Lost River, California
Total Maximum Daily Loads

Dissolved Inorganic Nitrogen (DIN) and Carbonaceous Biochemical Oxygen Demand (CBOD) to address Dissolved Oxygen and pH Impairments

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Comment Responsiveness Summary

United States Environmental Protection Agency
Region 9
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Contents

Comments Received:

Comment Set A: Catherine Kuhlman, North Coast Regional Water Quality Control Board
Comment Set B: Greg Addington, Klamath Water Users Associaton
Comment Set C: Pablo Arroyave, U.S. Bureau of Reclamation
Comment Set D: David Solem, Klamath Irrigation District
Comment Set E: Zeke Grader, Pacific Coast Federation of Fishermen's Associations
Comment Set F: Lisa Brown, WaterWatch
Comment Set G: Regina Chichizola, Klamath Riverkeeper
Comment Set H: Earl Danosky, Tulelake Irrigation District
Comment Set J: Maggie McKaig
Comment Set K: Kevin McKernan, Yurok Tribe
Comment Set L: Felice Pace, Klamath Forest Alliance
Comment Set M: Christian Scheuring, California Farm Bureau Federation
Comment Set N: Phil Smith, Resighini Rancheria
Comment Set P: Felicia Sobonya
Comment Set R: Sandi Tripp, Karuk Tribe of California
Comment Set S: Senator Doug Whitsett, Oregon State Legislature

EXECUTIVE SUMMARY

The US Environmental Protection Agency (EPA) received comments on the Draft Lost River Dissolved Inorganic Nitrogen (DIN) and Carbonaceous Biochemical Oxygen Demand (CBOD) Total Maximum Daily Loads (TMDLs) (2007). This document presents the comments that were submitted, and responds to those comments. The comments and responses are arranged by comment set. Where multiple comments were received on a single topic, the response generally refers to the most extensive response to comment and additional details are included for the specific comment(s), as necessary. Any change that is made to the TMDL document in response to a comment is summarized in the response. If no change is noted in the response, then no change was deemed to be necessary in the TMDL document.

Summary of Changes to the Final TMDLs

Several changes were made to the Lost River TMDLs document as a result of public comment. Significant changes include:

- Added discussion to Chapter 1 regarding linkages between the Lost River and Klamath River, about the inter-agency effort for coordinated TMDL development in the Klamath Basin, and about the related TMDLs in the Basin
- Added discussion about the model to Chapter 1, as well as expanded discussion in Chapter 5 to clarify use of the model and available data; also the modeling report has been added as Appendix A
- Added brief discussion of the North Coast Regional Water Quality Control Board (North Coast Regional Board's) intention to implement the Lost River TMDLs, and the state's process for developing an implementation plan and incorporating the TMDLs into the North Coast Basin Plan
- Expanded discussion in Chapter 1 on physical setting and hydrology, including information on Klamath Project history and operations, description of Tule and Lower Klamath Refuge operations and management
- Clarified the areas addressed by these TMDLs, as well as the geographic scope of the nutrients and pH listings on the state's section 303(d) lists in Chapter 1
- Expanded discussion regarding Lost River and shortnose suckers in Chapter 2, including status of Endangered Species Act (ESA) listings and recovery plans and adding a brief description of habitat and spawning requirements
- Expanded description of water quality impairments in the Lost River in Chapter 2, including description of Joe Eiler's (2005) phytoplankton study and reference to Danosky and Kaffka (2002) study on relationships between agricultural practices and surface water quality in the Tulelake Irrigation District
- Clarified, particularly in Chapters 4 and 6, that the misnamed "background" loads identified in the Draft TMDL document actually refer to "upstream" loads coming into a particular segment of the river
- Rewrote the TMDL document to reflect that the allocations are given to "sources" of the relevant pollutant; in Chapter 6, these "sources" are generally identified as locations in the applicable segment at which the pollutant entered the segment

- Added text to better explain the partial load transfer between particular segments
- Expanded discussion in Implementation Chapter in Table 7 regarding: role of and participants in an implementation workgroup; that this implementation working group should be led by a neutral third-party entity
- Added monitoring recommendations in Chapter 7: for *Aphanizomenon flos-aquae* (AFA) to determine its potential effect on nutrient dynamics in the Lost River; of internal inputs of nutrients within Tule and Lower Klamath Refuges; to define nutrient contributions specifically from waterfowl excrement within the Refuges; to determine impact of reduced groundwater flows on surface water quality
- Added implementation recommendations in Chapter 7 regarding: evaluation of restoration of riparian areas, lakes and wetlands as tools for water quality improvements; evaluation of benefits of voluntary irrigation demand reduction program; coordination between the North Coast Regional Board and United States Fish and Wildlife Service (USFWS) to jointly identify actions that will both improve water quality and facilitate recovery of the sucker species; evaluation of potential creation of treatment wetlands to reduce nutrient loads

COMMENTS AND RESPONSES

Comments are presented in an order to facilitate the presentation of issues. To distinguish comment text from response text, comments are presented in Times New Roman font and responses are presented in Arial font.

Comment Set A: Catherine Kuhlman, North Coast Regional Water Quality Control Board

Comment A-1: *Regional Board has responsibility for implementation*. Regional Water Board has responsibility for implementing the TMDLs developed for waterbodies within the North Coast Region. The Draft Lost River TMDL is one of several TMDLs developed for tributaries with the Klamath River watershed. TMDLs have been completed for the Salmon River, Scott River, Shasta River, and South Fork Trinity River, and mainstem Trinity River. TMDLs for nutrients, dissolved oxygen, and temperature in the mainstem Klamath River are now under development and subject to the schedule contained in the consent decree resulting from *PCFFA, et. al. v. EPA* [Marcus]. Staff is currently involved in the development of the Klamath River TMDL and implementation plan. It is our intention to turn to the Lost River TMDL implementation plan at some point in the future.

TMDLs are based on the best available data and assessment.
The Draft Lost River TMDLs are based on a set of models employed by Tetra Tech, Inc. by which existing physical and water quality data are used to calculate the reductions in Dissolved Inorganic Nitrogen (DIN) and Carbonaceous Biological Oxygen Demand (CBOD) necessary to achieve instream water quality objectives for dissolved oxygen and pH. Throughout the document, USEPA makes the point that the existing data upon which the model relies is very limited. As such, there is uncertainty in the results.

Regional Water Board staff participated with staff from USEPA and the Oregon Department of Environmental Quality as members of the technical team responsible for reviewing the modeling work and directing its modifications, as necessary. We therefore want to make clear our confidence that the TMDLs, as calculated by USEPA, are based on the best available data and assessment. In addition, we believe that the models, as calibrated and validated by Tetra Tech, Inc., form an appropriate basis for the TMDL calculations. We draw these conclusions from our involvement on the technical team and from Tetra Tech's August 2005 report entitled "Lost River Model for TMDL Development."

Response: EPA agrees that the Tetra Tech, Inc. models – and, thus the resulting TMDLs – utilized the best available data and assessment.

Comment A-2: *Suggestions to aid other readers of the document, to improve confidence in the modeling and assessment*. To aid other readers of the draft TMDLs we offer the following recommendations:

1) USEPA should consider including, as an appendix, Tetra Tech's 2005 report. We find it to provide a robust and compelling explanation for why, despite the variety of limitations, the

model performs adequately for the purpose of estimating necessary DIN and CBOD load reductions. The explanations, as provided in the draft Lost River TMDLs, are not at present as compelling. As a less attractive alternative, USEPA could excerpt, more widely, language from Tetra Tech's 2005 report.

2) USEPA should consider moving to the first chapter a clear discussion of the model used, the data limitations encountered and the reasons why the model performs reasonably well for establishing load allocations. By postponing the introduction of this material to Chapter 5, USEPA risks the erosion of the reader's confidence in the work with every mention before that point of the "data limitations" associated with this project.

3) Specific to Chapter 4, many of the source category descriptions (pp. 22-24) begin with the phrase "As direct loading data were unavailable for this analysis…" We believe that the repetition of this phrase throughout the chapter has the unintended consequence of leading the reader to believe that the source analysis is deeply flawed. As above, Regional Water Board staff believe the modeling conducted in support of these TMDLs provide results that are adequate for the purpose to which they are applied. But, other readers may benefit from a broad discussion at the beginning of Chapter 4 of the loading data limitations and a robust explanation of how the limitations are overcome in the analysis. Each source category description need not then begin with the above quoted phrase.

Response: Tetra Tech, Inc.'s report has been included as Appendix A to the TMDL document, and has been added to EPA's website, which is available separately for those who would like to review it. A summary of the model, including its strengths and limitations, has also been added to Section 1 of the TMDL document and the discussion in Chapter 5 has been modified to clarify the use of the model and available data.

Comment A-3: *Regional Board will use implementation recommendations to develop an implementation plan*. Chapter 7 of the Draft Lost River TMDLs includes thoughtful, well-researched recommendations for implementation of the calculated load reductions. Regional Water Board staff commend USEPA on its efforts to establish the range of measures that may be useful and identify the stakeholders who will be important to the implementation of these TMDLs. As you know, the State Board adopted a Nonpoint Source Policy that requires Regional Water Boards to adopt waste discharge requirements, waivers, or prohibitions to control nonpoint source discharges. It is our intention to develop an implementation plan, using these tools, for the Lost River TMDLs at our earliest possible convenience. At that time, we intend to incorporate many of the suggested measures in Table 7 of the Lost River TMDLs.

Response: A brief discussion of the North Coast Regional Board's intention to implement the Lost River TMDLs has been added to Chapter 7.

Comment A-4: *Assessment of relative importance of suggested implementation measures should be included*. Prior to its finalization, it would be useful for the Lost River TMDLs to include, however cursory, an assessment of the relative importance of the suggested implementation measures. That is, at present the Draft Lost River TMDLs do not include either a quantitative or qualitative ranking of the recommended management measures with respect to the expected load

reductions. Such an exercise would strengthen the implementation recommendations and improve the Regional Water Board's ability to craft a meaningful Action Plan from them.

Response: We have added a discussion to Chapter 7 to highlight several of the suggested implementation measures.

Comment A-5: *Incorporation of landowner concerns in load reduction measures for Action Plan; Action Plan may vary from TMDL document*. Regional Water Board staff understand that some landowners in the Lost River basin are interested in instituting load reduction measures in the near term. They have voiced the need, however, for assurance that the measures included in the Draft Lost River TMDLs are the measures that will be required by an Action Plan adopted by the Regional Water Board. Regional Water Board staff can not predict the exact nature of the future Action Plan to be adopted by the Board. But, staff can offer the following assurances: (a) Staff will propose to the Regional Water Board for adoption a Lost River Action Plan that includes many of the management practices and measures recommended by USEPA in its draft TMDLs. (b) It is staff's recommendation that landowners be credited with any load reductions achieved prior to the adoption of the Lost River Action Plan. To ensure proper crediting, a system of monitoring will be necessary by which loads prior to and after implementation of chosen practices are measured. Landowners are advised to contact Rich Fadness, Monitoring Coordinator for the Regional Water Board at (707) 576-6718 for a consultation and assistance in developing an appropriate monitoring system.

Response: Chapter 7 has been revised to include this information. Additionally, please see response to comment B-9 regarding the baseline year as a comparison point for expressing the loads, and thus measuring water quality improvements.

Comment A-6: *Include discussion of land ownership and facility management*. It would be useful both in support of the source analysis and to the Regional Board's development and adoption of an implementation plan if the TMDLs included a discussion of land ownership and facility management in the Lost River basin. Other TMDLs have employed GIS data to identify watershed land area and the percentages of the basin owned or operated by various major landowners/operators.

Response: Land ownership and facility management in the Lost River basin is complex. The background section in Chapter 1 has been enhanced to include a brief discussion of available information regarding land ownership and facility management. This information is included for general information purposes only, and should not be considered definitive or conclusive for any purpose. Further analyses should be conducted as part of TMDL implementation.

Comment A-7: *Include discussion of Klamath Straits Drain discharge as a point source and possible NPDES regulation*. Discussion related to the Klamath River TMDLs has included the observation that the Klamath Straits Drain, as it discharges to the Klamath River, operates very much like a point source discharge and should perhaps be regulated under a National Pollution Discharge Elimination System (NPDES) permit. USEPA should consider including a discussion of this matter as a general point of interest.

Response: Whether or not Klamath Straits Drain (KSD) is a point or a nonpoint source is not an issue in these particular TMDLs being established by EPA, as EPA is not assigning an allocation to the KSD. Rather, the portion of the KSD in California is considered to be one of the impaired segments that these TMDLs address, and allocations are given to the sources that discharge into the KSD. On the issue of whether KSD is a point or nonpoint source in general, we note that this issue is currently in litigation. See also response to comment G-3 regarding water transfer facilities.

Comment A-8: *Regional Board may propose modification to USEPA's TMDLS to account for new information*. USEPA asserts its expectation that "the Regional Board...incorporate these TMDLs...in its Basin Plan..." Please be aware that the Regional Board has an obligation under CEQA to consider all pertinent information available at the time of a proposed action. As such, the Regional Board will consider Oregon's Lost River TMDLs, the Klamath River TMDLs, and any data produced, for example, by the US Bureau of Reclamation or US Fish and Wildlife Service, if they are available when adopting the Lost River TMDLs into the Basin Plan. At that time, staff may propose modifications to USEPA's TMDLs as necessary to account for new information.

Response: EPA acknowledges the North Coast Regional Board's obligation to consider the California Environmental Quality Act (CEQA) information and other relevant TMDL information as available when they adopt these TMDLs into the Basin Plan. We encourage the North Coast Regional Board to consider revisions to these TMDLs, incorporating new or updated relevant information, when revising its Basin Plan (see comment A-9, below). EPA will then review and approve TMDLs and Basin Plan amendments developed by the North Coast Regional Board. Acknowledgement of the possibility of revision is included in the final text.

Comment A-9: *Clarification of TMDL recalculation based on new information*. USEPA should consider making clearer that the TMDLs can be recalculated as new data information becomes available. Such data or information includes, but is not limited to:

- Load allocations from the State of Oregon to California for the Lost River as it flows into Oregon;
- Load allocations to the Klamath Straits Drain to accomplish the Klamath River TMDLs; and
- Individual landowner or tributary discharge data.

Response: Chapter 1 of the TMDL document has been amended to convey this information. Please also see the response to comment A-8.

Comment A-10: *Role of refuges in treatment of nutrient-rich waters*. As a point of interest, discussion related to the Klamath River TMDLs has included consideration of the role the Lost River refuges might play as wetland treatment of nutrient rich waters from the Upper Klamath basin. Use of the refuges for such a purpose would surely have consequences for the Lost River TMDLs, worth acknowledging at this point.

Response: This potential implementation option, use of the Refuges for enhanced nutrient removal, is included as topic 7 in Table 7-1 of the TMDL document presenting recommended implementation actions. EPA encourages the North Coast Regional Board, responsible for implementation (see comment A-1), to consider all options in its development of implementation plans to address these TMDLs (see comment A-3). Please also see the response to comment F-2 addressing the management of the Refuges.

Comment A-11: *Agriculture versus background sources of nitrogen and CBOD*. USEPA states on page 20 that "the largest estimated source of nitrogen and CBOD loading is agricultural drainage flows into the Lost River." Table 4, however, indicates that those loads identified as "background" amount to 136 metric tons/yr DIN and 1,022 metric tons/yr CBOD and constitute the largest contribution to the Lost River in CA. This discrepancy should be repaired or explained.

Response: In Tables 4 and 6 of the Draft TMDL document, loads from upstream inputs to each segment were inaccurately identified as "background" loads. The TMDL document text and tables have been modified to use the term "upstream inputs" to represent loads transferred between modeling segments. Additionally, the inputs to each model segment are not necessarily equivalent to the total loads in the upstream segment. For example, only a portion of the waters in Segment 2 (Tule Lake Refuge) are pumped to Segment 3 (Lower Klamath Refuge), and processes (including losses) that affect DIN and CBOD in modeled segments (e.g., settling processes in Tule Lake and Lower Klamath Lake) may ultimately lead to reduced downstream load contribution. Aside from upstream inputs, the largest loads to each segment are from anthropogenic sources (i.e., agricultural drainage flows). The TMDL document has been amended to better explain the calculation process.

Comment A-12: *Nutrient contributions from hydrological modifications*. A discussion of background conditions should include a more robust assessment of the role that diking and draining of historic wetlands has played in the mobilization of nutrients within the Lost River system. "USGS Water-Resources Investigations Report 97-4059" (Snyder and Morace, 1977) includes an estimate of the annual contribution of nitrogen and phosphorus released to Upper Klamath Lake due to the draining and subsequent oxidation of nutrient-rich wetland soils for agriculture. The nutrient contributions from the intense modification of the Lost River system is potentially a significant component of the background nutrient loads worth acknowledging and assessing as a part of the monitoring efforts recommended under the TMDLs.

Response: The TMDL document includes additional discussion of current and historical hydrology, added to Section 1, including a description of the history of draining the historical wetlands. Also see the response to comment A-10 (Refuges for treatment of nutrient-rich waters).

Comment A-13: *Editorial: consistent use of terms*. USEPA should consider using a consistent set of terms throughout the document. Further, it should consider using terms that mirror those used in Tetra Tech, Inc.'s 2005 report—or provide a translation. For example, USEPA sometimes uses the term "nitrogen" to mean total nitrogen and other times to mean the dissolved

inorganic nitrogen of concern to the TMDL. Similarly, the TMDL sometimes refers to plants and algae, algae and macrophytes, or algae when discussing the role of aquatic vegetation in the DO and pH cycles while Tetra Tech, Inc. refers to phytoplankton and macrophytes. USEPA also uses the term mtons/yr on page 21 and on page 36 "metric tons/yr."

Response: Modifications have been made to improve use of terms.

Comment A-14: *Habitat-related beneficial uses; need for more discussion of suckers*. USEPA mentions on page 9 that the "habitat-related beneficial uses are of greatest concern in these TMDLs because of the potential adverse impact of depressed dissolved oxygen and elevated pH levels on native fish in the Klamath basin including the Shortnose sucker...and Lost River sucker..." It would be useful to provide a discussion of the particular sensitivity of these endangered species to DO and pH levels, including an assessment of the effects of supersaturation. There is at present no discussion of their life cycle requirements or habitat needs. In addition, mention of the native fish of the Klamath Basin suggests access to the Lost River by other Klamath River fishes. It would be useful to provide some clarification of this matter.

Response: EPA has expanded the discussion of this topic in Chapter 2 of the TMDL document to include additional information on Lost River and shortnose suckers, and the USFWS process to revise the Sucker Recovery Plan, initiated in the fall of 2008. For more information about the sucker recovery plan process, please see the USFWS website: http://www.fws.gov/klamathfallsfwo/

Additionally, EPA has consulted with and received concurrence from the USFWS (December 9, 2008) regarding the determination that the adoption of these TMDLs "may affect, but is not likely to adversely affect" listed species subject to the jurisdiction of the USFWS - the federally-endangered shortnose suckers (*Chasmistes brevirostris*) and Lost River suckers (*Deltistes luxatus*). EPA is also consulting with the National Marine Fisheries Service (NMFS) regarding the effect of this action on coho salmon or its critical habitat in the Klamath River. EPA retains the discretion to revise the TMDLs if the consultation identifies deficiencies in the TMDLs or allocations. EPA will make available to the North Coast Regional Board all comments submitted to EPA on the TMDLs (including the consultations) for use when developing implementation plans for these TMDLs.

Comment A-15: *Natural nutrient sources*. USEPA offers on page 14 a list of natural sources of nutrients to an aquatic system. One such identified source is "fish returning from the ocean to spawn." USEPA should elaborate on the mechanism by which this source contributes to an aquatic system (e.g., carcass decay) and its relevance to the Lost River.

Response: We have removed reference to anadromous fish and clarified that carcass decay and defecation are two ways that fish can provide nutrient load and organic material to a waterbody.

Comment Set B: Greg Addington, Klamath Water Users Associaton

Comment B-1: *Adequacy of data, time extension, and disclosure of assumptions and limitations.* EPA prepared the Draft TMDL without sufficient data to support the load allocations, sources or baseline condition assumptions. KWUA urges EPA to pursue an extension of the deadline to ensure that any TMDLs adopted for the Lost River are based on accurate, current data and reasonable assumptions. EPA must expressly and unambiguously acknowledge the limitations of the data and assumptions. Specifically, the TMDL should acknowledge that: (1) the technical model created to support the load allocations does not consider all factors affecting the environment, including natural background levels and significant contributions from waterfowl and aquatic fecal material; and (2) substantial discrepancies between the model and the actual water quality conditions, particularly the inputs into Lost River from Oregon, likely exist. (See Draft TMDL, at pp. 25-31)

Response: Deadline for TMDLs - In 2007, EPA and the plaintiffs in the *Pacific Coast Federation of Fishermen's Association et al v. Marcus* (PCFFA v. Marcus) lawsuit agreed to amend the consent decree such that the Lower Lost River TMDLs must be completed by December 31, 2008. EPA does not plan to request a further extension for these TMDLs. EPA considers it appropriate to establish the Lost River TMDLs at this time so as to further the understanding of this portion of the overall Klamath watershed, and to provide additional information for use by the North Coast Regional Board, and by other stakeholders, in order to address the impairments in this portion of the overall watershed. In its comments on the Draft TMDLs, the North Coast Regional Board indicated it may modify the EPA TMDLs in the future based on new information (e.g., developed in the Oregon and California Klamath River TMDL processes). EPA has no objection to the North Coast Regional Board developing new Lower Lost River TMDLs at that time, or developing watershed-wide TMDLs addressing both the Lost and Klamath rivers. In either case, once EPA approves new TMDLs prepared by the North Coast Regional Board, those new TMDLs would supersede the EPA Lost River TMDLs.

Adequacy of Data - The modeling conducted by Tetra Tech, on behalf of EPA for these TMDLs, is based on the best available data and assessment (see comments A-1 and K-41 regarding adequacy of data and data limitations). Please also see comment K-16 regarding incorporation of water quality data, and comments B-6 regarding the models handling of natural "background" loads and B-7 regarding incorporation of waterfowl inputs. These issues are also addressed in the modeling report, which has been added as Appendix A, and is also available at EPA's web page: http://epa.gov/region09/water/tmdl/progress.html

New monitoring information may be incorporated into revised Lost River TMDLs when the North Coast Regional Board prepares to adopt Lost River TMDLs into the Basin Plan. Such a revision would be accompanied by a public review process. Please also see comment A-8, North Coast Regional Board modification/adoption of TMDLs.

Comment B-2: *Clarification of TMDL focus area: "Lower Lost River" (Tule Lake and Mount Dome HSAs) v. "Lost River Hydrologic Area." 303(d) listing and TMDL for agricultural leased*

lands and Klamath Straits Drain. The Draft TMDL fails to sufficiently explain the basis for directing the TMDL at the "Lower Lost River hydrologic area." (This TMDL effort is based on the State of California's continual 303(d) listing of the "Lost River System" The Draft TMDL appropriately state that California has listed "Tule Lake and Lower Klamath Lake National Wildlife Refuge for pH" and the Tule Lake and Mount Dome Hydrologic Sub Areas (HSA) of the Klamath River Hydrologic Unit, Lost River Hydrologic Area for nutrients.) Rather, the applicable hydrologic area is the Lost River hydrologic area which is further divided into HSAs. EPA should clarify that the Tule Lake and Mount Dome HSAs, which comprise the area addressed by the TMDL (Draft TMDL Figure 1), are collectively referred to as the "Lower Lost River." EPA has not sufficiently explained the basis for defining the "Lost River Hydrologic Area" listed on the California 303(d) list as: the Lower Lost River from the Oregon Border to Tule Lake Refuge; Tule Lake Refuge (including sumps and surrounding lease lands); Lower Klamath Refuge; and Straits Drain from Lower Klamath Refuge to the Oregon Border (Draft TMDL p 4).

The Draft TMDL does not reference any specific 303(d) listing for Straits Drain. The Basin Plan does not specifically include Straits Drain or the leased lands within any given hydrologic area or subarea. The leased lands comprise agricultural lands and do not fall subject to Clean Water Act regulation as a "water body"; thus, the leased lands are not the proper subject of a 303(d) listing or a TMDL. The Draft TMDL provides no basis for suggesting that the Consent Decree requires a TMDL to be created for Straits Drain or the leased lands. KWUA acknowledges that the Basin Plan includes the Lower Klamath Lake National Wildlife Refuge within the Mount Dome HSA of the Lost River hydrologic area, even though it is in a distinct drainage basin from the Lost River. However, the Draft TMDL appears to address only the "Lower Lost River," which comprises the Mount Dome and Tule Lake HSAs, not the "Lost River hydrologic area." To avoid misinterpretation and confusion, KWUA recommends that EPA state the specific 303(d) listing of each water body addressed by this TMDL and provide all applicable water quality objectives directed at such water bodies (with specific reference to the Basin Plan).

