or riparian areas will have much effect on flow in July or August. During the summer all the rainfall is needed to grow vegetation on the watershed. Wetlands could significantly increase summer flow if they are designed to store water like a small reservoir and have man regulated releases for late summer; but would take lots of acres and lots of water storage.

Urban development for a population which will probably double in the near future can only increase phosphorus loading. Stopping light rail development to the west side or land use regulations could slow down urban growth and reduce potential loading. Controlling urban growth is probably the most important long-term action needed to control phosphorus loading.

HOWARD R. THOMAS
Head, Water Quality Staff

United States Department of the Interior

GEOLOGICAL SURVEY

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May 21, 1993

Dr. Benno Warkentin, Director
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Strand Agriculture Hall 210
Corvallis, OR 97331

Dear Dr. Warkentin:

Thank you for the opportunity to review the report entitled "A Project to Collect Scientific Data and Provide Evaluation and Recommendations for Alternative Pollution Control Strategies for the Tualatin River Basin." Below are some general comments as well as specific comments with numbered references in the text. In addition, I have also made a few notations in the text margins you may want to consider in your final report. Sorry for the delay in getting these review comments back to you.

General comments:

Overall, I don't feel this report gives us much new information. The report focuses on the need to "fix" everything in order to meet the goals of improved water quality. Very little time is spent discussing which "fixes" would have the highest probability of success at the lowest cost. So much of the report is general "textbook" philosophy that it is difficult to extract a well thought out message relative to the Tualatin Basin.

It seems inappropriate for me to comment on the CE-QUAL-W2 model results or the applicability of various scenarios because (a) the model is not calibrated or checked; (b) the assumptions in the model are not spelled out; (c) the input data sets are not discussed; (d) the model does not have recent documentation from the Army Corps of Engineers; and (e) a modeling report has not been written. It seems inappropriate to summarize the results of a model that has not been completed. Invariably, there will be conflicts between this summary report and the final detailed modeling report Portland State University will generate. I would suggest delaying publication of this summary report until peer reviews can be made on each report it summarizes.

Specific comments:

(1) In the forward it is stated that supplementary reports will provide the detailed analyses. Again, it is inappropriate to summarize reports that don't exist. I have a very difficult time with the concept

of providing recommendations for control strategies before the effects and costs of these strategies have been rigorously evaluated.

(2) (Page 1, paragraph 2) Wetlands are not always nutrient sinks, particularly on a seasonal basis. It is not difficult to imagine geochemical processes that could mobilize phosphorous in Tualatin wetlands and transport them to the main stem during summer months. All wetlands do not behave alike.

(3) (Page 1, paragraph 2) This statement suggests that growth in population is responsible for current water-quality problems. I contend that phosphorus comes from many sources (including natural sources) and that singling out urbanization is not appropriate.

(4) (Page 1, paragraph 2) Ammonia may continue to be a problem from November through April in the Tualatin River. The severity of the problem during winter months depends on wastewater treatment plant loading, flow conditions in the river, and water temperatures. Please give dates for these kinds of statements.

(5) (Page 2, paragraph 1) "Algae growth" does not require high nutrients, high temperatures, and long residence times. Phytoplankton require long residence times to build a large biomass; but many algal blooms occur in cool or cold waters with moderate nutrient concentrations.

(6) (Page 2, paragraph 1) Historically, the largest algal blooms in the Tualatin River occur in June, not July and August. Algal control scenarios need to consider the June through September time period. Moreover, I don't think enough scenarios have been run on a calibrated and checked model to say that an additional 100 cfs in July and August will control algal growth problems.

(7) (Page 2, paragraph 1) The effect of extra flows on temperatures would probably be very small in the lower river, probably negligible.

(8) (Page 2, paragraph 1) Are you ready to say that nonpoint phosphorus inputs need to be decreased by 50 percent to see an affect on algae? I'm not. Also, are you ready to say that it may not be possible to decrease nonpoint phosphorus by 50 percent? If you don't know where the phosphorus comes from, how can you speculate on its ease of control? I would be real careful how you make these statements. It sounds like you are saying that algal control through nutrient reductions is not a viable option.

(9) (Page 2, paragraph 5) Why recommend aggressive nonpoint phosphorus control? It was all but stated above that it would be difficult to make any progress on this front (see comment #8).

(10) (Page 3, paragraph 1) This statement suggests that the river is degrading further. However, in page 1, paragraph 2, you talk about recent "major improvements in river water quality." There seems to be a conflict.

(11) (Page 3, paragraph 2) If we revert back 150 years, water storage in the landscape may increase flooding and make much agriculture land unfarmable. Is this a reasonable long-term action?

(12) (Page 6, paragraph 1) Removal of phosphorus from wastewater treatment plants is a chemical/physical process, not biological.

(13) (Page 6, paragraph 1) Some of the most aggressive BMP's being put in place are associated with confined animal feeding operations and manure control.