Response: EPA has committed under the consent decree (*PCFFA et. al. v. Marcus*) to establish TMDLs for the California segments of the Lost River, a tributary of the Klamath River. In its section 303(d) list, California listed the "Klamath River Hydrologic Unit, Lost River Hydrologic Area (HA), Tule Lake and Mount Dome Hydrologic Sub Areas (HSAs)," which in its Basin Plan (e.g., Water Quality Objectives, Table 3-1) are referred to as the "Lower Lost River," "Tule Lake", "Lower Klamath Lake," "other streams" and "groundwaters." In its section 303(d) listings, California has identified these two HSAs as impaired for nutrients, and listed the Tule Lake and Lower Klamath Lake "Planning watersheds" (PWSs) for pH impairments. In the Draft TMDL document, EPA used the reference to the "Lower Lost River" area to represent the areas addressed in the TMDL document, in order to avoid unwieldy references to the specific HSAs and PWSs throughout the document. EPA did not intend to suggest that these HSAs defined a specific HA for the purposes of the state's identification of water quality impairments. EPA has amended the TMDL document to clarify the areas addressed by these TMDLs, and added a figure showing the HSAs and the PWSs identified in the state's section 303(d) listing.

For this TMDL analysis, EPA has subdivided the HSA and PWS areas addressed by California's section 303(d) listings into four segments (see TMDL document Figure 4-1): (1) the Lost River from the Oregon Border to Tule Lake Refuge; (2) Tule Lake Refuge; (3) Lower Klamath Refuge, which includes the small segment of Ady Canal in California; and (4) Klamath Straits Drain (still within the boundary of the Lower Klamath National Wildlife Refuge [NWR]) from Stateline Highway to the Oregon Border. These four segments are fully within the HSA areas listed as impaired for nutrients, as well as within the PWS areas listed for pH on California's 2006 section 303(d) list.

Figure 1-1 in the TMDL document shows the areas addressed by and waters in the Mt. Dome and Tule Lake HSA, and the areas addressed by and waters in the PWS areas. Klamath Straits Drain, as well as drains in the agricultural areas of the PWS areas, are included in the section 303(d) listings by their inclusion in the Tule Lake and Lower Klamath PWS areas. Neither EPA nor the North Coast Regional Board are claiming that all lands within the boundaries of the PWS areas are jurisdictional waters of the U.S. The maps instead delineate a geographic area, and all waters of the U.S. within that geographic area are covered by the applicable section 303(d) listing.

Please also see response 6 to comment B-5 regarding the characterization of the leased lands. In the TMDL document, EPA is taking no position on the status of the leased lands as jurisdictional waters of the U.S., which is a question that goes substantially beyond scope and detail of a TMDL. The leased lands can be a source of pollutants under these TMDLs regardless of their status as jurisdictional waters. In addition, as noted above, implementation of these TMDLs will be by the North Coast Regional Board using the whole range of tools available to it under state and federal law. If the legal status of the leased lands as jurisdictional waters of the U.S. becomes relevant during the implementation of these TMDLs, EPA will participate in that evaluation at that time.

Regarding the Klamath Straits Drain, as noted above and in response to comment B-5, EPA believes that the Klamath Straits Drain is a water of the U.S. and that it was properly listed as impaired during California's section 303(d) listing. In these TMDLs, the Klamath Straits Drain is treated as an impaired segment. In addition, EPA has been working with the states of California and Oregon to determine how to collaboratively develop TMDLs for interstate waterbodies such as the Klamath Straits Drain. We anticipate that the state of Oregon will propose TMDLs for the Klamath River in the near future, and that that TMDL analysis will identify the Klamath Straits Drain as a source of pollutants to the Klamath River. We believe that identifying a load allocation for the California TMDL's segment of the Klamath Straits Drain will assist the state of Oregon as it determines the upstream state's (California's) contribution of loads through the Klamath Straits Drain into Oregon.

Comment B-3: *Water Quality Objectives are unattainable due to natural or historical conditions, so TMDL is a futile exercise.* In assigning the loads to achieve state water quality objectives, EPA should recognize that the Basin Plan water quality objectives for the Lost River hydrologic area are not achievable due to natural or historic conditions (Basin Plan, p. 3-6.00).

For example, the Ady Canal during summer months diverts water from Klamath River, which fails to meet water quality objectives for temperature, pH, DO, nutrients, and chlorophyll-a; all of which are attributable to loading from Upper Klamath Lake. If the water quality objectives are simply unattainable, preparing a TMDL is a futile exercise.

Response: TMDLs are required by the Clean Water Act, and EPA has committed that Klamath and Lost River TMDLs will be established pursuant to a schedule determined by the consent decree in *PCFFA v. Marcus.* EPA considers the water quality standards to be attainable, recognizing that achieving water quality objectives for the Lost River is challenging and that these TMDLs may be only part of the solution. TMDLs provide vital information as to loadings of pollutants and sources of those loadings, and should not be dismissed as a futile exercise. Please also see comments A-8 and A-9 regarding North Coast Regional Board modification/adoption of these TMDLs.

Comment B-4: *Separate Beneficial Use designations not adequately considered.* By grouping the refuges and "Lost River" in California as a general "Lower Lost River" designation, the Draft TMDL fails to appropriately consider the applicable beneficial uses. The Basin Plan separately identifies beneficial uses for the Mt. Dome HSA and the Tule HSA; however, the Draft TMDL provides a table of beneficial uses for the "Lower Lost River Subbasin" that does not match up with the separately designated beneficial uses in the Basin Plan. The Draft TMDL does not acknowledge that the Basin Plan identifies specific water quality objectives for "Lower Lost River," "Tule Lake," "Lower Klamath Lake," and "Other Streams" of the Lost River Hydrologic Area (Draft TMDL, p. 9; Basin Plan, p. 2.700, 3-6.00).

Response: Chapter 2 in the TMDL document has been modified to distinguish the differences in beneficial use designations for the Mount Dome and Tule Lake HSAs. In addition, the water quality objectives for "other streams" and "groundwaters" in the Lost River HA have been added to highlight those differences, which are minor.

Comment B-5: *"Sources" of water should be adequately explained; loads should not be assigned to a district or governmental agency; Ady Canal and Klamath Straits Drain as "sources."* The Draft TMDL designates entire stream segments as "sources" of the water quality problems. These segments are described as "irrigation drain flow" which in no way identifies the source of any water quality impairment. The one unique "source" identified by EPA is the "Ady Canal," which is a mere water diversion. If EPA cannot identify actual sources, the TMDL should explain the data deficiencies. The TMDL should explain that the identified sources "Ady Canal" and "irrigation drain flow" point to various irrigation, farming, and other land use practices applied along those stream segments, the specifics of which contributions EPA fails to understand. KWUA recognizes that EPA does not have sufficient information to identify actual sources of contaminants. However, this failure to identify sources within the TMDL effectively shifts that burden to other parties, which minimizes the utility of the TMDL.

We question the "assignment" of loads to a district or other governmental agency rather than to actual "sources." EPA regulations suggest that a load allocation should be "attributed to either one of its existing or future nonpoint sources of pollution or to natural background sources." (40 CCR [sic] 130.2(g). As the Draft TMDL recognizes, when individual nonpoint sources cannot be

quantified or distinguished from natural background sources, the TMDL should assign a "gross allotment" to all the nonpoint and natural background sources contributing to a receiving water (Draft TMDL p 33, 40 CCR [sic] 130.2(g)). However, rather than assign a gross allotment to all nonpoint and natural background sources to the Lost River, the Draft TMDL attempts to assign loads to governmental agencies, diversion points, and other water bodies. The load allocations must be reevaluated to ensure that EPA regulations are appropriately applied.

It is highly unusual for a TMDL to identify a diversion structure (e.g., Ady Canal) as a source. The water quality in Ady Canal is a function of the quality of the Klamath River water that it diverts (in Oregon). Identification of the Ady Canal as a source is in practical effect no different than identifying the Klamath River as a source. The Draft TMDL does not explain the parameters by which established water quality objectives apply to Straits Drain (KWUA was previously advised that Straits Drain would be treated as a "source" in any Klamath River TMDL.) The Draft TMDL does not appear to identify Lower Klamath Lake or Lower Klamath National Wildlife Refuge as a source of loading to Straits Drain. KWUA asks that EPA address and reconcile these concerns. (Due to *Rapanos v. United States*, 126 S. Ct. 2208 (2006) and subsequent EPA/ Army Corps guidance, it may be appropriate for EPA to consider whether any of these waters are subject to the federal Clean Water Act.)

Response: These comments raise a number of discrete issues.

1. See the response to comment B-2 for a discussion of the listings applicable to the different waterbodies in the Lost River TMDLs.

2. EPA has rewritten the TMDL document to reflect the regulation's provision that a TMDL identify the "sources" of the relevant pollutants. See 40 CFR Section 130.2. These "sources" are usually stated as locations in the applicable segment at which the pollutant entered the water segment. Where possible, EPA has also identified the entity responsible for that source. This identification is preliminary and informational only, and does not carry any direct implications for any future implementation decisions by the North Coast Regional Board as it develops its implementation strategy. Implementation of the TMDLs is within the purview of the North Coast Regional Board, and when the North Coast Regional Board develops implementation measures, it will analyze which entities and which processes (e.g., regulatory, non regulatory, voluntary) are the best means of implementing the allocations.

3. EPA agrees that the TMDL allocations should reflect the level of technical information available both within a segment and as to a particular source. We do not agree that the entire TMDL should be rewritten as "gross allotment." We believe that there is sufficiently detailed information in many cases to identify the source with some particularity, and that is reflected in the TMDLs. See also comment A-2.

4. See the response to comment B-2 for a discussion of the listings applicable to the various waterbodies covered by these TMDLs, including the Ady Canal. EPA

basically agrees with the comment that the water being brought to the Lower Klamath Refuge is water being imported from sources in Oregon. The load allocation to the Ady Canal is recognition that this imported water does not meet California water standards, and that it constitutes a source of the impairments to Segment 3 (Lower Klamath Refuge). EPA anticipates that the state of Oregon will take steps through its water quality programs to address the sources of impairment in Oregon, with a goal of meeting the downstream water quality standards. Additional implementation decisions addressing this particular source may be made by the North Coast Regional Board, given that the Ady Canal terminates in California.

5. The TMDL document has been edited to better explain that loads from the Lower Klamath Refuge are being considered sources to the Klamath Straits Drain. See Table 6-1 and the accompanying text in the TMDL document.

6. This comment is similar to others that raise concerns about the status of some particular area as a "water of the U.S." for purposes of establishing federal Clean Water Act jurisdiction. EPA notes that these TMDLs are not intended nor required to make a formal jurisdictional determination about every parcel in the Lost River system. EPA appreciates the complexity of the water operations in this area. For example, some of the lands within the boundaries of the Tule Lake Refuge are leased for agricultural production. Many of these "leased lands" are part of a program of rotational or periodic flooding designed to achieve multiple refuge management objectives. Whether these leased lands constitute jurisdictional waters of the U.S. for purposes of the federal Clean Water Act would require a parcel by parcel evaluation that is significantly beyond the scope of these TMDLs. At this time, EPA is not taking a position one way or the other on this jurisdictional issue on the leased lands.[1]

For purposes of the TMDLs, the relevant jurisdictional inquiry is whether each of the segments contains waters of the U.S. that have been listed as impaired under Clean Water Act section 303(d). In this case, this is clearly true. The discussion above and in the response to comment B-2 clarify which water segments have been listed under Clean Water Act section 303(d) by the state of California.

Consideration of the Lost River segments in California as jurisdictional "waters of the United States" is governed by the guidance document issued jointly by the EPA and the United States Army Corps of Engineers ("Rapanos Guidance", June 5, 2007).

As noted, the entire Lost River basin is a significantly altered hydrologic system, with most of the alterations being constructed in the first half of the twentieth century. Although the Lost River basin historically was usually isolated from the Klamath River,

1 Note that the jurisdictional status of the lease lands is irrelevant to their status as a "source" of pollutants in the TMDL. "Sources" need not themselves be jurisdictional waters. "Sources" need only be the source of the relevant pollutant introduced into a jurisdictional water.

the alterations have converted the system into a functional tributary to the Klamath River.[2] Further, both the Lower Klamath Refuge (Segment 3 in the TMDL) and the Tule Lake Refuge (Segment 2 in the TMDL) support recreational boating[3], and are therefore navigable. Segment 1 (the Lost River immediately upstream of the Tule Lake Refuge) is a direct tributary to the Tule Lake Refuge, and Segment 4 (the Klamath Straits Drain) is a direct tributary to the Klamath River. Given this hydrology, under the Rapanos Guidance, EPA believes that Clean Water Act jurisdiction for all segments is justified in that the segments are either navigable in fact or a "relatively permanent" tributary to a navigable water.

Further, EPA notes that the Lost River is an interstate waterbody, crossing from California into Oregon, back into California, and then back into Oregon before discharging into the Klamath River. Interstate waters are subject to EPA regulations under the Clean Water Act. See 40 CFR Section 230.3(s)(2) and (5).

Finally, EPA understands that the man-made conveyances and pumping facilities constitute part of the Lost River hydrologic system. This does not affect the status of the waters as subject to the Clean Water Act. See Headwaters, Inc. v. Talent Irrigation District, 243 F. 3d 526 (9th Cir. 2001)(Constructed conveyance); U.S. v. Adam Bros. Farming, Inc., et al., Case No. CV 00-07409) (D. Cal. Central District) (12/08/03)(Pumping stations).

Comment B-6: *Upstream segments loads assumptions and reductions.* The Draft TMDL assumes that the water coming into the Lost River in California will meet the 50% load reduction. The reliance on "the State of Oregon['s] plans to develop TMDLs for DIN and CBOD for Lost River in Oregon in the near future" is not sufficient assurance that specific load reductions will be met. (Draft TMDL, p. 22.) Put simply, a failure to achieve the load reduction at the top of the California system will inevitably create a ripple effect whereby each downstream source will not be able to ensure the total load requirement assigned to its respective segment is met. EPA must account for the actual nature of incoming contaminants and their effect on achieving the load allocations throughout the Lost River segments in California. (Draft TMDL, at pp. 32-36.) On the other hand, it is not clear how the Draft TMDL has taken into consideration the TMDL for Upper Klamath Lake. Reduction in loads to (and from) Upper Klamath Lake would reduce pollutants both in drainage waters entering Lost River in California and in Klamath River water that enters the Lost River basin directly. In addition, the Draft TMDL does not appear to recognize that drainage waters from Oregon enter California by means other than the Lost River itself. For example, drains flow under the J Canal from Oregon into

2 See USBR, "Klamath Project - Historic Operation," November 2000 ("It is important to note that the Klamath River Basin Compact (Compact) recognizes that the Lost River has been made a tributary to the Klamath River via the Project operation (see Klamath River Basin Compact, Article II-Definition of Terms 3). The Compact was ratified by both California and Oregon and consented to by the United States (August 30, 1957; 71 Stat. 497)."

3 See, for example, http://www.californiagameandfish.com/hunting/ducks-geese-hunting/CA_1207_02/index1.html for a discussion of recreational boating opportunities on these waterbodies.

California. KWUA also urges EPA to reexamine the assumption of specific loads to Lost River between the state line and Tule Lake.

EPA should reconsider the fictional "background load" that the Draft TMDL assigns to outflow from Tule Lake Refuge to Lower Klamath Refuge and from Lower Klamath Refuge to Straits Drain. The Draft TMDL reduces the existing load for these identified "sources" to 50% and then requires an additional 50% load reduction under the TMDL. (Draft TMDL, pp. 34-35.) The Draft TMDL does not provide sufficient justification for the inequitable treatment of these segments.

KWUA recognizes that the Draft TMDL attempts to address the background load concerns by explaining that the same method is used in other areas and that "[e]ven if projected load reductions are not met upstream, [downstream source] allocations will still be applicable." (Draft TMDL, p. 33.) However, this language does nothing to ensure that the loads assigned to the downstream sources, potentially affected by upstream contributions that exceed the assumed loads, will be adjusted to consider the failed assumption of 50% reductions to sources not addressed by this, or any other, TMDL.

Response: Coordinated Effort - A technical team of EPA Regions 9 and 10, together with the Oregon Department of Environmental Quality (ODEQ) and the North Coast Regional Board, and supported by Tetra Tech, Inc., have been working together toward the development of unified models to support the development of coordinated TMDLs for the Oregon and California portions of the Klamath and Lost Rivers. The following table summarizing these TMDLs, the lead agency, and the impairments being addressed, will be incorporated into the TMDL documents.

TMDLs	Within Oregon	Within California
Lost River	ODEQ (DO, pH, ammonia toxicity, and temperature in Lost River tributaries only)	EPA Region 9 (pH, nutrients)
Klamath River	ODEQ (DO, pH, ammonia toxicity, temperature, chlorophyll *a*)	North Coast Regional Board (Organic enrichment/low DO, temperature, nutrients)

This Lost River TMDLs document is developed to meet the specific North Coast Regional Board Basin Plan water quality objectives for the Lost River HA. TMDLs being developed for the Oregon portion of the Lost River, for the Oregon portion of the Klamath River, and for the California portion of the Klamath River will be developed by the states of Oregon and California and water quality will be evaluated using the applicable objectives/criteria for those areas. The Lost River inputs to the Klamath River via Klamath Straits Drain will be addressed in the Oregon TMDLs for the Klamath River. Again, the technical analyses for these TMDLs were conducted as part of the joint technical approach by EPA Regions 9 and 10, and the states of Oregon and California.

TMDLs have been completed for the major tributaries to the Klamath River. TMDLs have been completed by ODEQ for Upper Klamath Lake (to address dissolved oxygen, chlorophyll *a*, and pH impairments) and waters that are tributary to Upper Klamath Lake, including the Sprague River subbasin (for dissolved oxygen, pH, and temperature

impairments), and the Williamson River subbasin (impaired by temperature). TMDLs have been completed by the North Coast Regional Board for the Salmon River (2005; temperature), Scott River (2006; sediment and temperature), Shasta River (2007; dissolved oxygen and temperature), South Fork Trinity River (1998; sediment), and mainstem Trinity River (2001; sediment). Additional descriptions of the related TMDLs for the Klamath River basin were added to the TMDL document.

Upstream Targets will be met - EPA recognizes that achieving water quality objectives for these waterbodies is challenging and that these TMDLs are only part of a larger solution. The Lost River TMDL allocations achieve applicable California water quality objectives for the Lost River HA. Drains feeding into the Lost River and its impoundments, including those that originate in Oregon and end in California, are represented through boundary conditions in the model.

As part of the coordinated effort for the basin, modeling for these TMDLs assumes that upstream waters (e.g., waters coming into the Lower Lost River) will meet the applicable TMDL targets and load allocations developed as part of the coordinated technical effort. For the Lower Lost River TMDLs, the Upper Klamath Lake TMDL was not a driver for necessary load reductions; however, the Upper Klamath Lake TMDL is explicitly considered in the modeling analysis for the Klamath River TMDL effort.

"Background" Loads – In the Draft TMDL document, inputs from the upstream segment were identified as "background" loads (e.g., Tables 4 and 6). For clarity, the terminology in the TMDL document has been changed to "upstream loads". Additionally, because of the hydrology of the system as well as biological processes that occur in the Refuges (pages 34-35 in the Draft TMDL document), the TMDL represents only a portion of the load in Segment 2 (Tule Lake Refuge) being conveyed to Segment 3 (Lower Klamath Refuge). This assumption results in the Segment 3 upstream inputs (formerly "background load") not being equivalent to the total load for Segment 2. The text has been refined to better explain this partial load transfer between some segments (which the comment describes as "an additional 50% load reduction under the TMDL.")

Comment B-7: *Identification of Non-Agricultural Contributions.* The Draft TMDL identifies load allocations to reduce the (estimated) existing loads of all agricultural sources by 50%, but does not treat all contributions similarly. Though the Draft TMDL assigns the 50% load reduction to all nonpoint sources and one existing National Pollutant Discharge Elimination System (NPDES) permittee, the Draft TMDL does not assign the "equitable" 50% reduction to all point sources. (Draft TMDL, at p. 33.)

As a further example, the Draft TMDL fails to clearly articulate load reductions for bird defecation in refuges. The Draft TMDL does not specifically estimate natural background levels and rather appears to assume that each "background load" somehow incorporates the unknown natural background levels entering each segment. (Draft TMDL, p. 21.) The 50% load reduction assigned to all background loads and nonpoint sources inherently assumes a 50% load reduction to natural background without any analysis or rationale for reducing the natural background

levels. (Draft TMDL, p. 36.) The failure to explicitly consider natural background levels must be remedied in this Draft TMDL.

Response: Allocations to Point Sources - The Draft TMDL document identified wasteload allocations for two entities: Caltrans (Segments 1, 2, and 3) and the City of Tulelake wastewater treatment plant (WWTP) (Segment 2). The Draft TMDL document specified an allocation equivalent to a 50 percent load reduction for the City of Tulelake WWTP, which is in the process of upgrading its treatment plant. The allocation for Caltrans corresponds to implementation of best management practices (BMPs) as specified in their existing NPDES permit.

Incorporation of Waterfowl inputs - It is acknowledged that some percent of the load contributed to each segment is from natural background sources. However, please see the response to comment A-11 (Upstream inputs inaccurately identified as "background" loads). Additionally, waterfowl excrement was considered as a source within the refuges included as part of the gross allocations to the refuges, not as background. Please see comment C-14 regarding internal loading from waterfowl. The implementation process is expected to further distinguish among sources and identify the required reductions to meet the "edge of stream" reduction requirements.

Comment B-8: *Coordination and Consistency with Other TMDLs in Region.* EPA must recognize that Klamath farmers and ranchers are on the receiving end of various TMDL processes. The Lost River TMDL for California cannot be prepared without proper and substantial coordination with Upper Klamath Lake and Klamath River TMDLs. At the very least, the iterative processes set forth in the implementation of those TMDLs must inform the assumptions about water quality in this California Lost River TMDL. Though EPA maintains that California irrigators will not be held accountable for non-California sources, the Draft TMDL does not expressly provide such assurances.

Response: EPA intends that the Lost River TMDLs and Klamath River TMDLs be coordinated, and the processes be iterative. The identification of load allocations to sources originating upstream in Oregon, and the incorporation of these upstream load reductions into the technical analysis, resulted in the determination of load reductions necessary in California to meet Lost River basin water quality objectives. Thus, the load reductions identified in Table 6, reflect an understanding and acknowledgement that improvements in water quality upstream represent part of the solution in meeting water quality objectives in California. Please see the response to comment B-6 (regarding Coordinated Effort for inter-related Klamath and Lost River TMDLs, and Upstream Targets), and comments A-8 and A-9 regarding North Coast Regional Board modification/adoption of these TMDLs.

Comment B-9: *Assumptions: 50% reductions rely on baseline loads; 50% source input reductions without assurances; incomplete data used for baseline; WQS may not be attainable under natural background conditions.* The Draft TMDL hinges the success of the TMDL effort on the "reductions in DIN and CBOD loadings of approximately 50% from the estimated baseline loads from 1999" to attain the applicable pH and dissolved oxygen water quality

standards in California. (Draft TMDL p. 6.) The Draft TMDL and supporting Model Configuration and Results, Lost River for TMDL Development, August 29, 2005 ("Model") suffer from three fatally flawed assumptions: (1) Oregon source inputs into the Lost River system will also see reductions of 50% without any regulatory program or other assurance that such reductions will be made; (2) the incomplete data from eight years ago has set an appropriate baseline by which to judge all success in attaining the water quality standards; and (3) the natural background conditions are such that the water quality standards are in fact attainable.

Response: (1) Please see response to comment G-5 on ODEQ's TMDLs and Implementation process. (2) Data used in the analysis are representative of typical conditions in the Lost River basin. The analysis period was selected so as to make best use of available data. The technical analysis identified what level of DIN and CBOD are allowable while still being able to meet water quality objectives; these levels happen to be approximately 50% of the levels in the 1999 baseline year. Thus, the baseline year is not relevant to what levels of pollutants the waterbodies are able to assimilate. The baseline year merely provides a comparison point for expressing the permissible loads. (3) Please also see response to comment B-6 ("background loads") as well as response to comment B-3 (Water Quality Objectives are Attainable).

Comment B-10: *Margin of Safety, data limitations, and model assumptions.* EPA regulations require TMDLs to incorporate a "margin of safety" to account for uncertainties in the data, modeling, or other information used to develop the TMDL. (40 C.F.R., §§ 130.2(g)-(i), 130.7(c)(1); EPA-440-4-91-01, Apr. 1991.) The model relied on to support the Draft TMDL, however, does not explain or justify the margin of safety and merely states that "no margin of safety (MOS) was explicitly considered in the modeling." (Model, p. 55.) Given that the Model admittedly has "extensive data limitations" and critical data sets are simply "not currently available," the Model should apply and consider explicit margins of safety to address severe uncertainties and data gaps. (Model, p. 4; see also Draft TMDL, pp. 22-23 ["additional water quality and flow monitoring in the supply and drainage system is needed to more accurately characterize the loading contributions from the different irrigation districts and refuge areas. . . . insufficient data are currently available to distinguish pollutant loads from TID and Refuge operations"].) The TMDL does not sufficiently justify the absence of a calculated margin of safety. (Draft TMDL, p. 35.) "Conservative assumptions" do not serve as an appropriate margin of safety when based solely on guesswork derived from eight-year old data.

Response: EPA does not concur with the characterization of "severe uncertainties and data gaps." Please see comment A-1 and K-41 regarding adequacy of data and data limitations. As stated on page 35 of the Draft TMDL document, the TMDLs incorporate an implicit margin of safety through the use of conservative assumptions in both the analysis and modeling. The TMDLs conservatively assume year-round reductions in DIN and CBOD reductions are needed (although the critical period in which water quality standards violations occur is during the summer months), and the W2 model calibration incorporates conservative rates for key water quality parameters (e.g., denitrification rates). TMDL guidance provides that an implicit MOS is acceptable and a calculated (explicit) MOS is not required.

Comment B-11: *Proposed Implementation Plan*. KWUA appreciates the Draft TMDL's statements that the recommendations within the Proposed Implementation Plan are not mandatory and are without effect. (Draft TMDL, pp. 3, 4, 37.) However, KWUA respectfully disagrees with the characterization of the Proposed Implementation Plan, which assigns responsible parties and contains aggressive timelines, as "a few recommended general strategies." (Draft TMDL, p. 37.) KWUA objects to the inclusion of Proposed Implementation Plan within the Draft TMDL and respectfully urges EPA to remove Chapter 7 from the Draft TMDL.

KWUA recognizes that EPA has put some effort into the discussion of implementation measures, and reasonable recommendations may well arise from the suggestions therein. To the extent EPA wishes to provide the North Coast Regional Water Quality Control Board (Regional Board) or interested parties some ideas or recommendations, EPA should develop and furnish any such recommendations outside of this TMDL document. The Regional Board could, pursuant to its authority under California law, then consider the recommendations, obtain the necessary information, and rely on local resources to formulate workable implementation measures. (See California Water Code, § 13240 [requiring that Regional Board consult with and consider recommendations from State and *local* agencies in amending or devising basin plans].) The Regional Board has authority to formulate implementation measures. In doing so, the Regional Board must comply with various state laws that EPA has ignored in devising Proposed Implementation Plan. Thus, inclusion of Proposed Implementation Plan as Chapter 7 of this TMDL evades state law and allows for complete avoidance of any accountability.

KWUA recognizes that EPA has an existing obligation and authority to devise the Draft TMDL. However, EPA has no obligation to develop an implementation plan and, in fact, has no authority to draft the implementation plan for the Regional Board. (33 U.S.C. § 1313(e) [States in charge of defining the method for ensuring "adequate implementation" of TMDLs]; *Pronsolino v. Nastri,* 291 F.3d 1123, 1129 (9th Cir. 2002); *Pronsolino v. Nastri,* 91 F.Supp.2d 1337, 1355-56 [implementation of TMDLs for nonpoint sources is subject only to state regulation]. (EPA's authority "related to implementation of nonpoint source pollution control measures are generally limited to education and outreach as provided by" Clean Water Act section 319. [See California Continuing Planning Process Report, at p. 31.]) EPA cannot step into the shoes of the State in regulating nonpoint sources. In providing a specific implementation plan including directives to individuals and districts that unquestionably fall under the State nonpoint source jurisdiction, EPA is inappropriately exceeding its legal authority. The Regional Board, not EPA, has authority to propose regulations or "action items" to address nonpoint sources in the Lower Lost River system. EPA simply cannot impinge upon the Regional Board's exercise of its discretion to regulate nonpoint sources by "assist[ing] local stakeholders in targeting actions to address suspected causes of water quality impairment in the Lost River system." (Draft TMDL, p. 3.)

Response: EPA disagrees with the characterization of the nature of the recommendations. As described in the TMDL document, the implementation *recommendations* are for the use of the North Coast Regional Board and other stakeholders to consider when developing an implementation plan, and do not "assign" responsibilities for implementation. EPA has no authority to develop an implementation

plan. EPA believes that these recommendations contain valuable suggestions, and their presentation is intended to capture the broad range of suggestions provided through the TMDL development process. The EPA TMDL document also clearly notes that Chapter 7 (Implementation Recommendations) is separate from the TMDLs and clearly identifies that the recommendations are not legally binding. Further, EPA has received many requests to include the recommendations and/or strengthen them. EPA is including implementation recommendations in this document to assist local stakeholders in targeting actions to address suspected causes of water quality impairment in the Lost River system, but they are strictly advisory, and are not required to be implemented under federal law.

The state of California develops and includes implementation plans along with TMDLs adopted into its Basin Plans, and the North Coast Regional Board has stated its intention to develop an implementation plan, which may vary from the recommendations offered in Chapter 7 of the TMDL document. When the North Coast Regional Board implements the TMDLs, it will determine what entities and what measures – voluntary, regulatory, or both – will best achieve the allocations and the TMDLs. Please also see comments A-1 (*North Coast Regional Board responsibility for implementation*) and A-3 (*Regional Board will use implementation recommendations to develop implementation plan*).

Comment B-12: KWUA respectfully requests that EPA consider the following suggestions for any implementation recommendations provided to the Regional Board:

• Discuss the Relationship Between the Various TMDLs in the Region: EPA has made it clear that EPA is preparing this TMDL now only because of the schedule within the Consent Decree. In the meantime, other TMDLs for interrelated waters in both California and Oregon will be prepared at some undetermined time in the future. Any implementation recommendations should include specific terms to ensure consistency, equity, and consideration of the larger regulatory picture.

Response: Please see responses to comment B-6 (Coordinated Effort for inter-related Klamath and Lost River TMDLs), comment A-1 (North Coast Regional Board responsibility for implementation), and comment A-8 (North Coast Regional Board may propose modification to EPA's TMDLs).

• Remove Timeframes: The timeframes within the Proposed Implementation Plan must be removed because: (1) they suggest that these "recommendations" are mandatory; and (2) the dates are arbitrarily created without the appropriate studies and data to support the feasibility or necessity of completing the "suggested" measures by that date. To the extent EPA seeks to evaluate the feasible timing of actions, KWUA suggests EPA recommend that the Regional Board coordinate work groups and prepare models to determine appropriate timeframes for carrying out any appropriate implementation measures. Any timeframes created must recognize the iterative nature of other water quality efforts upstream of the Lost River in California. The timelines set forth in the Proposed Implementation Plan suggest that EPA defines success as taking uninformed quick action rather than acquiring sufficient understanding of the water

quality conditions to use in formulating reasonable solutions. (Draft TMDL, p. 45 ["even though there is uncertainty regarding how long the river system may take to fully recover and how much past practices may be influencing current conditions, given the current conditions of the river there is need to speed up recovery to the extent practicable"].) KWUA urges EPA to reconsider the inclusion of timeframes to ensure that appropriate time is allowed to ascertain the existing water quality conditions and coordinate with the various other water quality efforts in the Klamath Basin.

Response: The timeframes provided in Chapter 7 for water quality improvements are recommendations for implementation. EPA recognizes the importance of cumulative water quality improvement efforts for the Lost River both in California, and upstream and downstream in Oregon, as well as coordination with efforts in other Klamath basin waterbodies. Concurrent activities toward achieving allocations are recommended to address impairments in each of the waterbodies via state-led implementation plans in the Klamath Basin. As stated above, the North Coast Regional Board will be responsible for the modification/adoption of these TMDLs (see comments A-8 and A-9); and the North Coast Regional Board, in conjunction with stakeholders, will develop an implementation plan, that will establish clear targets and timeframes for implementation.

• Form Work Group: The current attempt to assign responsibilities to the districts, agencies, and individual growers will not ensure a successful TMDL. For example, districts have no authority to enforce water quality discharges or change farming practices of their constituents. Rather than attempt to assign tasks to various parties without a full understanding of the local dynamic in the Klamath Basin, EPA should recommend that the Regional Board form a work group of local stakeholders (irrigators, districts, KWUA, UC Cooperative Extension) to, among other things, gather more site-specific data about Lost River impairments and consider workable solutions. (See California Continuing Planning Process Report, p. 7.) Rather than EPA attempting to dictate new requirements for federal lessees and force Reclamation to initiate a monitoring program, the work group could further coordinate with the Bureau of Reclamation and U.S. Fish and Wildlife Service to consider potential measures for addressing federal involvement and management activities to improve water quality. (KWUA finds EPA's attempt to require management plans for federal leased lands especially troubling. The Proposed Implementation Plan, as currently drafted, treats growers with leased lands differently by mandating special requirements for federal leases. Though KWUA understands that EPA is trying to get all actors focused on resolving water quality issues, KWUA urges EPA to instead recommend that the potential water quality improvements related to federal land management practices be considered by the local federal land managers and lessees.) The work group could also analyze implementation possibilities on a regional level or, at the very least, coordinate with other water quality efforts in the region.

Response: EPA has added text to modify Topic #2 in Table 7-1 regarding who should be involved in the establishment of an implementation work group. The North Coast Regional Board, responsible for implementing these TMDLs, will determine the best parties to effect the implementation, as well as the most appropriate measures (regulatory, voluntary, or a combination) when they develop the implementation plan.

• Consider Technical and Economic Feasibility: Any implementation plan should identify implementation measures necessary to carry out the plan, including financing, the time needed to carry out the plan, and the economic, social, and environmental impact of carrying out the plan. (See e.g., 40 CFR 130.6(6).) KWUA appreciates EPA's willingness to assist in locating funding sources, but any implementation recommendations should discuss in more detail how EPA or others would assist with locating funding sources. EPA must recognize obstacles outside of Klamath farmers' control, such as regulatory limitations on algae and aquatic weed removal, power rates, and water costs. This feasibility analysis is especially important with respect to aquatic plant removal. As drafted, the Proposed Implementation Plan assumes that individual growers will remove aquatic plants, but does not sufficiently account for limitations on individual's authority or ability to do so.

Response: As stated in comment A-8, "the North Coast Regional Board has an obligation under CEQA to consider all pertinent information available at the time of a proposed action". EPA acknowledges and appreciates that there are many factors that affect whether a particular action is feasible and will be effective towards achieving load reductions. EPA has expanded the discussion under Topic #2 in Table 7-1 regarding the role of and participants in an implementation workgroup.

• Consider Other Efforts: Any implementation recommendations should consider other efforts in the Klamath Basin to improve water quality, such as the Oregon Department of Agriculture's Lost River Subbasin Agricultural Water Quality Management Area Plan and the Klamath River and Upper Klamath Lake TMDLs. EPA should suggest that the Regional Board coordinate with other agencies (EPA (including Regions 9 and 10), State Water Resources Control Board, Oregon Department of Agriculture, and Oregon Department of Environmental Quality, Natural Resource Conservation Service, California Resource Conservation Districts), before finalizing an implementation plan, to avoid inconsistent and potentially conflicting regulation or efforts. Considering the limitations of the Draft TMDL, the concerns identified herein, and various other regulatory activities in the region, KWUA does not believe that it is prudent or good public policy for EPA to suggest that the Regional Board adopt the Proposed Implementation Plan.

Response: Comment noted. The recommendations to convene state and federal regulatory agencies with jurisdiction in the Lost River basin has been added to Chapter 7 of the TMDL document. Please see also comment A-3 regarding how the North Coast Regional Board will use the implementation recommendations to develop an Implementation Plan, and comment B-6 regarding the current coordination of EPA Regions 9 and 10, the North Coast Regional Board and ODEQ.

• Encourage Non-Regulatory Measures: KWUA appreciates the inclusion of nonregulatory measures (as provided for in the Basin Plan) within the Draft Implementation Plan (See e.g., North Coast Basin Plan, 4-31.00, 4-32.00; see also (40 CFR 130.6(c)(4)(ii) ["Regulatory programs shall be identified where they are determined to be necessary by the State to attain or maintain an approved water use or where non-regulatory approaches are inappropriate in accomplishing that objective"].) KWUA supports the pursuit of nonregulatory measures to gain an understanding of the water quality conditions in the Lower Lost River system, including:

- Development of Memoranda of Understanding with other agencies and organizations;

- Coordination with local government and non-profit organizations and individuals to develop control strategies;
- Incentives for organizations and individuals to control waste discharges and conduct watershed restoration activities;
- Focus on public outreach and education;
- Development of a guidance document;
- Develop a monitoring strategy for filling gaps in current data and for ensuring progress with implementation measures.

Response: Comment noted. Additional detail and options for the North Coast Regional Board to consider in developing an Implementation Plan were added to Chapter 7.

• Review DO Criteria: Any implementation recommendations must recognize that the Regional Board has started considering the appropriateness of its DO objective due to the infeasibility of meeting the DO standards in light of natural conditions. EPA should recommend that the Regional Board consider the water quality objectives through Basin Plan amendments based on site-specific data for the watershed. (See e.g., North Coast Basin Plan, 4-34.00.)

Response: The North Coast Regional Board directed staff in its 2007 Triennial Review of the Water Quality Control Plan for the North Coast Region (Basin Plan) to develop a proposal for the revision of the water quality objectives for dissolved oxygen as contained in the Basin Plan. A Scoping Document, designed to initiate the public scoping process under CEQA, is available at the following web page: http://www.swrcb.ca.gov/northcoast/water_issues/programs/basin_plan/dissolved_oxygen_amendment.shtml
Public CEQA Scoping meetings and workshops were held in Santa Rosa and Weaverville, California in October 2008. North Coast Regional Board staff will draft a Basin Plan Amendment and Staff Report and the North Coast Regional Board will consider public comment prior to the Board's decision regarding adoption of the amendment. It is anticipated that the North Coast Regional Water Board will consider the proposed amendment in Spring 2009.

• Reconsider Recommendation to Reduce Return Flows: Return flows are an important part of water management in the Klamath Basin. Return flows provide water to wildlife refuges and downstream irrigators as well as assimilative capacity for pollutants. Rather than focus on reducing return flows, any implementation recommendations should instead focus on studying any impacts from return flows and studying appropriate measures to enhance the water quality of return flows.

Response: EPA acknowledges that improving the water quality in return flows is the primary concern. Potential alterations to return flows are addressed as part of implementation plan. We have included these recommendations as an option for consideration.

• Implement Adaptive Management: Adaptive management and phasing is imperative due to the lack of information and the high contribution to water quality impairment from natural and historic conditions.

Response: Comment noted. EPA encourages adaptive management approaches to implementation and has incorporated adaptive management into the implementation recommendations.

• Discuss Past and Current Efforts: The implementation plan should take into account and discuss voluntary actions taken by landowners and others in the Klamath Basin to address water quality issues. These actions were taken subsequent to the data gathering in 1999 upon which the Draft TMDL and Proposed Implementation Plan rely.

Response: The technical analysis identified what level of DIN and CBOD are allowable while still being able to meet water quality objectives; these levels happen to be approximately 50% of the levels in the 1999 baseline year. Thus, the baseline year is not relevant to what levels of pollutants the water bodies are able to assimilate. The baseline year provides a comparison point for expressing the permissible loads. We strongly encourage additional monitoring to document progress and demonstrate reduction of loads from the 1999 baseline that have already been achieved. EPA encourages contact with North Coast Regional Board staff to discuss any such efforts. Please see North Coast Regional Board comment A-5 and EPA's response.

• Remove Inappropriate Responsible Party Designations: The Proposed Implementation Plan obligates individuals and governmental agencies to duties that are not necessarily within their legal authority or area of competence. These inappropriately assigned actions, if incorporated into an adopted implementation plan, will likely not be carried out effectively or at all. KWUA suggests that EPA remove these inappropriate responsible party designations in Table 8 of the Proposed Implementation Plan (e.g, Draft TMDL, p. 38 [requiring irrigation districts to assist with development and implementation of nutrient and residue management plans] .)

EPA should not recommend implementation measures devised without appropriate data or modeling of implementation measures. Any planning efforts must be informed and take into account the unique nature of the Lower Lost River system and the surrounding region.

Response: Please see the responses to comment B-11, and to earlier portions of this comment (B-12).

Comment B-13: *Summary of KWUA Recommendations.* KWUA recognizes that water quality impairments within the Upper Klamath Basin exist and require attention. However, from a public policy perspective, the most appropriate course of action for EPA is to amend the schedule in the current Consent Decree to establish a more logical and orderly approach to addressing the issues raised by the Draft TMDL and these comments.

Response: Comment noted; please see response to comment B-1.

Comment Set C: Pablo Arroyave, U.S. Bureau of Reclamation

Comment C-1: *Editorial*. Page 4: Wilson Diversion Dam should be Lost River Diversion Dam.

Response: The change has been made to the TMDL document.

Comment C-2: *Editorial*. Page 5: On page 5, as well as several other locations in the document, there are references to the "Klamath Irrigation Project." These should be corrected to read the Klamath Reclamation Project. The Project was authorized as a drainage and flood control project.

Response: The changes have been made to the TMDL document.

Comment C-3: *No natural connection between Lost River and Klamath River; P canal, LKL Refuge, Klamath Straits Drain*. Page 7: The language about the location and hydrology of the Lost River should be fully explained to clarify that the Lost River actually terminates in the Tule Lake sumps, but for TMDL purposes EPA has chosen to incorporate the interconnectivity with the Klamath River system through the P canal, Lower Klamath Lake National Wildlife Refuge and the Klamath Straits Drain. The language is confusing and one could draw the incorrect conclusion that the Lost River has a natural connection to the Klamath River.

Response: The TMDL document includes additional discussion of historical and current hydrology, added to Section 1-2, including language clarifying the connection to the Klamath River, via the Lower Klamath Refuge and Klamath Straits Drain created by pumping through Sheepy Ridge by way of the "D" Pumping Plant. This is described in "Klamath Project Historic Operation" (US Department of the Interior, Bureau of Reclamation Nov 2000) as follows.

> *"It is important to note that the Klamath River Basin Compact (Compact) recognizes that the Lost River has been made a tributary to the Klamath River via the Project operation (see Klamath River Basin Compact, Article II—Definition of Terms[3]).The Compact was ratified by both California and Oregon and consented to by the United States (August 30, 1957; 71 Stat. 497)."*
>
> > *[3 Congress consented to the negotiation of the Klamath River Basin Compact (between the States of Oregon and California) by the Act of August 9, 1955, 69 Stat. 613 and to the Compact itself by the Act of August 30, 1957, Public Law 85-222, 71 Stat. 497*.] (Page 7)
>
> "*The Tule Lake National Wildlife Refuge receives water from the Tule Lake area and from the Lost River. Since the Lost River is in a naturally closed basin, Reclamation has constructed a pump and tunnel system (pump "D") from Tule Lake to Lower Klamath National Wildlife Refuge. Return flows from irrigation accrue to Tule Lake and are reused for irrigation before the water is ultimately passed through the pump system and to the Lower Klamath Lake area, where it is used on agricultural and refuge lands. Finally, the water is returned to the Klamath River via the Straits Drain*." (Page 23)

"*P Canal System…is operated to transport water to and through the Lower Klamath Refuge. Pumping Plant D removes water from the Tule Lake Sump and discharges into the Tule Lake Tunnel. The water is then used by individuals or the Refuge, or discharged to the Klamath Straits Drain and thence to the Klamath River. On occasion, Pumping Plant D is not pumping in order to maintain objective levels in the sump. During these periods, "Special Pumping" is allowed so that water users, including the refuge, in the Lower Klamath Lake area can get water*." (Pg 27)

Comment C-4: *Limited winter water releases from reservoirs*. Page 7: "In winter, substantial amounts of Lost River flow come from reservoirs within the Lost River watershed..." This is not the case. No water releases are made from reservoirs from the time the irrigation season ends in October until it begins the following April unless very high inflows occur at Gerber and spill over the spillway occurs (which happens approximately one in ten years). Winter flows come from runoff from all lands throughout the watershed.

Response: This is correct. The TMDL document has been updated to reflect this information.

Comment C-5: *Water sources in summer and winter months*. Page 7: "Much of the supply water to these operations comes from water supply canals that divert water from upstream locations in the Lost River system (e.g., D, G, J and N Canals)." The D and G Canals originate from and are comprised entirely of Upper Klamath Lake water, via the A Canal, and much of the water in the J and N Canals is from the Klamath River and/or Upper Klamath Lake. During summer months very little water originating in the Lost River watershed flows past Harpold Dam (~15 cfs) and the Lost River downstream of this point is comprised of Upper Klamath Lake and Klamath River waters. During winter months, Lost River water will flow as far downstream as Wilson Reservoir (Lost River Diversion Dam), where it is diverted to the Klamath River. Water in the Lost River downstream of the Lost River Diversion Dam during winter months is almost entirely run-off from the surrounding lands.

Response: This will be clarified in Section 1 of the TMDL document.

Comment C-6: *Lost River water from canal system*. Page 7: "In summer, most Lost River flows in California come from the Upper Klamath Lake via the Link River or from Keno Reservoir in the Klamath River system via diversion canals." Most of the water in the lower Lost River comes from Upper Klamath Lake via the A Canal (and the associated canal system) and from the Klamath River via the Lost River Diversion Channel.

Response: This will be clarified in Section 1 of the TMDL document.

Comment C-7: *FWS manages Refuge lands*. Page 7: The Fish and Wildlife Service (Service) has ultimate administrative control of all lands within the Refuge. The Bureau of Reclamation does not jointly manage any lands within the Refuge in California. The Service does have a Cooperative Agreement with Reclamation to administer lease contracts for farming within the Refuge on the Oregon side of the border.

Response: The text has been clarified to reflect this information.

Comment C-8: *N reductions will be ineffective due to AFA; need to estimate amount of N from AFA*. Page 14: "'Modeling analysis conducted for these TMDLs found that reductions in phosphorous loads would have little, if any, effect on algal growth rates or dissolved oxygen deficits; in contrast, reductions in nitrogen loads were found to be effective in reducing excess algal growth…." It's likely that nitrogen reductions in the Lost River will be ineffective considering that *Aphanizomenon flos-aquae* (AFA), an abundant phytoplankton in the lower Lost River watershed, has the ability to "fix" atmospheric nitrogen (N_2). Even if much of the nitrogen load to the lower Lost River system was eliminated, AFA "blooms" could continue to flourish (through fixation of atmospheric nitrogen), which would continue to load nitrogen to the system and perpetuate the high pH and low dissolved oxygen conditions. An accurate characterization of the amount of nitrogen contributed to the system by the AFA in the lower Lost River system is required to be effective in estimating the effects of phosphorous and nitrogen reductions on water quality conditions.

Response: Eilers (2005) identified the dominant aquatic plant species in the Lost River as non-nitrogen fixing Ceratophyllum demersum (coontail). AFA was identified in significant amounts only at two of the ten sampling locations. To make best use of available data, the modeling framework was built around the dominant (non-nitrogen fixing) aquatic plant species present in the river. While AFA may have localized impacts, available data do not suggest that nitrogen fixation by AFA is a dominant factor. In the event that sufficient, quantitative data are collected and indicate otherwise, the model may be updated in the future to explicitly consider AFA. EPA recommends that, during TMDL implementation, monitoring to better understand and quantify contributions from AFA be undertaken. We have incorporated this recommendation into Topic #9 (monitoring), Table 7-1 in Chapter 7. Also see comments A-8 and A-9 (North Coast Regional Board may propose modification to EPA's TMDLs based upon new information).