(14) (Page 6, paragraph 3) Do you have a reference for this estimate? Give dates where this estimate applies. It is not year round.

(15) (Page 6, paragraph 4) There is no evidence to suggest that problems are intensifying. In fact, summer water-quality has probably improved in the past 2 years.

(16) (Page 9, paragraph 4) What time of year were these observations made? Flooding in the winter and spring occur today.

(17) (Page 10, paragraph 3) Summer base flow in the Tualatin River was not necessarily larger than it is now. Hagg Lake discharges make a big difference. Summer base flows in tributaries are probably less now than they were 150 years ago.

(18) (Page 10, paragraph 3) It is not safe to assume that the phosphorus content of water in the Tualatin and its tributaries increased. These wetlands, with their potentially reducing conditions in the summer, may have mobilized phosphorus and transported it to the main-stem river. Wetlands are not always nutrient sinks year round.

(19) (Page 14, paragraph 1) "Biological recovery" of the basin is not practical unless humans leave. The presence of farms, urban areas, and forest harvesting precludes a "recovery." I suggest you draft the previous four paragraphs in more realistic terms, and address what practical things may be accomplished.

(20) (Page 14, paragraph 2) Tributary stream temperatures don't reach 90 degrees Fahrenheit during a typical year; typical maximum temperatures range from 70 to 75 degrees Fahrenheit.

(21) (Page 14, paragraph 3) Hagg Lake has only a small influence on peak flows in the Tualatin Basin because it captures runoff from only about 5 percent of the Basin.

(22) (Page 15, paragraph 5) Provide the time period for the suspended solids mass balance.

(23) (Page 15, paragraph 5) There is more than one-third of the drainage basin above river mile 39. There is more than one-half.

(24) (Page 15, paragraph 5) You have not made the case that algae in the Tualatin River are approaching phosphorus limitation. Decreasing phosphorus concentrations in eutrophic systems does not always reduce algal growth.

(25) (Page 19, paragraph 3) What are "aerobic organisms?" I don't recall seeing dead algae or other organisms on the surface over the past three summers. Where does this information come from? In addition, I don't recall odorous gases causing problems either.

(26) (Page 21, paragraph 3) The effects on water temperature will be very small. Thermal equilibrium will be achieved in a day or two.

(27) (Page 22, paragraph 4) The natural conditions you refer to may have increased the time-of-travel in the Tualatin River, which may have promoted algal growth.

(28) (Page 23, paragraph 1) I'm not convinced the Tualatin River ever had much velocity during summer months. Your historical information suggests the river was basically a swamp. I don't see where the "natural" mechanical reaeration you are proposing to reproduce ever existed.

(29) (Page 27, paragraph 2) Again it is inappropriate to discuss results of a model that has not been calibrated, checked, published, or documented.

(30) (Page 27, paragraph 6) The USGS has no plans to use the model developed for this study. We are developing a model independent of this study.

(31) (Page 29, paragraph 4) Why concentrate on July and August in these scenarios? Some of the worse algal problems occur in June; some of the worse dissolved oxygen problems occur in October.

(32) (Page 30, paragraph 2) Water from Barney Reservoir is already delivered to the Tualatin River, so the risk of interbasin transfer of organisms has already been taken.

(33) (Page 32, paragraph 3) It is not clear whether the text is referring to total phosphorus or orthophosphorus. Keep in mind that Durham WWTP was not at full tertiary removal of phosphorus in July and August 1991, which may explain why phosphorus levels at Stafford Bridge seem high. Tertiary phosphorus removal at both plants should be modeled.

(34) (Page 32, paragraph 3) Remember, the Tualatin River TMDL is for total phosphorus. I thought that numbers generated from CE-QUAL-W2 are orthophosphorus. These are not directly comparable.

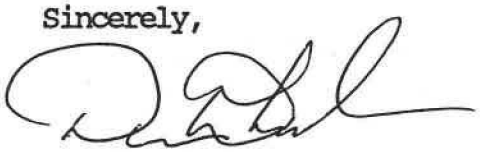
(35) (Page 32, paragraph 3) I'm not convinced that phosphorus applied to farmland significantly affects ground-water concentrations. It may, but the data are not available to support it. Natural phosphorus inputs may be more important.

(36) (Page 37, paragraph 3) Each major segment of the basin has not pursued load reductions of phosphorus in the past few years. Only the WWTP's upgrades have lead to load reductions. This paragraph is an overstatement.

(37) (Pages 39 and 40) These recommendations are too broad and inclusive to be of much use. The message needs to be focused so that managers can select the most cost effective and beneficial strategies. A "shopping list" approach to recommendations suggests that there is no agreement as to what is needed. The suggestion that everything needs to be "fixed" can lead to an incredibly expensive cleanup effort that cannot be realistically accomplished.

Thank you for the opportunity to review the subject report. Please call me at (503) 251-3255 if you need further clarification.

Sincerely,



Dennis D. Lynch
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