Comment C-9: *Internal N loading from bed sediment, source waters, wetlands, waterfowl, and AFA*. Page 15: "The major sources of nitrogen in water include agricultural return flows and runoff, municipal and industrial waste water, failing septic systems, and animal waste runoff." This may be the case in a typical watershed, but the Klamath and Lost River systems are unusual in the fact that large quantities of nitrogen occur naturally. Sources of nitrogen within the Lost River system also include internal loading from bed sediment, large quantities of nitrogen in "background" source waters (Upper Klamath Lake and the Klamath River), decomposition of organic matter from wetlands, waterfowl excretion, and nitrogen fixation from AFA.

Response: Internal loading from bed sediment is explicitly included in the model. Contributions from source waters are also included through boundary conditions. The additional sources noted (such as wetlands and waterfowl excrement) are also inherently considered in boundary conditions assigned, ultimately enabling the model to be calibrated for the river itself. While insufficient data are available to quantitatively distinguish contributions from these sources throughout the basin, these sources are recognized and incorporated into the modeling analysis for each segment.

Comment C-10: *Unlikely that biological fixation is important nitrogen source*. Page 16 & 17: "Biological fixation is the more important process in terms of anthropogenic increases in nitrogen in the Lost River Subbasin. The enzyme nitrogenase found in the bacteria of the genus *Rhizobium* mediates biological fixation. Biological fixation is an oxygen-dependent reaction and therefore is prevalent in legumes growing in aerated, upland soils." This statement implies that crop production in the Lost River watershed is a significant source of nitrogen to the Lost River through nitrogen fixation. It's unlikely that biological fixation is an important process in terms of anthropogenic increases of nitrogen, especially when compared to other nitrogen sources in the system including the background nitrogen load coming from source water (Upper Klamath Lake and the Klamath River), internal loading from sediments, nitrogen fixation from AFA, waterfowl excretion, and the decomposition of organic matter in wetland soils.

Response: The TMDL document has been modified to clarify likely sources of significant nitrogen loading to the Lost River. Data are not available to individually quantify contributions from these sources throughout the basin. The model represents the collective effects of all sources. Also see response to comment C-8 (AFA is not dominant aquatic plant species).

Comment C-11: *Sources of organic matter*. Page 17: "External sources of organic sediments include runoff and return flows from farms, rangeland, forest, and urban lands and wastewater treatment plant upsets." The greatest source of organic matter to the Lost River watershed comes from background sources in the form of AFA and particulate organic carbon from Upper Klamath Lake and the Klamath River and from the AFA production that occurs within the Lost River watershed. AFA production has been noted throughout the Lost River watershed, including Gerber, Harpold, Wilson, and Anderson-Rose Reservoirs. Additional sources of organic sediment include wetland decomposition products and waterfowl excretion.

Response: "External sources" identified in the TMDL document refer to non-aquatic sources of organic matter (OM) from the Lost River watershed. Activities in the basin contribute OM to the Lost River and affected waterbodies and the referenced language acknowledges these in-basin sources. The TMDL document will include language acknowledging the additional contributions of sources originating from outside of the basin (such as inputs from Upper Klamath Lake and Klamath River). Also, as Eilers (2005) reported, AFA is not the dominant aquatic plant species throughout the river basin (see comment C-8).

Comment C-12: *Agricultural and refuge drainage are lesser sources of N and CBOD than internal sources*. Page2l: "Table 4. Nitrogen and CBOD Loading Estimates (based upon 1999 data)" states that 74 metric tons of dissolved inorganic nitrogen (DIN) are attributed to "agricultural and refuge drainage loads to Tule Lake Refuge." All of the background loads from surface waters are attributed to "agricultural and refuge drainage" when estimating a "gross" load to Tule Lake by "calculating the difference between DIN and CBOD loads to and from Tule Lake Refuge area, and assuming the difference is comprised of loads from agricultural drainage or refuge operation discharges to the Tule Lake sumps." This is very likely an inaccurate assumption. Internal loading from bed sediment and loading from waterfowl excretion is likely responsible for a large portion of the load that's attributed to "agricultural and refuge drainage."

See comments 13 and 14 for detailed information on internal loading from bed sediments and nutrient contribution from waterfowl excretion. Also, Kaffka (2002) estimated a total nitrogen load of 388.5 tons (352.4 metric tons) was diverted into the J Canal system in 1999. If not diverted, this very large nitrogen (and associated CBOD) load would have been transported to Tule Lake.

Response: The Draft TMDL document inaccurately identified upstream inputs to a section as "background" loads (see response to comment A-11).

The loads to a segment (e.g., "refuge drainage") include all sources within the segment - including waterfowl excrement and internal loading. Loads from any source that contribute to either Tule Lake or Lower Klamath refuges may ultimately end up in bed sediments. Internal loading from the sediment actually results from external loading over time. Therefore, bed sediment contributions inherently represent natural and anthropogenic loads (e.g., from agricultural and refuge drainage).

As external loads are reduced, internal loads would ultimately be reduced as well; and sediment oxygen demand (SOD) is reduced in the model as external loads are reduced. Internal loading is included in the model. However, it is not expected to be significant for Tule Lake, since Tule Lake is generally shallow and does not stratify. Without stratification, dissolved oxygen at the bottom of the lake is generally high enough to prevent a nutrient flux from the sediment. See also response to comment C-14 regarding internal loading from waterfowl.

Comment C-13: *Internal loading is significant* Page 22: "Internal nutrient loadings to Tule Lake were not quantified in this analysis. Over the long run, however, internal loading rates will likely decrease as the amount of excessive nutrient loading from externa1 sources are decreased." On page 6 the TMDL document states that "High nitrogen and BOD loads come principally from water diversions into the Lost River system, agricultural return flows, and cycling of nutrients and organic matter from water body bottom sediments." The TMDL document recognizes that "cycling of nutrients and organic matter from water body bottom sediments" is a principal loading source for the high nitrogen and CBOD loads, yet does not take internal loading into consideration for TMDL development. Reclamation believes that internal nutrient loading within Tule Lake and Lower Klamath Refuges is significant. Internal loading is a substantial source of nutrients that isn't adequately addressed by this TMDL. Significant internal nutrient loading from the organic bed sediments within Tule Lake and Lower Klamath Lake Refuges will likely continue indefinitely. The sediments of Tule Lake and Lower Klamath Lake Refuges are extremely deep organic depositions (Tule Lake in particular due to the fact that it was historically the terminus for the Lost River watershed) that have accumulated large reservoirs of nutrients over thousands of years. Research conducted on similar sediments in Upper Klamath Lake has shown that very large quantities of bio-available nutrients are released on an annual basis (Walker, 2001). Researchers have speculated that the internal nutrient loading occurring in Upper Klamath Lake will continue for decades. The internal nutrient loading will likely continue for a comparable time frame within Tule Lake and Lower Klamath Lake Refuges.

Response: Please see comment C-12 regarding internal loading accounted for in the modeling framework. EPA recommends that, during TMDL implementation, monitoring to better understand and quantify internal loads be undertaken. We have incorporated this recommendation into Topic #9 (monitoring), Table 7 in Chapter 7.

Comment C-14: *Internal loading, including waterfowl excretion*. Page 22: "Inputs to this segment are from lands and drains in the TID or that are part of the Tule Lake National Wildlife Refuge..." Substantial additional nutrient inputs include internal loading and waterfowl excretion. See the previous comment on internal loading. In addition to internal nutrient loading, waterfowl are responsible for a substantial nutrient contribution to Tule Lake and Lower Klamath Lake Refuges. Research conducted by Post and others (1998) at the Bosque del Apache National Wildlife Refuge found that waterfowl can contribute a significant portion of the annual nutrient budget to a water body that's heavily utilized by large populations of migratory birds. This study estimated the nutrient load to a 1,200 acre wetland by approximately 40,000 Lesser Snow Geese and Ross' Geese. "Of the estimated total amount of N and P excreted by geese, about 60% was loaded into the wetlands..." (Post and others, 1998). This research estimated a total of 15 metric tons of nitrogen was excreted by geese in one winter, of which 8.8 metric tons were estimated to have been "loaded" to the adjacent water body. The study only estimated the nutrient loading from geese, which underestimated the actual "bird-borne nutrient loading rates." Tule Lake and Lower Klamath Lake Refuges are utilized by larger populations of geese (and other waterfowl) than at the Bosque del Apache National Wildlife Refuge. "Over the long-term period (1953-2001) the [Lower Klamath Lake Refuge] supported an average of about 45% (about 450,000 birds per day) of Klamath Basin NWR complex waterfowl during autumn and about 54% (nearly 200,000 birds per day) in spring" (Gilmer and others, 2003). "Over the long-term period (1953-2001), the [Tule Lake Refuge] supported an average of about 50% (about 500,000 birds per day) of the Klamath Basin refuge complex waterfowl during autumn and about 38% (nearly 140,000 birds per day) in spring" (Gilmer and others, 2003). Tule Lake Refuge has approximately 13,000 acres of open water/wetlands and Lower Klamath Lake Refuge has up to 32,000 acres of open water/wetlands, which is considerably greater than the 1,200 acres of wetlands studied by Post and Others at the Bosque del Apache National Wildlife Refuge. The larger surface area of Tule Lake and Lower Klamath Lake Refuges increases the likelihood of deposition of waterfowl excretions in Tule Lake and Lower Klamath Lake Refuges. In addition, the populations of geese and other waterfowl that utilize Tule Lake and Lower Klamath Refuges are greater than the populations studied during the Post and others (1998) research, therefore the nutrient transport and load to Tule Lake and Lower Klamath Lake Refuges is likely greater than that which was estimated by Post and others (1998). Waterfowl are responsible for loading several metric tons of nitrogen and CBOD to the refuges each year. The Lost River TMDL modeling and analysis effort fails to consider this substantial source of nitrogen and CBOD. The nutrient loading from waterfowl and internal sources (bed sediment) must be quantified to accurately identify the proportion of nutrient input from the various sources (agricultural drainage, refuge operations, waterfowl, and internal loading). Without an accurate representation of loading sources incorporated into the TMDL modeling and analysis effort, the recommended TMDLs will not provide attainment of water quality standards.

Response: Internal loading, including waterfowl excrement, is explicitly included in the model (see response to comment C-12) and the additional sources noted are inherently

considered in boundary conditions to the model. While contributions from these sources are not individually quantified throughout the basin, due to insufficient data, boundary conditions assigned ultimately enabled the model to be calibrated for the river itself. Chapter 7 of the TMDL document has been amended to include recommendations to evaluate benefits of further characterizing internal loadings by monitoring (see Table 7-1, topic 9) and estimating contributions from waterfowl (see Table 7-1, topic 7).

Comment C-15: *Ady Canal is operated by Klamath Drainage District, not Reclamation*. Page 23, Ady canal: The Refuge takes water from the Ady canal (Klamath River) throughout the entire year, including the summer months. The Ady Canal and North Canal are solely owned and operated by Klamath Drainage District, not Reclamation. Reclamation does not own, operate, manage or control any facilities on these two canals and hence any load allocations can not be assigned to Reclamation. In addition, water in the Ady and North canals is solely from the Klamath River so any input conditions would need to be measured against Klamath River water background conditions.

Response: The text in the report has been clarified to reflect that Klamath Drainage District operates the Ady Canal. In the TMDL modeling analysis, Klamath River water quality conditions are used as the basis for setting Ady Canal boundary conditions (where water quality data were not available within the canal itself). North Canal was not explicitly included as a tributary for this TMDL evaluation; however, it was implicitly represented in the model in the distributed tributary boundary condition. Water quality in the portion of the Ady Canal in Oregon (coming from the Klamath River) will be addressed in the ODEQ TMDL document for the Lost River in Oregon.

Comment C-16: *Klamath Straits Drain owned and controlled by USFWS*. Page 24, Straits Drain: The portion of the Straits Drain that exits between the Lower Klamath Lake National Wildlife Refuge outlet and the California border is solely owned and controlled by operations within the Refuge boundaries. No private agricultural land exists in this location. All land on the California side of the border is owned and managed by the US Fish and Wildlife Service not the USBR. This section is the sole responsibility of USFWS. It should be noted that all of the agricultural land and associated drains within the Refuge boundaries (Area K) that are co managed by USFW and Reclamation are within the State of Oregon and not in the State of California.

Response: The text of the TMDL document has been clarified to reflect that land on the California side of the border is owned and managed by the USFWS.

Comment C-17: *Modeling analysis, Klamath Straits Drain, USFWS management*. Page 24: " ...the modeling analysis focused upon a segment from Lower Klamath Refuge to Pump Station E that crosses the Oregon-California Border approximately 1-2 miles north of Lower Klamath Refuge ..." The portion of the Straits Drain that exits between the Lower Klamath Lake National Wildlife Refuge outlet and the California border is solely owned and controlled by operations within the Refuge boundaries. No private agricultural land exists in this location. All land on the California side of the border is owned and managed by the US Fish and Wildlife Service, not Reclamation. This section is the sole responsibility of USFWS. It should be noted that all of the agricultural land and associated drains within the Refuge boundaries (Area K) that are

co-managed by USFWS and Reclamation are within the State of Oregon and not in the State of California. Also, approximately 1/3 of a mile of the Klamath Straits Drain, downstream of the Lower Klamath Refuge, is in California, not 1-2 miles.

Response: Text in the report will be updated to clarify the representation.

Comment C-18: *Model assumptions for phytoplankton, AFA*. Page 28: "Key assumptions associated with Lost River model development are as follows: One phytoplankton species and one macrophyte species are sufficient for representing the overall primary production and nutrient interactions in the system." This assumption may not accurately characterize the nutrient interactions depending on the species selected to represent the phytoplankton community. What species was selected? AFA could play a major role in the nitrogen loading to the Lost River system (due to AFA's ability to fix atmospheric nitrogen). If the interaction of AFA isn't considered in the nutrient (in particular nitrogen) cycling of the system, then the model will likely fail to estimate actual water quality improvement from the modeled load reductions (i.e. the model may show water quality improvement from a hypothetical load reduction, but in reality the load reduction cannot be attained due to the nitrogen loading from AFA nitrogen fixation). An accurate characterization of the amount of nitrogen contributed to the system by the AFA in the lower Lost River system is required to be effective in estimating the effects of phosphorous and nitrogen reductions on water quality conditions.

Response: Please see response to comment C-8. In addition, under an adaptive management program that includes an adequate monitoring program, the effectiveness of implementation activities should be tracked and used to modify or add other implementation activities to attain load reductions.

Comment C-19: *Reductions of N, CBOD may be associated with irrigation; mechanisms responsible for reductions in Tule Lake and Lower Klamath refuges need to be identified*. Page 34 & 35: "'First, the water quality model indicates a substantial amount of nitrogen and CBOD discharged to Tule Lake and Lower Klamath Refuges are consumed in these water bodies through biological processes ..." A substantial portion of this nitrogen and CBOD reduction could be associated with usage of the water for agricultural purposes. There are several locations around Tule Lake where water is removed from the lake and used for irrigation. When the water is applied to a field, the organic matter settles out and is deposited in-situ, thereby removing the organic matter (CBOD) and associated nutrients from Tule Lake. The crops will also utilize the bioavailable forms of nitrogen (DIN) and phosphorous, thereby reducing the load. The usage of Tule Lake water for irrigation could be responsible for a substantial portion of the nitrogen and CBOD reduction that occurs in the "Tule Lake Refuge segment of the Lost River." The mechanisms responsible for nitrogen and CBOD reduction in Tule Lake and Lower Klamath Lake Refuges needs to be identified and quantified in order to set attainable TMDLs. The established TMDLs may not be attainable if the assumption that reduction of nitrogen and CBOD within Tule Lake and Lower Klamath Lake Refuges, due to biological processes, doesn't hold true.

Response: Contributions to Tule Lake and the Lower Klamath Lake Refuges represent net contributions. Therefore, the irrigation withdrawals noted in the comment are inherently considered through boundary conditions to these segments.

Comment C-20: *Assumption of reductions not accurate; needs to incorporate internal loading, including bed sediments, waterfowl*. Page 35: "Second, the analysis projects that if the amount of nitrogen and CBOD discharged to these water bodies is reduced by 50% as projected in the TMDLs, the nitrogen and CBOD loads discharged from these waters will also be reduced by approximately 50%." It's very unlikely the TMDL model will accurately estimate the nutrient and CBOD reduction of water discharged from Tule Lake and Lower Klamath Lake Refuges from nutrient input reduction, since the model doesn't incorporate the input nutrient and CBOD loads due to internal loading from bed sediments and waterfowl nutrient contribution. See comments 13 and 14.

Response: Internal loading is explicitly included in the model. Please see responses to comments C-12 and C-14.

Comment C-21: *No Lower Klamath Lake Refuge water enters canals; water goes to Klamath Straits Drain and Klamath River*. Page 35: "Third, a significant percentage of water (with its associated DIN and CBOD loads) pumped from Tule Lake Refuge and Lower Klamath Lake Refuge go to irrigation supply canals and not directly to the next "downstream" water segment." NO water that leaves the Lower Klamath Lake Refuge ENTERS ANY IRRIGATION CANALS. All discharges from the refuge go directly into the Klamath Straits Drain and are pumped directly into the Klamath River. Reclamation has no control over Refuge owned and managed discharges in the portion of the Klamath Straits Drain in California.

Response: The TMDL document text has been clarified to reflect that all water exiting Lower Klamath Lake Refuge goes into Klamath Straits Drain. This is correctly reflected in the model.

Comment C-22: *Reclamation does not plan to study mitigation measures until loads are established*. Under draft recommendations: Reclamation does not plan to begin any studies on any potential water quality mitigation measures until load allocations for Reclamation's portion of the TMDL for the Klamath River are established.

Response: Comment noted.

Comment Set D: David Solem, Klamath Irrigation District

Comment D-1: *KID background*. Klamath Irrigation District (KID) is a member of the Klamath Water Users Association, which has provided comments on the Pre-Public Draft TMDL on October 16, 2006, and is providing comments on the Public Review Draft TMDL by July 6, 2007. KID concurs with their comments, and requests your consideration of those comments on behalf of KID.

Response: Comment noted. Please see responses to comment set B, from Klamath Water Users Association.

Comment D-2: *KID is an Oregon entity and cannot implement actions in California*. KID is an Oregon entity, and the KID boundary stops at the Oregon-California state line. It has no regulatory authority in either state to develop and implement nutrient and residue management plans (Table 7, page 38). It is not appropriate to single out KID and assign it responsibility to implement actions in the State of California for the California Lost River TMDL. We request all references to KID be removed from the final TMDL report.

Response: The implementation *recommendations* are for the use of the North Coast Regional Board and other stakeholders to consider when developing an implementation plan, and do not "assign" responsibilities for implementation. Please see response to comment B-11 regarding EPA's proposed implementation recommendations. The states of Oregon and California are each responsible for implementation plans in their respective states, and those plans may vary from the recommendations offered in Chapter 7. EPA Regions 9 and 10 and the states of Oregon and California are working together on a collaborative approach to water quality problems in the entire Klamath Watershed, which includes the Lost River watershed. EPA encourages participation in this process by stakeholders in both states.

Comment D-3: *Lack of understanding of the Lost River system for adequate Implementation*. We do not believe the recommendations in Table 7 will result in the achievement of the TMDL. Many of the Table 7 recommended actions are misguided because of the lack of understanding of the Lost River system. While an attempt to describe the highly modified Lost River is included in the report, it misses a major point. In 1905, the states of Oregon and California ceded to the United States the lands under Lower Klamath Lake and Tule Lake. Also in 1905, the Secretary of Interior decided the U.S. Reclamation Service (now the U.S. Bureau of Reclamation) should reclaim the lands beneath both lakes for the primary purpose of homesteading. In 1910, with the construction of Clear Lake Dam, drainage of historic Tule Lake began. In 1912 the Lost River Diversion Dam construction began, rerouting Lost River to the Klamath River.

The fact that Lost River was drained by a federal action in order to make land available for homesteading is not mentioned in the TMDL. It is the affect of this fact that makes conventional actions less likely to succeed. The generalized recommendations in Table 7 do not match the situation on the ground. At times, the quality of the water in Lost River is dominated by the current water quality of Upper Klamath Lake, for which there is no TMDL established.

Establishment and achievement of a TMDL in Oregon waters will not occur by the proposed Table 8 timeline, making the achievement of the California TMDL timeline impossible.

Response: The TMDL document will be expanded to provide additional history of the Lost River system, including the information presented in this and other comments. Please also see response to comment B-6 regarding the coordination of efforts, the status of other TMDLs in the Klamath basin and the way upstream loads are addressed, and response to comment B-11 regarding EPA's proposed implementation recommendations.

Comment D-4: *Remove implementation plan and timeline*. KID objects to the inclusion of the implementation plan and timeline and suggests it be developed by a group that will take the time necessary to formulate a workable plan that is specific to the complex hydrology. The implementation plan will have to be innovative to have any chance of success.

Response: Please see response to comment B-12 regarding removal of timeframes.

Comment Set E: Zeke Grader, Pacific Coast Federation of Fishermen's Associations

Comment E-1: *PCFFA disappointed in TMDL and prospects for improved water quality.* As the lead plaintiffs in the lawsuit that compelled development of these North Coast California TMDLs, Pacific Coast Federation of Fishermen's Associations, et al. v. Marcus, and given the Lost River's substantial contribution of pollution to the Klamath River, it is difficult for us to express adequately our disappointment in this TMDL and its dim prospects for improving Klamath River water quality. PCFFA stands more than ready to assist EPA and the State of California to improve the approach to non-point pollution control in the Lost River sub-basin, i.e., over the inadequate measures contemplated in this draft TMDL. We hope that you will accept our enclosed comments in that spirit of prospective close collaboration on stemming Klamath River pollution in order to restore the river's vital salmon resource. Given the Klamath River's water quality condition, and given the deficiencies of EPA's Public Review Draft "Lost River California Total Maximum Daily Loads Nitrogen and Biological Oxygen and pH Impairments" ("Lost River TMDL"), PCFFA regards the river and the federal government's poor stewardship of it as interrelated unnatural disasters.

Response: Comment noted. We strongly encourage PCFFA to participate in the development of the North Coast Regional Board's implementation plan as discussed in comment A-3.

Comment E-2: *Pacific Coast salmon season declared a commercial fishery failure due to decline of Klamath salmon stocks, which are due to declining Klamath water quality. TMDL doesn't recognize Lost River's role in the Klamath River and Pacific Coast Fisheries.* On August 10, 2006 U.S. Secretary of commerce Carlos Guitierrez declared the 2006 Pacific coast salmon fishing season, under section 312(a) of the Magnuson-Stevens Fishery conservation and Management Act, a "Commercial Fishery Failure due to a Fishery Resource Disaster". The reason for the 2006 Pacific Coast salmon Commercial Fishery Failure was the severe restrictions placed on ocean salmon fishing to protect the declining stocks of Klamath River Chinook salmon. A principal reason for the decline of Klamath River Chinook salmon stocks is the declining quality of Klamath River water.

Response: The influence of the Lost River on the water quality of the Klamath River, and thereby the Pacific Coast fisheries, are addressed in the Klamath River TMDL documents being developed by the states of Oregon and California. Please see response to comments B-6 regarding the coordinated effort being conducted by the states of Oregon and California with EPA Regions 9 and 10.

Comment E-3: *PCFFA is misnamed in the TMDL.* Now it might seem trivial that the TMDL authors cannot name the Pacific Coast ocean salmon fishermen's organization, but the misnaming of PCFFA in the draft TMDL, and the TMDL's explicit assignment of water quality clean-up responsibility to the same water users who have, in recent generations, degraded the Lost River, says a great deal about just how exclusive, how totally lacking in recognition of the Lost River's place in the health of the Klamath River and Pacific coastal fisheries, the TMDL really is.

Response: The document has been changed to correctly name the PCFFA. EPA acknowledges the Lost River's input to the Klamath River and Pacific Coast fisheries (see response to comment E-2). Please see comment E-10 regarding the formation of a workgroup not led by a special interest group.

Comment E-4: *TMDL does not recognize the role of the Lost Rivers in Klamath River and Pacific Coast Fisheries; PCCFA should not have agreed to separating the Klamath basin into six separate TMDLs. Recovery of Klamath River salmon cannot be accomplished unless/until Lost River's pollution contribution to the Klamath River is staunched*. The TMDL claims that: "The following organizations are available to assist growers, individual irrigators, landowners and operators who are responsible for recommended implementation actions on fields to develop and devise plans for achievement. Environmental Organizations: Pacific Coast Fishermen's Federation of America, Environmental Protection Information Center and Endangered Species Groups."

It was a mistake, in retrospect, for PCFFA, as lead plaintiff in the lawsuit that compelled these North Coast TMDLs (PCFFA v. Marcus) to have agreed to the workload division of the watersheds – in the case of the Klamath basin, into six separate TMDLs within the California portion of the basin alone. We did not realize at the time (1997) the degree to which the TMDL developers would focus down on each sub-basin to the exclusion of its place within the Klamath watershed as a whole, without regard to the relationship of the several sub-basins to the health of California and Oregon's coastal communities. This unanticipated balkanization of the relationships of the sub-basins to the mainstem Klamath River has rendered these TMDL products, to a major degree, ineffectual in the recovery of the beneficial uses of the Klamath River, including the restoration of its vital salmon resource.

The Lost River TMDL is perhaps the worst example of this institutional TMDL balkanization. The Lost River is a major contributor of nutrients to the mainstem Klamath River. Nutrients from the Lost River and other upstream sources have been implicated in the production of cyanobacteria and other noxious algae species which play a direct role in some of the most destructive of the Klamath River's fish diseases which cause chronically high yearly losses of juvenile chinook salmon in the mainstem Klamath River.

Unless one knew otherwise the Lost River TMDL could have been prepared for a Great Basin watershed. There is no mention of this sub-basin's historic and continuing connection with the Klamath River. The document lacks any substantive historical context. It does not explain that the Lost River/Lower Klamath Lake sub-basin was once a vast wetlands area that was drained and diked through direct federal action and government incentives for settlers. It does not identify Lost River as a contributor of pollution to the Klamath River. PCFFA believes that recovery of the Klamath River salmon resource, a beneficial use of Klamath River water of incalculable value, cannot be accomplished unless and until the Lost River's pollution contribution to the Klamath River is stanched (sic).

Response: The TMDL document has been modified to better present the coordinated effort for TMDL development being conducted for the Klamath and Lost Rivers (see response to comment B-6) regarding. Please also see response to comment C-3

regarding the connection between Lost and Klamath Rivers; and, comment D-3 regarding history of the Lost River Basin.

Comment E-5: *TMDL implementation measures for Klamath River recovery must be strengthened*. The measures identified in EPA's draft Lost River TMDL will not staunch Lost River pollution of the Klamath River. The implementation measures proposed in the TMDL must be significantly strengthened.

Response: As described in response to comment B-6, the Lost River inputs to the Klamath River via Klamath Straits Drain, using modeling analyses conducted under the joint technical work, will be addressed in the Oregon TMDLs for the Klamath River. Implementation measures will be developed under ODEQ for Oregon efforts, and North Coast Regional Board for California efforts. Please see comment A-1 regarding the North Coast Regional Board's responsibility for developing an implementation plan for the Lost River in California, and response to comment G-5 regarding the ODEQ implementation process.

Comment E-6: *Klamath Straits drain contributes half the nutrient load of Klamath River at Keno Reservoir, but Lost River pollution also enters Klamath River via winter pumping into the above-Keno reach*. This Lost River TMDL covers the California portion of the Lost River, Lower Klamath Lake (LKL) and the Klamath Straits Drain (Figure1), which empties into the Klamath River, at the Keno Reservoir near the California-Oregon stateline. The Klamath Straits Drain is thought to contribute as much as half the entire nutrient load of the Klamath River at Keno Reservoir (Mayer, 2001). The Drain is not, however, the only path by which Lost River pollution finds its way to the Klamath River. Deas and Vaughn (2006) point out that winter flows are pumped into the above-Keno reach of the Klamath River in winter from the Lost River. Nutrient loads in winter flows are largely entrained particulate organic matter, but these accumulate and add to biological oxygen demand and nutrient pollution cycles as the river warms in summer. The Lost River TMDL fails to note these profound connections between Lost River and Keno Reservoir/Klamath River water quality.

Response: As described in response to comment B-6, the Lost River contributions to the Klamath River, presenting modeling analyses conducted as part of the joint technical work, will be addressed in the Oregon TMDLs for the Klamath River. Please also see the response to comment C-5 regarding winter flow diversions from the Lost River to the Klamath River via the Lost River Diversion Channel.

Comment E-7: *The TMDL does not demonstrate that reducing nutrients by 50 percent will be sufficient to recover water quality in Keno Reservoir, an element of the Klamath TMDL; Keno may lack oxygen for five weeks a year; lower Klamath cannot be restored if an upper reach is dead*. The draft TMDL sets a goal of reducing nutrients by 50 percent but it does not demonstrate that that amount will be a sufficient to allow recovery of water quality in Keno Reservoir, an element of the current, parallel Klamath TMDL development process. Deas and Vaughn (2006) report that the Keno reservoir may lack of oxygen for up to five weeks a year. PCFFA does not think that the lower Klamath River can be restored while leaving an upper reach essentially dead. If the lower four Klamath Hydroelectric Project dams are removed, but the

Keno Reservoir and Lost River pollution problems are not remedied, then nutrient spiraling from these heavily polluted upstream segments could continue to cause acute nutrient pollution and fish mortalities downstream.

Response: Please see response to comment B-6 "Coordinated Effort" regarding the coordination of TMDLs for the Klamath and Lost Rivers.

Comment E-8: *Model fails to include parameters for blue-green algae nitrogen fixing; incremental approach to nutrient reduction fails to recognize need to restore ecosystem function*. One highly significant flaw in the Lost River TMDL is that it uses a model that fails to include parameters for blue-green algae nitrogen fixing that add substantially to nutrient problems in the Lost River, LKL and the Straits Drain. The TMDL takes an incremental approach to nutrient reduction under the theory that reducing nutrient emissions alone will solve the pollution problem. The document fails to recognize the need to restore ecosystem function and natural filtration capacity through the re-establishment of riparian areas, lakes, and wetlands. As a consequence, nitrogen fixing blue-green algae will continue to flourish and offset any decreases in nutrients won through the implementation of best management practices on the land.

Response: Please see responses to comment C-8 regarding the modeling framework being built around the dominant (non-nitrogen fixing) aquatic plant species present in the river. In the event that sufficient, quantitative data are collected and indicate otherwise, the model may be updated in the future to explicitly consider nitrogen fixing blue-green algae. The TMDL document (Chapter 7) includes recommendations to evaluate implementation options for improving ecosystem function.

Comment E-9: *Sucker are listed under ESA; Lost River water quality limits recovery, conditions are often lethal. Size and depth of Tule Lake and Lower Klamath Lake should be increased. Suckers are not adequately addressed in implementation or monitoring sections.* The Lost River sucker (Deltistes luxatus) and shortnose sucker (Chasmistes brevirostris) have been listed as endangered species under the federal Endangered Species Act since 1988. There is no evidence their populations are improving. The U.S. Fish and Wildlife Service (USFWS, 1993) indicated that water quality in the Lost River was limiting sucker recovery and that lethal conditions for suckers often prevail. The National Research Council's (2004) *Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery* recommends expanding the size and depth of Tule Lake and LKL to restore water quality and sucker species. The Lost River TMDL invokes the suckers in the Problem Statement, but they are never mentioned thereafter, neither in the recommendations nor monitoring section, and these fish species are not likely to be assisted through the implementation approach set out in the draft TMDL.

Response: Please see response to comment A-14.

Comment E-10: *TMDL should not assign a lead role in implementation to the Klamath Basin Water Users*. The most galling flaw of the Lost River TMDL is that it assigns a lead role in implementation to the Klamath Basin Water Users. Placing a special interest group in charge of a government water pollution control program is absurd.

Response: EPA agrees that development of a working group with a neutral third party leader and equal participation by all stakeholders will improve the outcome in the implementation process. We have modified Topic #2 in Table 7-1 of Chapter 7 to suggest that development of a working group could be facilitated by a neutral third party, or state and federal water quality agencies. However, the North Coast Regional Board is responsible for implementing these TMDLs (see comment A-1), and will determine the best parties to effect the implementation, as well as the most appropriate measures (regulatory, voluntary, or a combination) when they develop the implementation measure.

Comment E-11: *Lost River TMDL should be eliminated and completed with Klamath TMDL, otherwise implementation should be developed together*. PCFFA joins the Klamath Basin Tribes in recommending that the technical Lost River TMDL be abandoned and that it be completed in conjunction with the Klamath TMDL. If this course is for some reason impractical then implementation of the Lost River TMDL must be joined to that for the Klamath TMDL because the water quality problems of the two are inextricably linked.

Response: Please see response to comment to B-6 regarding the coordinated technical development for the Lost River and Klamath River TMDLs. EPA agrees that coordinated implementation of both the Lost River and Klamath River TMDLs would be beneficial.

Comment E-12: *Lost River, Lower Klamath Lake and Klamath Straits Drain water quality and hydrology.* The Lost River was historically a sink that ended in Tule Lake before development of the federal government's Klamath Reclamation Project was commenced in1905. Its headwaters are in the Modoc Plateau of northeastern California, it meanders north into Oregon, then turns south and empties into Tule Lake in California. Since about 1940, the Lost River has been artificially connected to the Lower Klamath Lake Refuge by pumping through Sheepy Ridge, which separates the two. NRC (2004) noted that 92 percent of the original open water and wetlands of Tule Lake and LKL have been drained for agriculture (Figure 2). This is a huge loss of the filtration capacity that kept biological systems in balance before disturbance.

Lost River/Tule Lake: The Klamath River used to spill into the Lost River basin during high flow events and cause Tule Lake to swell to upwards of 110,000 acres. The Modoc Tribe and others in the region feasted on the huge Lost River and short-nosed sucker fish that thrived in Tule Lake and ran upstream to spawn in the spring. Their harvest was estimated at 100,000 pounds annually (NRC, 2004). USFWS (2001) characterized the lower Lost River today (Figure 3) as follows: "The Lost River can perhaps be best characterized as an irrigation water conveyance, rather than a river. Flows are completely regulated, it has been channelized in one 6 mile reach, its riparian habitats and adjacent wetlands are highly modified, and it receives significant discharges from agricultural drains and sewage effluent. The active floodplain is no longer functioning except in very high water conditions."

NRC (2004) noted that Tule Sump 1A and 1B now comprise less than 15,000 acres and recommended expansion of open water and wetland areas on the public land now leased to

farmers (the "Lease Lands"). The Tule Sump has some of the worst water quality in the Upper Klamath Basin (see below). That water is shipped from Pump D through Sheepy Ridge where it feeds the LKL Refuge or flows into the Straits Drain.

Lower Klamath Lake (LKL): NRC (2004) describe LKL before settlement as larger than Upper Klamath Lake, with flat bottom steam-driven paddle-wheel boats able to cross 50 miles of open water from Klamath Falls to the railroad to the south. LKL was fed by high spring flows from the Klamath River, then drained the same water back to the river in summer and fall. This created a highly productive ecosystem for suckers (NRC, 2004) and the marshes and peat bogs within LKL doubtless trapped huge quantities of nutrients. Today the LKL Refuge is 4,700 acres (Figure 4), not all of which is flooded each year because less water is available to the refuges in drier years. LKL lacks sufficient depth and ecosystem function to support suckers today, but NRC (2004) thought they could be restored there, if the lake bed were re-flooded.

The Klamath Straits Drain: The Klamath Straits Drain carries largely agricultural return water from the Tule Sump and the farmlands adjacent to it on the former Lower Klamath Lake lakebed. Water circulation patterns do not necessarily provide for substantial retention time on the LKL national wildlife refuge, consequently Straits Drain water is often high in nutrients. Mayer (2001) estimated that the Drain contributed between 25-75 percent of the nitrogen and up to 50 percent of the phosphorous entering Keno Reservoir. The drain itself is a straight canal with no riparian area, adjoining wetlands, nor biological filtration capacity (Figure 5). Watershed Sciences (2002) noted that algae blooms often covered the Straits Drain near its convergence with the Klamath River, although it has not yet been determined whether the blooms there are nitrogen fixing blue-green algae.

Response: The TMDL document has been expanded to include additional information regarding the history of the Lost River basin (see comment D-3), the connection established between the Lost and Klamath basins (see comment C-3) and status of sucker in the Lost River (See comment A-14).

Comment E-13: *Blue-Green algae problem; Upper Klamath Lake*. The Upper Klamath Lake TMDL (ODEQ, 2002) recognizes that a huge amount of nutrients are fixed into the waters of the lake by *Aphanezoemenon flos-aquae*. This blue green algae species, which was not found in early biological samples of the lake, now comprises 99 percent of its phytoplankton flora and increases nitrogen in waters that pass through it by 3.5 times (ODEQ, 2002).

The prevailing theory concerning this algae species' rise to dominance is that marsh reclamation for agriculture, and the diking off of wetlands surrounding Upper Klamath Lake, so changed the acid-base balance they opened this special niche A. flos-aquae. The historically mildly acidic natural conditions were thought to have kept it in check. The bulk of the water for the Klamath Project is drawn from the outlet of Upper Klamath Lake (Figure 6) through the A-Canal and ultimately flows into the Lost River. There is a substantial inoculant of A. flos aquae within this water. Eilers (2005) found this species to be prevalent where the Lost River flows into Tule Sump. Neither the Lost River nor Tule Sump has adjacent marginal wetlands any longer with which to maintain ecosystem function nor that historic acid-base balance to stem A. flos-aquae blooms. The Klamath Straits Drain is, likewise, a canal with no wetlands or nutrient stripping

function. Consequently, reduction of nitrogen accomplished by the Lost River TMDL will likely be offset by blue green algae nitrogen fixing because of the TMDLs failure to recognize the role that expanded Lost River sub-basin wetland and lake restoration would play in nutrient control.

Response: Please see responses to comment C-8 regarding the modeling framework being built around the dominant (non-nitrogen fixing) aquatic plant species present in the river.

Comment E-14: *Lost River TMDL will not recover listed sucker species*. The Lost River TMDL acknowledges the at-risk status of the Lost River and shortnose suckers and the need to recover them in the Problem Statement section: "The habitat-related beneficial uses are of greatest concern in these TMDLs because of the potential adverse impact of depressed dissolved oxygen and elevated pH levels on native fish in the Klamath basin including the Shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*). Both sucker species were listed as endangered under the federal Endangered Species Act in 1988, and water quality degradation resulting from algal blooms was identified as a probable major factor in their declines (Williams 1988)." There is, however, absolutely no further discussion of sucker recovery in the implementation and monitoring sections of the document. NRC (2004) points out that there is no measurable recovery of ESA listed sucker species despite considerable expenditure of funds by USFWS, U.S. Bureau of Reclamation and other entities to improve habitat conditions.

USFWS (1993) noted that "It can be concluded that water quality in the Lost River limits habitat for all fish, including Lost River suckers and Short-nose suckers, and can be seasonally lethal." Shively et al. (2001) pointed out that suckers and all other native fish declined in the lower Lost River between 1973 and 1999, while invasive, pollution tolerant species had taken their place. Even hardy test fish in live cages downstream of agricultural drains died during Shively's studies when no one water quality or chemical constituent that would cause such effects was measurable. The Lost River here has become a toxic stew.

Response: Please see the response to comment A-14. In addition, Chapter 7 of the TMDL document has been expanded to recommend additional monitoring (Table 7-1, topic 8) and coordination of efforts with USFWS.

Comment E-15: *Tule Sump 1A and 1B are not homogeneous; "donut hole" in Tule Sump 1A supports suckers; suckers in Lower Klamath Lake, Klamath Straits Drain*. The section of the Lost River covered in this TMDL is a very short channelized reach that extends just above the Tule Sump (Figure 3). Water quality in this reach cannot be restored without re-establishing riparian wetlands in the reach by securing easements on adjacent farmlands. Dams in this reach impede adult sucker spawning migration. There is a recognized, remnant adult population of suckers that resides in the southern portion of Tule Sump 1A (USFWS, 1993; 2001; NRC, 2004) that need upstream access to spawning habitat, but the Lost River TMDL ignores this issue.

The Lost River TMDL model assumes that Tule Sump 1A and 1B are homogeneous water bodies and that agricultural drains in this area have the same ambient water quality as the incoming Lost River and the sumps. In fact, Shively et al.. (2001) found drainage from adjacent

Lease Lands to be of much worse quality than Lost River or Tule Sump. Furthermore, there is a major and well recognized anomaly in water quality in the southern end of Tule Sump 1A called the "donut hole" (Figure 8). The donut hole has elevated turbidity, apparently caused by suckers swimming in circles, that inhibits photosynthesis. This has changed the substrate to a smooth clay bottom with low biological oxygen demand (BOD), which helps prevent lethal dissolved oxygen sags. Decreasing photosynthesis also prevents D.O., pH and dissolved ammonia from reaching levels that are lethal to suckers.

The NRC (2004) report recommended expanding wetlands surrounding the Tule Sump by flooding public lands and reconnecting marshes and wetlands. Such measures would not only expand sucker habitat, but would assist significantly with nutrient absorption and create a more natural pH balance. The U.S. EPA provides no such direction in the Lost River TMDL and fails to even mention expanding Tule Lake, ignoring all opportunity for sucker recovery.

Lower Klamath Lake continued to support sucker species into the 1950's, despite the continual draining its former bed for farming since the 1930's. NRC (2004) said that LKL should be re-flooded to allow suckers to once again flourish there. The Lost River TMDL says that some of the LKL Refuge lands should be used as experimental wetlands for nutrient filtration, but sets no target for re-establishing sucker species in their former habitat.

The Klamath Straits Drain was once the essential hydrologic connection between the Klamath River and LKL. Today it is a seasonal and toxic agricultural drain. If sufficient wetland expansion in Tule Lake and LKL were to proceed and the Klamath Straits Drain had some connected wetlands along its edges, then suckers could live in all of these habitats. Until sucker populations in the Lost River expand, the beneficial uses of water in the subbasin shall not have been restored. The USEPA's failure to address sucker recovery is a profound failing in the TMDL. The draft TMDL clearly does not meet the standards of the Clean Water Act that requires that this critical beneficial use be restored.

Response: Insufficient data were available to fully represent heterogeneities in the area of Tule Sumps 1A and 1B. However, the TMDL document text has been amended to include additional information from Danosky and Kaffka (2002) on the water quality of agricultural drain waters and sump water. Additional monitoring to better characterize water quality in various areas including those mentioned (Lost River, drainage, and areas of the sumps including the described "donut hole") is proposed in the implementation recommendations included in Chapter 7. Implementing the TMDLs developed for the Lost River is the responsibility of the North Coast Regional Board; and the North Coast Regional Board has indicated that wetland treatment will be considered in the development of implementation plans (Please see comments A-3 and A-10).

Regarding the sections of the Lost River addressed in this TMDL document, the impairments and the Beneficial Uses (BUs) addressed by this TMDL effort, please see responses to comments B-2 (303(d) listing and areas addressed in TMDLs), B-4 (BUs for HSAs), and B-6 (Coordinated efforts for TMDLs). Regarding sucker habitat and

management of the Tule Lake and Lower Klamath NWRs, please refer to comment A-14 and comment F-2, respectively.

Comment E-16: *Wetlands as water filters*. Mayer (2005) found that water that had been cycled through LKL Refuge wetlands had a substantially reduced nutrient load. Wetlands have been completely eliminated from the riparian zone of the Lost River and Tule Lake and LKL have been reduced in area by 92 percent. The only way to restore Lost River water quality and to sufficiently filter water pollutants is to expand wetland systems with sufficient connectivity to re-establish ecosystem function. The failure of the TMDL to recognize this essential technical fact reflects the weakness of the draft document.

Response: Implementation recommendations (Chapter 7 of TMDL document) include the recommendation to pursue opportunities to expand/create wetlands as a means for achieving nutrient load reductions. Implementing the TMDLs developed for the Lost River are the responsibility of the North Coast Regional Board, and the North Coast Regional Board has indicated that wetland treatment will be considered in the development of implementation plans (see comments A-1 and A-3). Please see responses to comment A-10 (Refuges for treatment of nutrient-rich waters) and comment F-2 regarding management of the Tule Lake and Lower Klamath Refuges and lease lands.

Comment E-17: *Groundwater*. The old saying "the solution to pollution is dilution" has a corollary in the lower Lost River; reduction of inflows of good quality water certainly is not the solution. USGS (2005) has noted a severe drop in the water table due to ground water pumping within the Lost River TMDL study area. The worst problem of the problems was noted in the Tule Lake area. Diminished flows from springs means reduced volumes of cold, clean water with adverse impacts on both water quality and fish health. It is unknown to what precise degree decreased flows might also reduce unknown sucker refugia. USGS (2005) characterized ground water extraction levels prompted by the 2001 Klamath Project irrigation curtailments as unsustainable. The Lost River TMDL fails to even touch this significant problem.

Response: A discussion of this issue has been added to Chapter 7 for the state's consideration in their implementation plan development. Please also see response to comment G-2 regarding the North Coast Regional Board's responsibilities to consider state laws as part of developing an implementation plan to address these TMDLs.

Comment Set F: Lisa Brown, WaterWatch

Comment F-1: *The TMDL fails to acknowledge or address the Lost River's water quality impact on the Klamath River*. The TMDL fails to identify and analyze Lost River as a very significant contributor of pollution to the Klamath River. Given the important resource issues of the Klamath River and its fish, this connection must be fully evaluated. The TMDL's failure to analyze the Lost River water quality problems in relation to the fish kills, toxic algae and other problems of the Klamath River is a huge shortfall that must be remedied.

Response: TMDLs for Klamath River addressing nutrients, temperature, and organic matter / low dissolved oxygen are currently under development by the state of California. Sources of these pollutants that may be contributed by tributaries, including the Lost River, will be addressed in those TMDLs. Please see comment B-6 regarding coordinated efforts for TMDLs in the Klamath basin.

Comment F-2: *EPA should evaluate water quality benefits of phasing out lease land farming on Tule Lake and Lower Klamath National Wildlife Refuges*. We request that the EPA evaluate the water quality benefits that would accrue from phasing out lease land farming on Tule Lake National Wildlife Refuge (NWR) and Lower Klamath NWR. Once the crown jewels of America's National Wildlife Refuge system, Tule Lake NWR and Lower Klamath NWR now are heavily used for private, commercial agriculture to the significant detriment of wetlands and water quality

Twenty-two thousand acres of Tule Lake and Lower Klamath NWRs are currently farmed commercially. This acreage could provide greatly needed wetland habitat, reduce irrigation season water demand, store water, and improve water quality if managed for refuge purposes. Mayer (2005) found that water that had been cycled through Lower Klamath Refuge wetlands had a substantially reduced nutrient load. The Klamath Straits Drain runs through 7,000 acres of national wildlife refuge land on Lower Klamath NWR, which land is leased for commercial farming. This land would be ideal to return to wetlands for treatment of polluted Klamath Straits Drain return flow and improved wildlife habitat.

Further, phasing out lease land farming is consistent with the recommendation of the National Research Council which recommends expanding the size and depth of Tule Lake and Lower Klamath Lake to restore water quality and sucker species. (*Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery* (2004)). Eliminating lease land farming from the refuges would give refuge managers the flexibility to better manage for increased water quality.

The problem with Walking Wetlands, even if expanded, is that the location of the wetlands changes every year or two, making it difficult to put them in the infrastructure necessary to use the wetlands for treatment or to develop them on a permanent basis where they are most needed. As indicated above, what is really needed is the phasing out of commercial farming on the refuges and permanent restoration of refuge wetlands. In the interim, expansion of the Walking Wetlands program should be analyzed for any short term water quality benefits it can achieve.

EPA's failure to evaluate the water quality benefits that would result from phasing out the lease land farming and restoring the wetlands of Tule Lake and Lower Klamath NWRs undermines its analysis.

Response: Several comments suggested that different water management approaches, especially management of the Refuges, could benefit water quality and the protection of designated uses in the Lost River and Klamath River system. EPA believes that much of this discussion is beyond the scope of the promulgation of the TMDLs themselves.

As noted in the response to comment A-1, developing and finalizing approaches for implementation of TMDLs is within the purview of the North Coast Regional Board. EPA believes that many of the comments regarding implementation options have merit for discussion, but believes that the North Coast Regional Board processes will be the appropriate forum for that discussion and possible action.

In addition, EPA notes that the operation of the Lost River system is governed by a myriad of statutory and regulatory programs at both the state and federal level. For example, operation of the Tule Lake and Lower Klamath National Wildlife Refuges is constrained by the federal Kuchel Act,[4] as well as by the many other state and federal mandates.[5] Any implementation plan finalized by the North Coast Regional Board will have to consider these multiple mandates.

EPA understands that there are a number of other forums currently reviewing water management options in the Lost River basin. These include the USFWS's development of Refuge Management Plans for Lower Klamath and Tule Lake Refuges, which began in the fall of 2008. The management plans for these refuges will be for a 15 year period, and are expected to address various parameters including water quality and flooding plans using available water. EPA encourages commenters to participate in those other management forums, as well as in the North Coast Regional Board process of developing implementation plans for the Lost River TMDL.

EPA has expanded its discussion of the management of the water system in the Lost River system in the TMDL document. This discussion is for informational purposes only, and is not intended to be definitive or conclusive, nor is it intended to constitute a legal position on any of the multiple legal disputes ongoing within the Klamath River basin.

4 Under the Kuchel Act, Tule Lake and Lower Klamath Refuge "shall be administered by the Secretary of the Interior for the major purpose of waterfowl management, but with full consideration to optimum agricultural use that is consistent therewith...."

5 See, for example, a discussion of legal constraints affecting the Refuges in a July 25, 1995 opinion from the Office of the Solicitor of the U.S. Department of the Interior. This opinion identified the highest water delivery priority as water required for Endangered Species Act purposes, followed by tribal water rights, then USBR Klamath Project agricultural irrigation rights, and fourth the Refuges.

Comment F-3: *EPA should evaluate opportunities for water quality improvement through restoration of ecosystem function*. Although the reduction of nutrient emissions is central in attaining decreased pollution loads, this approach alone is insufficient in fully solving the pollution problem. Despite being an effective and achievable method for reducing pollution in river systems, restoring proper ecosystem function and natural filtration mechanisms is not adequately evaluated in the current TMDL. The EPA should fully evaluate restoration of riparian areas, lakes, and wetlands as tools for improving water quality in the Lost River Basin.

Response: Please see response to comment F-2 Management of the NWR and Lease Lands, as well as comments E-16 (wetlands for treatment of waters), A-1 (North Coast Regional Board responsible for implementation plan development) and A-10 (North Coast Regional Board consideration of the Refuges for wetlands treatment of waters).

Comment F-4: *Implement better irrigation practices and protect the water left instream*. WaterWatch supports requiring more efficient irrigation practices as part of addressing the severe water quality problems of the Lost River. Drip irrigation, sprinkler irrigation and other flood irrigation alternatives that promote increased in-stream water flow need to be implemented. Flood irrigation should be reduced and replaced with a more efficient form of irrigation with the saved water protected instream to aid in water quality recovery.

Response: Comment noted. Please see response to comment F-2 regarding water management, and refer to Topic #4 in Table 7-1, Chapter 7 of the TMDL document.

Comment F-5: *Limit increased groundwater use in the basin and monitor impacts*. The Lost River has many springs that supply it with clean cold water. These springs are vulnerable to increased groundwater development in the Lost River Basin. The loss of these springs or diminishment in flow from these springs should be prohibited. The impacts of groundwater development on the springs should be closely monitored.

Response: Please see response to comment E-17.

Comment F-6: *Analyze the benefits of a voluntary irrigation demand reduction program*. The basin is severely over-appropriated and the return flow from agriculture is polluted. Reducing irrigation in the basin through a voluntary demand reduction program would improve water quality, streamflow, and help bring water use in the basin back to what is sustainable.

Response: Please see response to comment F-4, above. Additionally, topic #4 in Table 7-1, Chapter 7, includes language regarding the evaluation of a voluntary irrigation demand reduction program.

Comment F-7: *Implement comprehensive water use measurement*. We strongly encourage the implementation of comprehensive water use measurement to measure the effects of the TMDL's identified water conservation efforts. All water users drawing from surface and ground water should be required to measure the amount of water they are diverting. The measurement of ground water use, in addition to surface water use, is critical given the well-documented hydraulic connection between ground water and surface water in the Lost River Basin. See, for

example, U.S. Geological Survey, Scientific Investigations Report 2007-5050, Ground-Water Hydrology of the Upper Klamath Basin, Oregon and California, prepared in cooperation with the Oregon Water Resources Department; State of Oregon, Ground Water Report No. 41, Ground Water in the Eastern Lost River Sub-Basin, Langell, Yonna, Swan Lake, and Poe Valleys of Southeastern Klamath County, Oregon (2004).

Response: A discussion of surface and groundwater use has been added to Chapter 7, and topic #9 (Monitoring) in Table 7-1 includes groundwater monitoring for consideration by the North Coast Regional Board.

Comment F-8: *TMDL completely fails to address Sucker Recovery*. The TMDL mentions suckers but completely fails to address the connection between the Lost River water quality and sucker recovery in the implementation and monitoring sections of the document. Suckers are a beneficial use of the Lost River and Lost River water quality problems are sometimes so severe that they are fatal for suckers. The US Fish and Wildlife Service has pointed out that "[i]t can be concluded that water quality in the Lost River limits habitat for all fish, including Lost River suckers and Short-nose suckers, and can be seasonally lethal." U.S. Fish and Wildlife Service, Lost River (Deltistes Luxatus) and Shortnose (Chasmistes brevirostris) Sucker Recovery Plan, Portland, OR (1993).

Response: Please see response to comments A-14 and E-15.

Comment F-9: *EPA should not place a special interest group in a leadership role*. EPA places Klamath Water Users Association in a lead role in implementing the Lost River TMDL. Specifically, the TMDL assigns the responsibility of "[f]acilitat[ing] development of a working group to refine implementation recommendations contained in this document" and "produc[ing] a plan with clear milestones and outcomes. At p. 46. Assigning such responsibilities to a special interest group is not an appropriate way to implement a government water pollution control program.

Response: Please refer to comment E-10 regarding assigning a lead role in implementation to a neutral third party.

Comment F-10: *The Technical Lost River TMDL should be abandoned and instead completed in conjunction with the Klamath TMDL*. WaterWatch of Oregon joins the Klamath Basin Tribes and Pacific Coast Federation of Fishermen's Associations in recommending that the technical Lost River TMDL be abandoned and instead completed in conjunction with the Klamath TMDL. Due to the Straits Drain and other connections between the Lost River and Klamath River, and the importance of the Klamath River system for salmon and other fish, these two systems must be evaluated together.

Response: Please see response to comment to B-6 and E-11 regarding the coordinated technical development for the Lost River and Klamath River TMDLs.

Comment Set G - Regina Chichizola, Klamath Riverkeeper

Comment G-1: *Implementation Plan needed.* We applaud the effort of the EPA to deal with the agriculture related pollution in the Klamath's most polluted tributary. We, however, are extremely concerned that this TMDL is not enforceable and does not include an implementation plan. The Lost River is the largest source of polluted water to the Klamath River, and if this TMDL is ineffective, then the Lost River TMDL must be addressed as part of the larger Klamath River TMDL. The management of the Lower Klamath Refuge and the Klamath Straits Drain play a large role in water quality pollution in the mainstem Klamath River and the Klamath River plays a large part in the health of the Lost River.

Response: EPA agrees that implementation of TMDLs is crucial. Implementation of Lost River TMDLs in California is the responsibility of the North Coast Regional Board, which will be developing implementation and monitoring measures for these TMDLs. Please also see responses to: comment to B-6 regarding the coordinated technical development for the Lost River and Klamath River TMDLs; comments A-1 (*North Coast Regional Board responsibility for implementation*); and comment A-3 (*North Coast Regional Board will use implementation recommendations to develop implementation plan*).

Comment G-2: *Lower Klamath Refuge and Klamath Straits Drain Role in Klamath River and Lost River health; TMDL violates Porter Cologne, CEQA, ESA; TMDL will not result in attainment of beneficial uses*. We believe the Lost River and Lower Klamath and Tule Lake Refuges TMDL violates the Porter Cologne Act, California's most important law pertaining to clean water, along with CEQA, does not take into account state and national Endangered Species Acts, and it will not result in the obtainment of the identified beneficial uses in the Lost River, Klamath refuges, and the Klamath River. We also believe that due to the lack of information regarding, and appropriate permitting of, point source pollution, this TMDL violates the Clean Water Act.

Response: Federal TMDLs are not subject to CEQA, Porter Cologne, or the state Endangered Species Act. As indicated in the North Coast Regional Board comments, the state will be responsible for implementing the Lost River TMDLs. Further, EPA fully expects that the North Coast Regional Board will meet its obligation to consider state laws, including California's Porter Cologne Act, CEQA, and the California ESA, prior to incorporating the Lost River TMDLs and a state Implementation Plan into the North Coast Basin Plan. (Please see comments A-1, A-3 and A-8.)

Please see response to comment A-14 regarding the federal ESA. Discussion in the TMDL document has been expanded to include additional information on the endangered Lost River and shortnose suckers.

Regarding the coordinated development of this and other Klamath Basin TMDLs, please see response to comment B-6. These TMDLs addresses the impaired segments of the Lower Lost River in California and TMDL allocations are calculated to meet water quality standards applicable to those segments. EPA recognizes the many

interconnections between the Lost and Klamath Rivers, as well as the contribution of nutrient loadings from the Lost River to the Klamath River. Please see comment A-8 by the North Coast Regional Board, which indicates that if necessary, modifications to EPA's TMDLs for Lost River may be made to account for new information, such as that resulting from the completion of the Oregon and California Klamath River TMDLs.

With regard to point source permitting, please see response to comment G-3.

Comment G-3: *Violates CWA due to unpermitted NPDES sources, including CAFOs.* We are also concerned that this TMDL may grant a conditional waiver to polluters that by law should currently have enforceable NPDES permits. Polluted water transfers and Concentrated Animal Feeding Operations (CAFOs) in the Klamath watershed have long operated without permits, a fact that has greatly added to the dire situation in the Klamath River.

Response: Nothing in this TMDL document constitutes an explicit nor an implicit waiver of any permit requirements. The purpose of the TMDLs is to identify sources of pollutants, quantify the level of total loading necessary to attain water quality standards, and allocate that loading among the sources. If a source is defined as a point source requiring a National Pollutant Discharge Elimination System (NPDES) permit, that source will receive a waste load allocation. Otherwise, the source will be treated as a nonpoint source and will receive a load allocation. See 40 CFR Section 130.2(g) and (h).

EPA Region 9 has consulted with the North Coast Regional Board, and neither EPA nor the North Coast Regional Board are aware of any consolidated animal feedlot operations (CAFOs) in the California portion of the Lost River watershed. The North Coast Regional Board is reportedly initiating a dairy permit program that will include gathering Region-wide information on all dairies and feeding operations; that process is expected to identify any facilities that meet the CAFO criteria but are not under NPDES permits.

Water transfer facilities are generally exempted from the requirement to secure an NPDES permit. See NPDES Water Transfers Rule, Final Rule, 73 F.R. 33697 (June 13, 2008)(amending 40 CFR Section 122.3).

Comment G-4: *Water supply concerns.* Another concern for us is the lack of planning regarding the water supply in the Lost River and Klamath Refuges. It is entirely necessary to address lack of water in a TMDL due to the lack of water contributing to the polluted state of the waterway. Please reference the Shasta River TMDL for discussions on why addressing water supply is appropriate in a TMDL. There is no questioning the fact that the draining of the Klamath wetlands, and the managing the Lost River as a series of reservoirs rather than as a river, are two of the main factors leading to the 303d list listings of this waterway.

Response: Provision of water supply for the Refuges involves water rights issues, which are beyond the scope of this TMDL. Please see response to comment F-2 regarding land and water management of the Tule Lake and Lower Klamath NWR's.

Comment G-5: *Lack of coordination between EPA, ODEQ and Regional Boards.* The failure of the EPA, ODEQ and Regional Boards in making sure the Lost River meets its designated beneficial uses is unacceptable. We are also concerned that the EPA and the state of Oregon are not coordinating well with one another regarding this TMDL. Furthermore, the EPA continues to allow Oregon to ignore all Clean Water laws pertaining to agriculture and continues to allow the Department of Agriculture to completely ignore all the environmental laws pertaining to clean water and beneficial uses in the Klamath Basin in their permitting processes. The fact that the voluntary program that the Department of Agriculture uses to regulate agriculture under the Clean Water Act is not working should show the EPA that TMDLs and following the Clean Water Act need to be enforceable. The EPA should consider exercising its authority to revoke the ability of the state of Oregon to administer the Clean Water Act in the Klamath Basin due to years of neglect unless ODEQ and ODA get serious about following the law on the Lost River.

Response: EPA Regions 9 and 10, California, and Oregon are coordinating closely on developing TMDLs to meet applicable water quality standards, which includes the protection of designated beneficial uses, in each of the various areas of the Klamath basin. Please see response to comment B-6 (coordinated effort for inter-related Klamath and Lost River TMDLs).

ODEQ is developing the TMDLs for the Oregon portions of the Lost River. The ODEQ web page provides information on their TMDL Program and Implementation Guidelines, including the Rules that guide TMDL implementation: http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_042.html Issues regarding Oregon's administration of the Clean Water Act are not within the scope of these TMDLs.

Comment G-6: *Request that the TMDL be implemented.* We hereby request that this TMDL implementation plan be implemented via the North Coast Regional Water Board and the funds to implement this TMDL, and related WDRs and NPDES permits, be given to the Regional Board. If this cannot be done than this TMDL should be incorporated in the Klamath River TMDL, as the Lost River is a major Klamath River water quality problem.

Response: Please see comment A-1 regarding the North Coast Regional Board's acknowledgement of responsibility for developing and carrying out an implementation plan for the Lost River TMDLs. EPA fully expects the North Coast Regional Board will implement these TMDLs. EPA Region 9 provides funding to the North Coast Regional Board to carry out its responsibilities with regard to Clean Water Act obligations, including developing and implementing TMDLs. We will continue to provide this funding to the state, consistent with the level of funding provided to EPA by Congress.

Comment G-7: *Influence of dams and diversions, refuges managed for agriculture, agriculture-related pollutant loads, Oregon DEQ beneficial uses lost*. The Lost River watershed is managed as two watersheds due to the numerous dams and diversions that dry up the middle of the watershed. Similarly, the Klamath Refuges are the only Wildlife Refuges in the United States that are managed for agriculture rather then wildlife. Within the refuges, former lakebeds have been drained until they are but a fraction of their former size. NRC (2004) noted that 92% of the

open water and wetlands that comprised Tule Lake and LKL had been drained for agricultural activities. The drying up of lake beds and the loss of filtrating capability and the huge agriculture related loads at the Tule Lake and Lower Klamath refuges have been blamed by many for a large portion of water quality problems in the Klamath River.

Intensive fertilizer and chemical use goes unchecked within these refuges despite the constant polluted run-off into lakes or sumps, and despite the practice of flooding farm lands for water storage which distributes the fertilizers and chemicals to the refuges. Many of the beneficial uses of the river and refuges have been completely written-off by the Oregon Department of Environmental Quality. The most shocking example of this is the writing-off of the Lost River as habitat for the endangered Lost River Sucker.

USFWS (2001) characterized the lower Lost River today (Figure 3) as follows:

> "The Lost River can perhaps be best characterized as an irrigation water conveyance, rather than a river. Flows are completely regulated, it has been channelized in one 6 mile reach, its riparian habitats and adjacent wetlands are highly modified, and it receives significant discharges from agricultural drains and sewage effluent. The active floodplain is no longer functioning except in very high water conditions."

Response: These TMDLs address issues related to dissolved oxygen, high pH, and excessive nutrients in the Lost River in California. As discussed in EPA's implementation recommendations, changes in nutrient management and agricultural practices may be necessary in order to achieve the allocations in the TMDLs. Please refer to comment A-1 regarding North Coast Regional Board's responsibility for implementation, and comment A-10 regarding the North Coast Regional Board's consideration of wetland treatments.

Much of this comment raises issues beyond the scope of these TMDLs. Please see response to comments F-2 regarding the management of the Refuges, comment G-5 regarding ODEQs TMDLs and implementation for the Oregon portions of the Lost River; and comment A-14 regarding suckers.

Comment G-8: *Listing inconsistency between Oregon and California.* The Lost River meanders over the California and Oregon border several times before being pumped into the Lower Klamath Refuge and the Klamath River through the Klamath Straits Drain. Within both Oregon and California it is highly polluted and virtually unregulated. While both states are consistently ignoring pollution, environmental laws and the effects of water transfers in this watershed, there are also many inconsistencies. For example, the Lost River is listed for nutrients, dissolved oxygen, and temperature in the California section of the Lost River, which is directly below the Oregon portion. In Oregon, directly above the Lower Lost for which this TMDL is being formulated, the Lost River is listed for dissolved oxygen (DO), chlorophyll, pH, ammonia toxicity, and bacteria. However within this TMDL it is stated that bacteria is not a concern for the California section of the watershed suggesting the Lost River loses the bacteria as it flows over the border ignoring the many CAFOs on the California side and a consistently leaking Waster Water Treatment plant in the town of Tulelake. There is no scientific reason the bacteria issue on the Klamath is not addressed in this TMDL.

"The introduction of untreated animal or human waste increases the possibility of bacterial contamination of water, increasing the risk of infection to swimmers." Oregon Department of Environmental Quality website, http://www.deq.state.or.us/lab/wqm/wqindex/klamath3.htm.

High concentrations of fecal coliform were detected at these monitoring sites. http://www.deq.state.or.us/lab/wqm/wqindex/klamath3.htm under Lost River subbasin

Response: EPA Region 9 is developing TMDLs to address impairments in the California portion of the Lost River (pH and nutrients), and ODEQ is developing TMDLs to address section 303(d) listings for the Oregon portion of the Lost River (dissolved oxygen, pH, ammonia toxicity, and temperature in Lost River tributaries only). The California portion of the Lost River was delisted for temperature in the 2006 update to the state's section 303(d) list. Nonetheless, despite the variation in the listed parameters, the agencies undertook a comprehensive analysis for the full Lost River watershed with focus on meeting applicable water quality standards on both sides of the border. Please see responses to comment B-2 regarding the section 303(d) listings and areas addressed by these TMDLs, comment B-6 regarding coordinated efforts to address the Lost and Klamath Rivers in TMDLs, and comment G-5 regarding ODEQs TMDLs and implementation processes.

The Draft TMDL document incorrectly stated that the Lost River was included in the state of Oregon's section 303(d) list for bacteria. The text has been corrected. Bacteria is not currently included on either California's or Oregon's section 303(d) lists for these waters, and it is not being addressed in the TMDLs being developed for Lost River by EPA or ODEQ. Evidence of bacteria impairments in these waters (e.g., monitoring data) should be provided to the states for consideration as part of their section 303(d) listing cycles.

Comment G-9: *Lost River is temperature impaired, which affects other pollutants.* The 2002 303d list identifies the Lost River as being impaired for temperature, yet this TMDL does not deal with temperature at all, even though the Lost River's temperature issues lead to some of the most impactful pollution. We have been told that the Lost River was de-listed for temperature, which seems inconceivable considering all the facts that support the listing. The fact is that the Lower Lost River *is* temperature impaired, and the temperature issues in the Lost River are contributing to other pollution problems. For instance, the North Coast Water Quality Control Board (NCWQCB), in their Lost River Water Quality report acknowledges, "The percent of this toxic un-ionized form of the total ammonia-nitrogen present increases with increased water temperature and/or increased pH level. During the summer period, the lower Lost River system exhibits both high water temperature and very high pH. The high pH results partly from photosynthetic activity from the highly eutrophic conditions. Recent U.S. Department of Interior studies (MacCoy, 1994) of the Klamath Project area found high levels of un-ionized ammonia in the lower Lost River system." Regional Board staff discussions with U.S. Fish and Wildlife officials (Schwartzbach S. personal communication, 1994) involved in the study found that they concluded that un-ionized ammonia might be the most consistently toxic material for aquatic life in this area."

Response: The TMDL document notes that in preparation for developing these TMDLs, EPA and the state of California reviewed the record supporting the prior listings for the Lost River system. The state of California determined that available data and information do not support the continued listing of Upper Lost River (upstream from Malone Dam) for nutrients or temperature, nor of Lower Lost River (downstream of Anderson Rose Dam below the Oregon border) for temperature. Thus, the state of California removed the section 303(d) listings for the Upper Lost River and for Lower Lost River temperature in October 2006. The temperature delisting was based on staff review of temperature data, which indicated that temperatures did not exceed the water quality objective for the most sensitive beneficial uses, which are the endangered sucker species.

Comment G-10: *Look at groundwater/surface water interactions.* USGS (2005) has noted a severe drop in the water table due to ground water pumping within the Lost River TMDL study area with the worst problems manifest in the Tule Lake area. USGS (2005) characterized ground water extraction levels after the 2001 ESA cut off of water to the Klamath Project, as unsustainable. Klamath Riverkeeper would like the EPA to look at the interaction of the Ground Water and the surface water in this TMDL.

Response: Please see response to comment E-17 regarding groundwater flow.

Comment G-11: *NPDES permits needed for water transfers.* Interbasin transfers of polluted water and CAFOs are both activities that need to be enforced under an NPDES permit. However in the Lost River and the Lower Klamath and Tule Lake Refuges no permits occur for these activities despite significant impacts to the environment. There are least two and possibly three polluted water transfers between the Lost River and the Klamath River, all of which are transferring extremely polluted water. These are: (1) the transfer of water from the Lost River divisions Dam, which controls downstream flow on the Lost River by diverting excess water to the Klamath River through the Lost River Diversion Channel, and (2) Pumping plant D, which regulated the water level in the Tule Lake Sump (which should be a wildlife refuge), by pumping.

Response: Please see response to comment G-3 regarding water transfer facilities and CAFOs as related to the California Lost River. Additionally, the Lost River diversion dams referenced in the comment will be addressed in the TMDL document being developed by ODEQ for the Oregon portion of the Lost River.

Comment G-12: *Klamath Straits Drain poor water quality, not addressed in document, affects Lost River and Klamath River; unpermitted water transfer into Klamath River; connection with Keno Reservoir.* Water quality in the [Klamath Straits] drain, when it is flowing, is similar to water quality in the Lost River. When flow is stopped, the drain resembles a stagnant pond, complete with fluorescent green patches of mold floating on mats of decaying algae. When flow is resumed, this water is directed towards either Lower Klamath Lake, or Klamath River, adding to poor water quality conditions at either end. Like the Lost River, water quality is impacted by high concentrations of total phosphates, biochemical oxygen demand, total solids, and ammonia and nitrate nitrogen throughout the year. Eutrophication is active in the spring and summer, when

water temperatures are high, as evidenced by very low dissolved oxygen concentration and high pH values. As in the Lost River, the conditions in the Klamath Strait Drain are right for the production of significant amounts of un-ionized ammonia. OWQI scores for this site was generally very poor throughout the year (Table 1). Klamath Strait Drain carries the dubious distinction of worst seasonal average OWQI score of all DEQ Laboratory-monitored sites in Oregon." (ODEQ website, http://www.deq.state.or.us/lab/wqm/wqindex/klamath3.htm)

The Klamath Straits Drain, while allegedly addressed in this document, is in reality barely mentioned. This waterway is listed as having very poor water quality and is known to be the most polluted water body in the State of Oregon. The Drain also releases an unpermitted polluted water transfer into the Klamath and has been linked to at least one fish kill in the Klamath River. The straits is noticeably darker then the Klamath or Lost River. This water transfer from the Lost River causes noticeable flow increases in the Klamath River at the outfall, and in summer months releases a large amount of low quality water is added into the Klamath River.

The Straits Drain is recognized as contributing as much as half of the nutrient load of Keno Reservoir (Mayer, 2001), but it is not the only avenue for nutrient contributions from the Lost River. Deas and Vaughn (2007) point out that winter flows are pumped into the same reach of the Klamath River in winter from the Lost River. Nutrient loads in winter flows are largely entrained particulate organic matter, but these accumulate and add to biological oxygen demand and nutrient pollution cycles as the river warms in summer. The Lost River TMDL fails to note these profound connections between Lost River and Keno Reservoir water quality. Deas and Vaughn (2007) report that the Keno reservoir my exhibit complete lack of oxygen for up to five weeks a year.

Response: EPA recognizes the many interconnections between the Lost and Klamath Rivers, including the contribution of nutrient loadings from the Lost River to the Klamath River. These connections are represented in the modeling framework. In this TMDL document, the portion of the Klamath Straits Drain in California is addressed as an impaired segment and TMDL allocations are calculated for inputs to this segment to attain California water quality standards in that segment. TMDLs for the Oregon portion of the Klamath Straits Drain are being developed by ODEQ as part of the Oregon Lost River TMDLs document, and water quality will be evaluated using the applicable State of Oregon criteria. Similarly, inputs to the Klamath River (e.g., from Klamath Straits Drain) will be addressed in ODEQ's TMDLs for the Klamath River.

Again, the technical analyses for these TMDLs were conducted as part of a collaborative effort by EPA Regions 9 and 10, and the states of Oregon and California, and Klamath Straits Drain is represented in that modeling framework. Thus, TMDLs being developed by Oregon for the Lost River and Klamath River will identify reductions needed from the California portion of the KSD in order to meet the provisions of those TMDLs. Please see comment A-8 by the North Coast Regional Board which indicates that, if necessary, modifications to EPA's TMDLs for Lost River may be made to account for new information, such as that resulting from the completion of the Oregon and California Klamath River TMDLs.

Regarding the statement that the KSD is an unpermitted water transfer, please see response to comment G-3.

Comment G-13: *Water diversions into the Lost River should be treated as a point source; Lake Ewauna contributes nitrogen to Keno Reservoir; water for the Klamath Project flows through the A-Canal into the Lost River.* "High nitrogen and BOD loads come principally from water diversions into the Lost River system, agriculture return flows, and cycling of nutrients and organic matter from water body bottom sediments" (TMDL). Water diversions into the Lost River is a point source and need to be treated as such for this TMDL.

Mayer (2001) estimated that it contributed between 25-75% of nitrogen and up to 50% of phosphorous to Keno Reservoir. The drain itself is a straight canal with no riparian area, adjoined wetlands or biological filtration capacity. Watershed Sciences (2002) noted that algae blooms often covered the Straits Drain near its convergence with the Klamath River, although it is not known whether blooms there are nitrogen fixing blue-green algae.

The bulk of the water for the Klamath Project is drawn from the outlet of Upper Klamath Lake (Figure 6) through the A-Canal and ultimately flows into the Lost River. There is substantial inoculum of *A. flos aquae* within these waters and Eilers (2005) found this species to be prevalent where the Lost River flows into Tule Sump. At the end of the irrigation season, generally during October, the canal (meaning the A canal) is into the Lost River and the Lost River Diversion Channel. (Biological Opinion) 2001

Response: This Lost River TMDL document addresses the California portion of the Lost River. Additionally, the sources identified in this comment are represented as inputs to the modeling framework for these TMDLs. Please see response to comment G-12 regarding the relationship between these TMDLs and those being prepared by ODEQ evaluating the Oregon segments of the Lost River and Klamath River. Additionally, see comment C-8 regarding the presence of nitrogen fixing bacteria.

Regarding the statement that water transfers are unpermitted, please refer to response to comment G-3.

Comment G-14: *Lack of water is a source and form of pollution that must be addressed to improve water quality; Upper/Lower Lost River are separate basins; permit status of diversions; water flow needs of sucker.* In the Shasta River TMDL it was found that the lack of significant flow was a major contributor to the pollution in the Shasta River, and cold instream flows from springs where recommended as part of the TMDL. In the Lost River flow issues are even more severe. The Lost River is actually managed as two basins because there is no hydraulic connection between the Upper Lost and the Lower Lost due to dams and diversions. Are all these diversions permitted? Are these permits enforced? What are the needs of suckers as far as stream flow? Dealing with the lack of water in the Lost River is key to improving water quality.

Response: Reference to the connection between the upper and lower Lost River, and to dams and diversion effecting hydraulic connection, apply to the Oregon segments of the Lost River and were represented in the modeling and technical analysis. Please

also see responses to comment F-2 regarding management of the NWRs and comment A-14 regarding suckers.

Comment G-15: *Phosphorous loading; connection to Klamath River/Lake.* Klamath Riverkeeper is very curious why phosphorous loading in the Lost River system is not a concern to the agency given that much of the summer water in the Lower Lost system comes from the Klamath River and Klamath Lake.

Response: As part of the technical analysis (modeling) for the Lost River TMDLs, a sensitivity analysis was performed wherein contributions of both nitrogen and phosphorous in the Lost River Basin were reduced. The analysis suggested that the system was not sensitive to the phosphorous reductions. Therefore, the Lost River TMDL modeling (developed prior to the Klamath River TMDL modeling due to consent decree scheduling) was developed to address nitrogen loading. EPA acknowledges that the Klamath River TMDLs will result in allocations to the Lost River, and these allocations may address phosphorus in addition to nitrogen. As indicated by the North Coast Regional Board (see comment A-9), the Lost River TMDLs can be recalculated to address information from these other TMDLs, as needed.

Comment G-16: *Minimum riparian buffers should be included in this TMDL.* The California State Wetlands and Stream Protection Policy is in preparation, and this TMDL should incorporate actions that will be part of that plan. This TMDL should also put a specific buffer on the Lost River, associated wetlands, and streams as a way to reduce loads. This buffer should be put into place based on land use and should apply to grazing, fertilizer use, dairies, chemical use, road building, streamside logging and heavy machinery use. A buffer of at least 50 and up to 100 feet should be considered for these activities.

Response: Please see response to comment F-2 regarding management of the National Wildlife Refuges and Lease Lands. A discussion of ecosystem/restoration issues was added to Chapter 7 as per the response to comments F-3, E-8, and E-16.

Comment G-17: *TMDL needs to include restoration of the Tule Lake and Lower Klamath Refuges***.** Restorations of wetlands have been identified as one of the major steps for restoring water quality, and sucker populations, throughout the basin. Without adding water to the Lost River watershed, and expanding wetlands, this TMDL may be an exercise in futility, and a waste of taxpayers' money.

Response: Please see response to comment F-2 regarding management of the NWR and Lease Lands, and comment E-16 regarding wetlands to improve ecosystem function.

Comment G-18: *Dams and diversions should be regulated in this TMDL because they are the main water quality issue***.** The mainstem of the Lost River is highly channelized and includes several impoundments (Harpold Dam, Wilson Diversion Dam, Anderson Rose Dam, Tule Lake Refuge, and Lower Klamath Refuge) to facilitate water storage, diversions, and agriculture

return flow. It is a highly modified environmental system driven largely by irrigation operations and, as a consequence, the system exhibits tremendous biological activity.

Although this sentiment acknowledged that the main water quality issue in the Lost River system is diversions and dams, no discussion on how to remedy these issues takes place in this TMDL and there are no proposed actions that will deal with the main impairment identified in these documents. These passages indicate that the Lost River will never achieve its beneficial uses or water quality standards if dams and diversions are not addressed.

Furthermore, due to the fact that the Bureau of Reclamation manages the water in the Lost River without considering the ecological impacts, the Oregon Department of Agriculture has concluded that water management is causing bank erosion in the Lost River, which is in turn leading to increased nutrients. Within the Klamath River main-stem reservoir nutrient cycling studies have shown the Iron Gate and Copco dams are causing extreme violations of water quality standards. The results of these studies are particularly disturbing in relations to water temperature, dissolved oxygen and algal production. Many of the TMDLs created in California, including on the Shasta River, mandate Reservoir management plans and monitoring. None of these rivers have as many impoundments as the Lost River.

Another notable study in the early 80's demonstrated that Upper Klamath Lake in a high year had far less algal blooms then in a year that in which it was drawn down. A comparison of low water level and high water level nutrients demonstrated that there was a difference of 138 ug/L of total phosphorous levels. EPA Clean Lakes Study (Klamath Consulting 1983)

The following recommendation from the Fish and Wildlife Service's Lost River and Shortnose Sucker Recovery Plan demonstrates the need to flow and dam management: "343. Improve spawning habitat in Lost River below Anderson Dam. Tule Lake is part of the Lost River system, but access to most of the river is restricted by the Anderson Rose Dam. Spawning activity was observed just below this dam in 1991. Spawning habitat is reportedly poor in most of the Lost River below Anderson Rose Dam. This habitat improvement should include improving substrate conditions and requiring minimum flows during the spawning period. A similar task is also recommended in the Water Users Plan." (Recovery Plan: Lost River Sucker and shortnose Sucker, US Fish and Wildlife, April 1993)

Response: Please see response to comment G-14 regarding dams and diversion in the Oregon portion of the Lost River. In addition, we expect that Oregon's future TMDLs for the Lost River in Oregon will address the water quality impairments in those reaches of the river.

Regarding management of water in the Lost River and the NWRs, please see the response to comment F-2. Contributions of nutrients from bank erosion are inherently included in model boundary conditions; however bank erosion was not explicitly represented in the Lost River model.

The USFWS is currently initiating a process to revise the Sucker Recovery Plan; please see response to comment A-14 for additional information.

Comment G-19: *Comprehensive water management could deal with many of the issues in the TMDL.* Management of water resources in the Upper Klamath Lake area has had to change significantly in recent years. Efforts to save water and improve water quality through increased efficiency, purchase of land and water rights, restoring wetlands, fencing cows out of creeks, and restoring tributaries have occurred to improve conditions for sucker species in this area. A similar comprehensive approach needs to occur in the entire Lost River system, and this TMDL should be used as a mechanism to start initiating changes. Water saving methods such as: ending all flood irrigation, only watering in the evenings and mornings, lining ditches, or even better putting irrigation lines in the ditches to end evaporation, seepage, and flooding, growing crops that require less water, and preventing overwatering could change the tailwater regime in the Klamath Basin. By saving water, rather then relying on polluted tailwater for flow, we could insure that cool, clean water is entering the Lost River system. Areas with cool water imputs, such as Bonanza Springs, should be prioritized for water savings. While improving, and fazing out ditches would significantly help with water saving, it would also help with the issue of algal growth in ditches which is a major contributor or poor water quality, especially when aquatic herbicides are used to control growth.

Response: EPA encourages an integrated approach to managing resources in the Basin that includes TMDL implementation.

Comment G-20: *Storm Water Management Plan.* The EPA should consider storm water management in this TMDL.

Response: Storm water was not represented as a separate and explicit source in the model (i.e., just storm water by itself), but it was explicitly represented in the model through the boundary conditions. Additionally, because boundaries were targeted for reduction through the designation of allocations, storm water management was considered.

Comment G-21: *Wetlands and refuge management.* "Disturbing marshlands aerates the soil, increases its pH, increases phosphate releases from peat, and increases aerobic decomposition of nitrogen." We are pleased to see that the EPA is looking at ways to utilize the refuges in the Lower Klamath and Lower Lost River to improve water quality and provide for habitat. We however are concerned that all the suggestions on refuge management are couched in words like explore or investigate. It is well know that the draining of wetlands in the Klamath and Lost River systems have led to a significant nutrient issue. These refuges are public lands that are meant for wildlife, and represent the best possibilities for wetland restoration in the Klamath Basin. The Fish and Wildlife Service is not exempt from the Clean Water Act and therefore must take action to restore the refuges and improve water quality.

In the next few years all the refuges of the Klamath Basin will be creating management plans. If the EPA is strong in its recommendations and ensures that Fish and Wildlife will address their water quality loads, these actions have a good chance of making it into the management plans. The TMDL should also recommend the end of chemical fertilizer use on the refuges and should initiate a buy-out program so the refuge's wetlands can be expanded. Initial Bureau of Reclamation studies at the Barn Ranch are showing that the constant flooding and subsequent

drying of wetlands is not improving water quality. Permanent wetlands have far more water quality benefits and should be encouraged in this TMDL. By taking public lands out of production, loads could be meet with a lesser burden to private lands. Klamath Riverkeeper feels this is a better alternative then walking wetlands.

However, if this TMDL does not make sure that higher quality water goes into the Tule Lake and Lower Klamath Refuges it may not be possible to meet the beneficial uses of the wetlands. This makes regulation of agriculture and point source pollution, such as the polluted water transfer of the Klamath River into the Lost River, especially important.

"The hypereutrophic conditions of Upper Klamath Lake impacts Tule Lake, lower portions of the Lost River, the Link River, Lake Ewauna, and the Klamath River downstream. Tule Lake is hypereutrophic and water quality is marginal for suckers during summer months. In June and July of 1992, the pH in most of Tule Lake was frequently above 9.5 (Reclamation unpublished data). Most of the inflow during these months is irrigation return water that has been reused up to 6 times and is of poor water quality for fish with high pH and low dissolved oxygen levels (USGS 1991)" Recovery Plan: Lost River Sucker and Shortnose Sucker, US Fish and Wildlife, April 1993

Response: Please see response to comment F-2 regarding management of the NWR and Lease Lands. The North Coast Regional Board, with responsibility for implementation of the Lost River TMDLs (see comment A-1), has indicated that Tule Lake and Lower Klamath refuges may play a role in wetland treatment of nutrient rich waters (see comment A-10).

Please also refer to response to comment G-3 regarding regulation of water transfers.

Comment G-22: *Sucker populations must be recovered and protected; TMDL violates CWA, ESA; suckers never mentioned in recommendations or monitoring sections.* The Lost River TMDL is completely inadequate at protecting the beneficial uses of the Lost River. This is especially true in respect to fisheries, such as the Lost River and Shortnose Suckers, which are an endangered species protected under the Endangered Species Act. In the Recovery Plan for the Lost River and Shortnose Suckers the acknowledged reason for the decline of sucker species is the following:

"The damming of rivers, dredging and draining of marshes, water diversions, hybridizations, competition, and predation by exotic species, insularization of habitat, and water quality problems associated with timber harvest, removal of riparian vegetation, livestock grazing and agricultural practices".

Directly after this paragraph the recovery plan goes on to recommend the three most important actions needed to recovery sucker populations. Action 3 pertains to this TMDL and reads:

"Improve Lost River and shortnose sucker habitat conditions through rehabilitating riparian areas and improving land management practices in the watershed, developing and achieving water quality and quality goals, and improving fish passage, spawning habitat, and other habitat

conditions. Directly under this passage the recovery plan deals with when these suckers should be recovered, the paragraph reads "**Date of recovery** The interim objectives of establishing refugia populations for each unique stock should be accomplished by 1012[sic] if research and recovery efforts are coordinated and water quality criteria have been met"

Because the EPA and North Coast Regional Water Quality Control Bard have virtually ignored the fishery beneficial uses thus far in the Lost River basin, and the Oregon Department of Environmental Quality has written-off the Lost River Suckers, as a beneficial use to be protected, the recovery plan for this endangered species may never be fully accomplished or implemented. Throughout the recovery plan, Fish and Wildlife Service point to water quality as the top cause of the demise of the Lost River sucker. However unlike the Klamath Lake area where numerous studies and restoration projects have been initiated, the Lost River has been virtually ignored and written-off by management agencies. To ignore the needs of an endangered species, which is also a beneficial use of a waterway is arbitrary and capricious.

"The reduction of open water has caused a decline in sucker species in Tule Lake and it has caused Lower Klamath Lake to lose its ability to support these fish altogether. The loss of wetlands has also created a major negative impact on water quality due to the loss of the natural filtering capacity they provided for these historic aquatic ecosystems. According to the National Research Council (NRC, 2004)

"Suspected watershed factors that may have contributed to the decline of the lost River and shortnose sucker habitat include the degradation and loss of wetlands and riparian habitat that helped maintain water quality and spawning habitat, and degraded water quality (hyper-eutrophication and increased sedimentation) in lakes and streams due to land management practices. Holistic resource management practices could approve overall watershed conditions. The survival and recovery of these species depends on the ability to rehabilitate watershed conditions to improve water quality throughout their current range." Recovery Plan for the Lost River Sucker and Shortnose Sucker, U.S Dept. of Interior, April 1993

"Select sites for refugal populations of both suckers in the Lost River Basin. Potential refugia should have good water quality, adequate habitat and water depth during drought periods, and be within the Clear Lake or Lost River Basin" Recovery Plan for the Lost River Sucker and Shortnose Sucker, U.S Dept. of Interior, April 1993

The Lost River and Short Nose suckers, both of which are endangered species once filled the Lost River basin. Harvest was estimated at 100,000 pounds annually (NRC, 2004).

Currently historical habitat for suckerfish throughout the Lost River has been written-off due to agriculture impacts and lack of water. To designate a watershed as a sacrifice zone for agriculture, then to pump polluted water into other habitat for endangered species (such as the Keno reservoir and main-stem Klamath River), is a violation of environmental laws such as the Endangered Species Act and Clean Water Act.

"Also, when high ammonia concentrations coincide with high pH and temperature, the fraction of ammonia nitrogen that is un-ionized increases. Un-ionized ammonia is toxic to fish as it

interferes with the ability of the fish gills to function. This interference occurs simultaneously with nitrogenous oxygen demand, meaning less oxygen is available to the fish during a critical period when they need more oxygen to compensate for the impairment to the respiratory system. The conditions necessary for the formation of un-ionized ammonia are present during the summer when water temperatures are warm, dissolved oxygen concentrations fluctuate between very low and very high, and pH values are high." DEQ website http://www.deq.state.or.us/lab/wqm/wqindex/klamath3.htm under Lost River.

U.S. Fish and Wildlife Service (USFWS, 1993) indicated that water quality in the Lost River was limiting sucker recovery and that lethal conditions for suckers often prevail. The National Research Council's (2004) *Endangered and Threatened Fishes in the Klamath River Basin: Causes of Decline and Strategies for Recovery* recommends expanding the size and depth of Tule Lake and LKL to restore water quality and sucker species. The Lost River TMDL invokes the suckers in the Problem Statement, but they are never mentioned in recommendations or monitoring sections and are not likely to be recovered with the current implementation approach.

The habitat-related beneficial uses are of greatest concern in these TMDLs because of the potential adverse impact of depressed dissolved oxygen and elevated pH levels on native fish in the Klamath basin including the Shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Deltistes luxatus*). Both sucker species were listed as endangered under the federal Endangered Species Act in 1988, and water quality degradation resulting from algal blooms was identified as a probable major factor in their declines (Williams 1988). There is a recognized, remnant adult population of suckers that resides in the southern portion of Tule Sump 1A (USFWS, 1993; 2001; NRC, 2004) that need upstream access to spawning habitat. However these suckers are in such a small polluted area that they can only survive though creating oxygen by swimming circles.

NRC (2004) points out that there is no measurable recovery of ESA listed sucker species despite considerable expenditure of funds by USFWS, U.S. Bureau of Reclamation and other entities to improve habitat conditions. USFWS (1993) noted, "It can be concluded that water quality in the Lost River limits habitat for all fish, including Lost River suckers and Short-nose suckers, and can be seasonally lethal." Shively et al. (2001) pointed out that suckers and all other native fish declined in the lower Lost River between 1973 and 1999, while invasive, pollution tolerant species had replaced them. Even hardy test fish in live cages downstream of agricultural drains died during their studies when no one water quality or chemical constituent that would cause such effects was measurable. The Lost River here has become a toxic stew.
NRC (2004) describe LKL before white settlement as larger than Upper Klamath Lake, with flat bottom steam driven paddle-wheel boats able to cross 50 miles of open water from Klamath Falls to railroad lines in the south. LKL was fed by high spring flows from the Klamath River, then cycled the same water in a reverse direction back in summer and fall. This created a highly productive ecosystem for suckers (NRC, 2004) and the marshes and peat bogs within LKL likely trapped huge quantities of nutrients.

Today the LKL Refuge is 4,700 acres (Figure 4), not all of which is flooded in all years because less water is allocated to the refuges in dry years. LKL lacks sufficient depth and ecosystem

function to support suckers today, but NRC (2004) thought they could be restored there, if the lakebed were reflooded.

Response: These TMDLs have been developed to meet water quality standards addressing the identified beneficial uses, which include sucker fisheries (see response to comment B-4). Please see responses to comment A-14 regarding suckers in Lost River ESA consultations, and the USFWS development of a recovery plan, and comment F-2 regarding management and water delivery within the Refuges.

Additionally, the North Coast Regional Board is responsible for developing implementation plans to address these TMDLs (see comment A-1), and will consider the implementation recommendations presented with these TMDLs as well as other measures (see comment A-3).

Comment G-23: *Grazing impacts.* "The principal nonpoint source discharge influences in this part of the watershed are from rangeland cattle grazing" Lost River Watershed Area in California (Tributary to the Klamath River) Water Quality Characteristics NCRWQCB 1995

The impacts of ranching and grazing, and appropriate ways to deal with these issues are not thoroughly discussed in this TMDL, but are a major cause of the impairment for which the waterway is listed. If there is an implementation plan grazing and ranching should be addressed.

Response: A discussion of options for implementation, including the impacts of grazing, has been added to Chapter 7 for consideration by the North Coast Regional Board for the development of an implementation plan.

Comment G-24: *Nutrient listing - contribution to WQ; Oregon & CA should make point sources get NPDES permits for water transfers and CAFOs; flow regulations, non-partial agency in charge, benchmarks and standards, and implementation plan not implemented by polluters.* Sources of nutrients include wastewater treatment facility discharge and faulty septic systems, runoff from animal husbandry, fertilizer application, urban sources, and erosion. ODEQ website http://www.deq.state.or.us/lab/wqm/wqindex/klamath3.htm

"Total ammonia-nitrogen (NH3-N) can be found in the Lost River system likely from several primary sources. It can be originating from Klamath River water diverted in the Lost River below Upper Klamath Lake during the irrigation season, or can be formed by the chemical and bacterial decomposition or breakdown of animal wastes or natural organic material, from resuspended bottom sediments, or it can be introduced as a crop fertilizer. Without knowledge for a study designed specifically to identify nutrient sources in a specific areas, the shallow eutrophic waters of Tule Lake and Lower Klamath Lake receiving imported and agricultural drain water make for an endless scenario of possibilities as to the primary origins of a given NH3-N concentration found at any one particular point in time." " Lost River Watershed Area in California (Tributary to the Klamath River) Water Quality Characteristics NCRWQCB 1995

In reality if the states of Oregon and California did not treat the Lost River, as an agricultural free-for-all and actually made point source polluters get NPDES permits with numerical standard

for both polluted water transfers and CAFO's, then a better understanding of sources would be obtained. However the state of Oregon already makes all their plans and regulation relating to agriculture voluntary and puts it into the hands of the Department of Agriculture. By making this TMDL voluntary, and by not providing an implementation plan, flow regulations, and by not placing a non-partial agency in charge of this TMDL, the EPA is guaranteeing that the TMDL will not be successful and that the Lost River will never meet water quality standards. This TMDL needs to be changed to include actual benchmarks and standards, along with an implementation plan that is not implemented by the polluters themselves.

Response: With regard to water transfers and CAFOs, please see response to comment G-3. Regarding implementation of these TMDLs, please see comment A-1. Regarding Oregon implementation processes, please see responses to comments G-5 and G-18.

Comment G-25: *Laws/policies not acknowledged (ESA, CWA, Porter-cologne, CEQA, CTR)*. Many nationwide and state policies pertaining to this TMDL are not acknowledged in this document. This TMDL should be considering laws such as, the Endangered Species Act, Porter Cologne, the Clean Water Act, CEQA, and California's Toxics Rule. Many actions for the Endangered Species Listing of the suckerfish, such as cleaning up water quality and dealing with lack of water, could be addressed in this document, but are not. Furthermore the lack of implementation, including for point sources, are a violation of Porter Cologne.

Response: Please see response to comment G-2 regarding consideration of state laws. Additionally, the California Toxics Rule sets water quality standards for specific toxic pollutants, none of which are the subject of these TMDLs. See also comment A-1, which addresses implementation of these TMDLs.

Comment G-26: *Lack of background science to support model and reductions*. The Lost River TMDL's most critical flaw is that it relies on a model that fails to include parameters for blue green algae nitrogen fixing that can add substantially to nutrient problems in the Lost River, LKL and the Straits Drain. The TMDL takes an incremental approach to nutrient reduction under the theory that reducing nutrient emissions will solve the pollution problem. The document fails to recognize the need to restore ecosystem function and associated natural filtration capacity through re-establishment of riparian areas, lakes and wetlands. As a consequence, nitrogen fixing blue-green algae will likely flourish and offset any decreases in nutrients through implementation of best management practices.

Response: Please see responses to comments C-8 regarding nitrogen-fixing bacteria in the California segments of the Lost River, comment E-16 regarding wetlands to improve ecosystem function, and comment A-10 regarding the North Coast Regional Board's consideration of wetlands treatment.

Comment G-27: *Klamath Water Users Association should not be responsible for implementation*. Klamath Riverkeeper is opposed to letting the Klamath Water Users Association write their own implementation plan, and believes that this is a violation of CEQA and Porter Cologne, as the Water Users do not have the expertise to write such a plan. Furthermore, despite

the fact that the Water Users can be a large help in generating "buy in" to the TMDL, it is undisputed that they represent the interests of the farmers first and foremost. Therefore, while we fully support the Water Users involvement with this process, and even support them getting financial support for working with individual farmers and irrigation districts, we believe it essential that a party with an interest in water quality, such as the Regional Water Quality Control Board, should be responsible for the implementation plan and monitoring and permit oversight.

Response: Please see response to comment E-10 regarding a working group led by a neutral third party.

Comment Set H: Earl Danosky, Tulelake Irrigation District

Comment H-1: Tulelake Irrigation District supports the comments from Klamath Water Users Association.

Response: Please see responses to comment Set B (Klamath Water Users Association comments).

Comment Set J: Maggie McKaig

Comment J-1: *Need to preserve/improve the Klamath River and tributaries, including the Lost, for salmon and Native Peoples, and must include an implementation plan.* I am writing to stress the importance and necessity of preserving and improving the health of the Klamath River, for the health and sustainability of both the Salmon as well as the Native Peoples--whose culture, spiritual beliefs, and preservation depend on the annual Salmon runs. Obviously this means making sure that all of the tributaries that feed into the Klamath must be clean…. which even more obviously means that the Lower Lost River TMDL, which is being prepared by the EPA, must include an implementation plan to clean up its contamination sources, and the ability to enforce the recommendations.

Response: EPA agrees that improving conditions in the Lost River is necessary to achieve water quality standards, including support of the salmon fishery and sustainability of Native American cultural beneficial uses. The North Coast Regional Board has responsibility for developing and carrying out an implementation plan (see comment A-1), per the delegated responsibilities under the Clean Water Act in the state of California. Please see also response to comments A-3 regarding development of an implementation plan, and K-32 regarding tribal involvement in that process.

Comment Set K: Kevin McKernan, Yurok Tribe

Comment K-1: *The TMDL inadequately characterizes water quality problems and requires substantial revisions to improve water quality*. The Public Draft Lost TMDL requires substantial revisions which are outlined below. Many of the legitimate requests made by the Work Group (Yurok Tribe, 2006) for improvements to earlier versions have been ignored. As a result, the TMDL does not characterize water quality problems adequately and will not likely contribute to water quality remediation.

Response: EPA has made revisions to the document to more clearly communicate the analysis and results. Please see also responses to comments A-1 regarding the adequacy of the data and modeling and A-2 regarding recommendations for clarifying the analyses and adding the model report as Appendix A.

Comment K-2: *Failure to use existing data on water pollution and sucker recovery*. The TMDL shows a near-total failure to use existing water quality field data from the Lower Lost River sub-basin. The revised Lost TMDL ignores extensive recent, relevant research conducted in the Lost River sub-basin, bearing on water pollution abatement and sucker recovery. There is little evidence (e.g. citations or a literature review) to indicate that this substantial body of scientific knowledge was put to any use whatsoever in developing the TMDL, other than to configure and calibrate the water quality model.

Response: EPA believes the best available data were used to develop the model which was used for the development of the TMDLs (see comment A-2), and further discussion of the model has been added to the text of the TMDL document. Additionally, please see comment A-8 regarding potential future modifications to these TMDLs by the North Coast Regional Board to account for new information, and comment A-14 regarding suckers in Lost River.

Comment K-3: *Models are inadequate and do not incorporate important processes*. The model used for supporting the technical TMDL suffers from unmet assumptions and uncertainties, and does not incorporate important processes such as nitrogen fixation by blue-green algae, ground water influence, and natural riverine denitrification. The water bodies included in the Lost TMDL are so profoundly altered from their original state that the use of models to analyze existing patterns in data provide little insight into what needs to be done to restore ecological function.

Response: The goal of this modeling study was to develop a predictive model based on the best available data to support TMDL development. The model has provided a reasonable representation of the physical, chemical, and biological processes occurring in the Lost River. For example, the model has reproduced the observed low dissolved oxygen concentrations (both in magnitude and timing) and trends for other parameters. The model was also developed based on the well-tested CE-QUAL-W2 modeling framework, which has been proven to successfully represent interaction between external forces and internal dynamics. Modeling assumptions and limitations are specified in the TMDL document and the model configuration report, added to the TMDL document as Appendix A.

Like any modeling study, the quantity and quality of available data along with the complexity/regularity of the system are the major factors that determine the quality of the modeling results. When data are not available, assumptions have to be made for system characterization. The only way to replace these assumptions is to collect more accurate and comprehensive data. We certainly encourage the collection of, and subsequent use of, additional field data to better define the specific contributions and functions of the processes noted in the comment. Collection of additional data is included in the implementation recommendations presented in Chapter 7. Regarding nitrogen fixing bacteria, please see response to comment C-8.

Comment K-4: *Ecosystem function*. The TMDL fails to recognize the need to restore ecosystem function to reduce nutrient pollution (i.e. restoring riparian areas, wetlands and lakes).

Response: Please see responses to comments F-2 (management of the NWRs), F-3 (restoration of ecosystem functions), E-16 (wetlands to enhance ecosystem function), as well as A-1 and A-10 (North Coast Regional Board responsibility for implementation, and considering wetland treatment).

Comment K-5: *Steps to restore sucker species*. The TMDL fails to define the steps needed to restore ESA-listed sucker species; there are no clear monitoring recommendations, and there is no timetable with which to assure that the numbers of this species are recovered.

Response: Please see responses to comment A-14 (suckers in Lost River).

Comment K-6: *Appropriate reductions considering Lost River and Klamath Straits Drain Impacts on Keno Reservoir and Klamath River downstream*. The TMDL fails to recognize the present impacts of Lost River water quality on the Klamath River downstream and to determine the amount by which nutrients from the Lost River and Straits Drain must be reduced to prevent degradation of Klamath River water quality. The Lost TMDL recommends 50% reductions in dissolved nitrogen and organic matter loads yet it does not consider whether that reduction is what is necessary to prevent violation of water quality standards at the Klamath Straits Drain's terminus in Keno Reservoir, nor in downstream reaches of the Klamath River. The Lost River's substantial contribution to Klamath River nutrient loads confounds water quality restoration and Pacific salmon recovery in the Klamath River.

Response: EPA recognizes the many interconnections between the Lost and Klamath Rivers, and we recognize the contribution of nutrient loadings from the Lost River to the Klamath River. The results from the Klamath River analyses (including load allocations for Klamath Straits Drain) will be incorporated into Oregon's TMDLs for the Klamath River. Regarding the coordinated development of this and other Klamath Basin TMDLs, please see response to comments B-6 and G-12.

Comment K-7: *Special interest group should not lead implementation*. The TMDL should not include selection of a special interest group, the Klamath Basin Water Users, to serve as technical lead for Lost TMDL implementation while, at the same time, ignoring totally the existence and legitimate interest of the Tribes and other river protection-interested communities.

Response: Please see response to comment E-10 regarding a working group led by a neutral third party.

Comment K-8: *NCRWQCB should implement the TMDL*. In its current condition the Lost TMDL is so seriously flawed we would request that the U.S. EPA approve it only for the limited purpose of returning responsibility directly to the North Coast Regional Water Quality Control Board (NCRWQCB) for the purpose of completing the necessary technical analyses and for developing a more effective plan of implementation. As reflected clearly in this inadequate TMDL, U.S. EPA lacks the regulatory position to implement an effective Lower Lost River water quality improvement program. We recommend, therefore, that such implementation is better placed with the State and its North Coast Regional Water Quality Control Board. Without sound implementation, the current version of the Lost TMDL will not meet the mandates of the consent decree.

Response: Please see responses to comments A-1 and G-6 (regarding the North Coast Regional Boards acknowledgement of responsibility for developing and carrying out an implementation plan for the Lost River TMDLs and EPAs support of those efforts), and comment A-8 (modifications based upon new information).

Comment K-9: *Hydrological modifications of Lost/Klamath altered nutrient balance, increased nutrient loads, ability to filter out nutrients/denitrify*. While this Public Review Draft has added a modest amount of information on the long- term loss of habitat in the Lost River, Tule Lake and Lower Klamath Lake, it fails, still, to make any connection whatsoever between these changes and the degradation of the sub-basin's water quality. It states that "riparian and wetland areas historically helped to filter pollutants from runoff to these receiving waters," but nowhere recommends that this natural pollution control capacity be restored. The Lost TMDL notes that "the Lost River is highly channelized and includes several impoundments to facilitate water source and support diversion canals and return flow drains," but it fails to recognize the system of man-made channels, canals, and drains severely impairs the river's ability to assimilate nutrients, as we explain below.

The Klamath River also had a seasonal connection with Lower Klamath Lake (LKL) with flows spilling from the river into the lake during spring-time floods (NRC 2004). Flows would reverse in late summer and the level of LKL would fall as the river dropped and LKL's water would flow from the lake through the Straits Drain back into the Klamath River. Steam driven, flat-bottomed paddle wheel boats navigated from Klamath Falls and Lake Ewauna more than 50 miles south through LKL to Lairds Landing, where goods from the railroad could be loaded, until about 1914 (NRC 2004).

Irrigation canals now carry water from Upper Klamath Lake and the Klamath River into the Lost River basin during summer, adding significantly to the Lower Lost River's nutrient burden. Excess streamflow from the Lost River can be pumped in reverse, through the irrigation canals back into the Klamath River, during winter and spring periods of high runoff. This has the potential to transport a great deal of organic matter to the Klamath River's Keno reach, which adds to nutrient pollution and biological oxygen demand (BOD) (Deas and Vaughn, 2006).

The altered condition of the Lost River was summed up by the USFWS (2001) as follows: "The Lost River can perhaps be best characterized as an irrigation water conveyance, rather than a river. Flows are completely regulated, it has been channelized in one six- mile reach, its riparian habitats and adjacent wetlands are highly modified, and it receives significant discharges from agricultural drains and sewage effluent. The active floodplain is no longer functioning except in very high water conditions."

The Klamath Project also extends up the Lost River into Oregon. Its low-gradient reaches once had complex, braided channels (Figure 3) with associated wetlands that would have filtered overland flow, buffered alkalinity and provided some water storage capacity. The channel is largely confined today (Figure 4,5,6) and wetlands are typically severed from the river by levees (Figure 7), so that they cannot act as part of the river's filter and buffering system (Bortleson and Fretwell, 1993).

Bernot and Dodds (2005) point out that channelized rivers have diminished denitrification capacity, a critically important issue nowhere mentioned in the Lost TMDL. Channelization and diking impairs natural river processes that retain (strip) nutrients from the water column through denitrification, the growth of attached algae, and the settling of organic matter. The result is higher downstream nutrient concentrations than those that would have occurred prior to channelization, resulting in impaired water quality. As described by Bernot and Dodds (2005): "Several additional management methods that have not been regularly employed may prove to be useful in maximizing N retention and removal in lotic ecosystems. These include: 1) Maximizing substrata heterogeneity within the stream channel and creating backwaters where high rates of N flux can occur (for example, encouraging both nitrification and denitrification). … 3) Restoring channelized lotic ecosystems that inherently decrease the ability of the system to handle increased N loads. This restoration should include reversion to historical sinuosity, channel complexity, and connectivity to riparian wetlands as well as decreasing mean depth of the water column in the river channel."

For example, studies in an agricultural area of Illinois (Opdyke et al., 2006) found that sediment denitrification was 390% and 99% higher in two meandering study reaches than in adjacent channelized reaches.

Response: Regarding the current form of the Lost River and suggestions for restoring ecosystem function, please see response to comments E-12 (history of the Lost River system), F-2 (management of the NWR and Lease Lands), F-3 (restoring ecosystem function), A-1 (North Coast Regional Board responsibility for implementation) and A-10 (North Coast Regional Board considering wetland treatment).

Regarding Lost River contributions to the Klamath River, please see comment B-6 (Coordinated Effort for inter-related Klamath and Lost River TMDLs), and response to comment G-12 (Inputs to Klamath River addressed in ODEQ TMDLs).

Regarding denitrification capacity, the model addresses nutrient loads in water from Upper Klamath Lake and the Klamath River carried into the Lost River basin during summer by way of irrigation canals (see also response to comments C-4, C-5, and C-6).

The denitrification rate in the Lost River model was set to the lower end of the potential range and thus represents diminished denitrification capacity associated with channelized rivers.

Comment K-10: *Hydrological modifications of Lost/Klamath altered and reduced wetlands, riparian/wetland habitat, sucker habitat.* The three paragraphs and the single graphic concerning changes from historic conditions do not properly explain the loss of one of the region's most important subsistence fisheries, nor does it provide a framework for understanding how the ecosystem could be restored sufficiently to restore the beneficial uses of water in the sub-basin.

Historic Changes to Hydrology and Land Use: Historic accounts of the Klamath River below Klamath Falls, Oregon establish the connection between the Lost River and Lower Klamath Lake. In high water years the Klamath River would spill over a low divide with the Lost River into Tule Lake, which once had a maximum surface area of 110,000 acres --making it seasonally larger than Upper Klamath Lake even before the latter was diked and drained.

Upper Klamath Lake was, historically, about 94,000 acres in surface area (Abney, 1964 as cited in USFWS, 1993). "A flood in the spring of 1890 gushed Klamath River water down Lost River Slough deep enough to swim a horse for about six months and brought Tule Lake to its last historic high water level of 4,064 feet…the Klamath River periodically flooding down the Lost River Slough is the main source of water which caused Tule Lake's historic high levels." Abney (1964)

Farming interests began diking off the Klamath River from the Lost River basin and draining the area's wetlands, beginning in 1890, before the advent of the federal Klamath (Reclamation) Project: "Following the high water of 1890, J. Frank Adams, Jessie D. Carr and a company of Tule Lake ranchers built a mile long dike along the east bank of the Klamath River to stop the flow of Klamath River into Tule Lake via the Lost River Slough and Lost River." (Abney, 1964)

The Klamath Project completed the works to prevent the spill of the Klamath River into Tule Lake; it built miles of canals and installed pumps to allow the marshes adjacent to Tule Lake to be converted to farmland. Tule Lake ultimately shrank in size from its maximum of 110,000 acres down to 9,400-13,000 acres of shallow water marsh.

U.S. Bureau of Reclamation's (BOR) Klamath Project activities have had an equal or greater impact on the hydrology and aquatic biodiversity of Lower Klamath Lake (LKL), which was originally 94,000 acres or roughly equivalent in size to Upper Klamath Lake. Today LKL has shrunk to about 4,700 acres as a result of diking for railroad development and subsequent draining by the BOR for farming. Figures 1 and 2 compare open water and wetlands in LKL between historic and the present-day conditions, including the percentage of open water and bulrush delineated on the pre-disturbance map (BOR, 2005).

BOR-led studies in the 1920s predicted that draining Lower Klamath Lake would fail to produce productive farmland and that, in fact, the peat below the lake and marshes would likely catch on fire if exposed (Amory 1926, as cited in NRC 2004). A peat fire did, in fact, ensue after the BOR proceeded to drain LKL despite its own prediction of futility. In 1940, the drain between Tule

Lake and Lower Klamath Lake was completed, in part to help extinguish the peat fire, but also to more effectively rid Tule Lake "Lease Lands" (i.e., private farming on the National Wildlife Refuge) of excess water.

The government's destruction of open water marshlands has caused a decline in sucker species in Tule Lake and it has destroyed Lower Klamath Lake's ability to support these fish altogether. The loss of wetlands has also created a major negative impact on water quality due to the loss of the natural filtering capacity that they provided for these historic aquatic ecosystems.

According to the National Research Council (NRC, 2004): "In Tule and Lower Klamath lakes, original wetlands were estimated at 187,000 acres; about 25,000 acres remain (Gearheart et al. 1995)."

The Lost River channel was mapped in detail in 1905 by the U.S. BOR just prior to the completion of the Klamath Project. Figure 5 shows an enlarged view of the Langell Valley reach, not far below Clear Lake. In this reach the Lost River flowed into a vast wetland that made its channel indiscernible. A more recent BOR map, however, shows this reach almost entirely confined by levees (Figure 4). Recent aerial photos of the Lost River just above its convergence with Tule Lake (Figure 5) show that the channel is separated from its old oxbows, which would have had wetlands connecting them to the main channel before wetlands "reclamation".

A ground photo by North Coast Regional Water Quality Control Board staff of the Lost River at Johnson Road (Figure 6) shows a different view of the channel with levees and no riparian trees nor buffer. Forward looking infrared radar (FLIR) imagery of the Lost River (Watershed Sciences, 2002, Figure 7) shows wetlands cut off from the river by levees.

Response: Please see responses to comments E-12 (expanded discussion on Lost River hydrology and history), C-3 (regarding the historical connection between the Lost and Klamath Basins), and comment F-2 (regarding the management of the refuges).

Comment K-11: *TMDL should provide more information concerning hydrology, water quality studies, aquatic biodiversity and sucker populations*. The final adopted Lost TMDL should provide more information concerning historic hydrology, recent water quality studies, aquatic biodiversity, and historic and recent trends in sucker populations, such as that provided below.

Response: Please see responses to the comments addressing each of these specific topics, below.

Comment K-12: *Recent water quality assessments: nutrients, pH.* The North Coast Regional Water Quality Control Board staff sampled the Lost River to determine levels of the pesticide acrolein (Winchester et al., 1994) and for general water quality monitoring purposes (Winchester et al., 1995). The staff of the U.S. BOR has sampled seventeen stations along the Lost River in Oregon and California since 1993. The U.S. Geologic Survey (Dileanis et al., 1996; Shively et al., 2000) also sampled Lost River water quality and biological diversity in 1992-93 and 1999. Winchester et al. (1994) found no trace of acrolein in the Lost River or Klamath Project canals despite its heavy use in the A Canal, which comes from Upper Klamath Lake. The herbicide is used to break down algae in order to keep water moving in the irrigation canals.

Shively et al. (2000) placed fathead minnows, a pollution-tolerant fish species, in live cages downstream of acrolein applications and found delayed mortality up to 48 hours after exposure to Lower Lost River water. Dileanis et al. (1996) also found measurable quantities of other pesticides. The Lost TMDL does not address pesticides and herbicides, but its recommendation for manual algae removal from canals could conceivably help with the herbicide problem.

Response: These TMDLs were developed for dissolved oxygen and pH impairments. Evidence of potential pesticide and herbicide impairments, or any other potential or existing impairments (e.g., monitoring data) should be provided to the states for their determinations of water body impairments for the section 303(d) listing cycles.

Comment K-13: *Recent water quality assessments: , temperature, DO*. Samples taken by NCRWQCB staff (Winchester et al., 1995) in the Lost River, Tule Lake and Klamath Straits Drain show water quality indicative of nutrient pollution and eutrophication, with high pH (Figure 8), water temperatures, high dissolved ammonia (Figure 9), and low dissolved oxygen (Figure 10) levels.

The NCRWQCB also sampled Klamath River water quality, including dissolved ammonia, in the Lost River and the Klamath Straits Drain, during a Clean Water Act Section 104(b)- funded study in the summers of 1996 and 1997 (Figure 11). Although the conductivity values in the Lost River and Tule Lake did not exceed Basin Plan standards, Winchester et al. (1995) found that water quality in the Straits Drain was sometimes out of compliance.

Conductivity reached 1500 micromohs at the Straits Drain while the Basin Plan limit for LKL, of which the drain is considered a part, is 1150 micromohs (Figure 12). Winchester et al. (1995) found it difficult to identify the component of California-only derived non-point source pollution to the Lost River because of its connection with Upper Klamath Lake through the A Canal and its pollution from the Oregon reaches of the river. The authors recommended that the relationship between flows in the Klamath Project and Lost River pollution be investigated.

Data collected by the U.S. BOR on the Lost River are consistent with those of the NCRWQCB, showing nutrient enrichment and eutrophication. Continuous data from the A Canal, which supplies Klamath Project lands, show the extremely high pH which is characteristic of Upper Klamath Lake (Figure 14). The high pH is a consequence of entrained algae. Shively et al. (2000) point out that water from the A Canal provides a major source of nutrient enrichment to Klamath Project lands and, ultimately, to the Lost River. Other findings by Shively et al. (2000) were:

- Dissolved-oxygen concentrations and pH tended to fluctuate each day in response to diurnal patterns of photosynthesis, and they frequently exceeded the criteria for protection of aquatic organisms,
- Elevated ammonia concentrations were common in the study area, especially downstream of drain inputs. The high pH of the water increased the toxicity of ammonia, and the concentrations exceeded criteria at sites upstream and downstream of irrigated land, and
- Sites with potentially toxic levels of ammonia were located all along the flow path, including water sources, agricultural drains, and receiving waters. The sites with the

highest percentage of values that exceeded the criteria were sites 10 and 11 in the Tule Lake Sump.

Existing water quality data for the Lost River basin show an increasing pattern of concentration downstream, with the highest levels of impairment in the Tule Sump and the Straits Drain.

Response: The TMDL document has been expanded to include longitudinal information for selected parameters showing increasing patterns of concentration downstream.

Regarding the relationship between these TMDLs and those being prepared for the Lost and Klamath Rivers by ODEQ, please refer to response to comment G-12. As noted in response to comment K-12, these TMDLs address dissolved oxygen and pH impairments in the California portion of the Lost River, by developing allocations for nitrogen and biochemical oxygen demand. Data for other parameters that should be considered as candidates for impairments should be directed to the appropriate state for consideration in the next section 303(d) listing process.

Comment K-14: *Recent water quality assessments: aquatic biodiversity, fish, suckers*. Shively et al. (2000) concluded that the Lost River aquatic communities retained little of their historic ecological structure and that extensive hydrologic modification and hypereutrophic conditions had degraded the quality of aquatic habitat. The investigators found species diversity to be low, with those species present having a high pollution tolerance. Other specific findings include:

- Historically, the region had many endemic mollusks, but it now supports a reduced mollusk fauna comprised mostly of pulmonate snails and other pollution-tolerant taxa.
- The benthic macroinvertebrate community is now dominated by chironomids and oligochaetes, both of which are tolerant to poor water quality conditions (Figure 15).
- The fish community has become simplified and dominated by short-lived, pollution tolerant species.

Shively et al. (2000) pointed out that there was a major shift in fish community structure of the Lost River between 1973 (Contreras, 1973) and 1999, with non-native species like the fathead minnow and brown bullhead displacing native species like Tui chub, blue chub, and sucker species. Shively et al. (2000) also cautioned that the interaction between Lost River contaminants might make the response by fish and other aquatic life to individual pollutants in a laboratory different than they could be in the Lost River itself. “There was much more mortality in animals tested *in situ*, indicating that environmental conditions (high pH, fluctuating dissolved oxygen, ammonia) presented additional hazards beyond those present in the static laboratory tests.” The U.S. Fish and Wildlife Service (1993) made the following statement about water quality in the Lost River: “It can be concluded that water quality in the Lost River limits habitat for all fish, including Lost River suckers and Short-nose suckers, and can be seasonally lethal.”

The number of pollution-intolerant aquatic insects of the orders Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) from Shively et al. (2000) is shown at Figure 15 and identifies all Lost River locations within California as having values that represent extremely poor ecological conditions. Harrington (1999) recognized streams having more than

19 EPT taxa as healthy, but those having fewer than 12 species as impaired. The values in the Lower Lost River range from only one to no more than six species present.

Historic Importance, Status and Trends of Sucker Species: Gilbert's (1898) early reconnaissance of Upper Klamath Basin fisheries had the following to say about the Lost River: "The 'Lost River sucker' is the most important food-fish of the Klamath Lake region. It is apparently resident during most of the year in the deeper waters of Upper Klamath and Tule lakes, running up the rivers in incredible numbers in March and April, the height of the run varying from year to year according to the condition of the streams. The Lost River fish are the most highly prized and are said to be much fatter and of finer flavor than those ascending the tributaries of Upper Klamath Lake."

The sucker fish were so abundant that early settlers tried to exploit them commercially: "Prior to 1894 an attempt had been made to preserve the meat in cans, but apparently with poor success. Oil had also been extracted from heads and entrails, said to be worth from 60 to 85 cents per gallon." (Gilbert, 1898)

Fisheries in Lower Klamath Lake are also described by NRC (2004): "Before 1924, suckers appear to have been abundant in Lower Klamath Lake, even after its connection to the river was severed in 1917. Suckers migrated into the lake from Sheepy Creek, a spring-fed tributary on the western edge of the lake, in numbers large enough to support a fishery (Coots 1965, cited in USFWS 2001)."

National Research Council (2004) pointed out that Native Americans may have harvested more than 100,000 pounds of adult suckers annually: "Lost River suckers in particular were once a staple food of the Modoc and Klamath tribes; they provided important protein in the spring, when food reserves had been depleted (Cope 1879, USFWS 2002)…Stern (1965) estimated an artisanal harvest of 50 tons/yr, which would correspond to 13,000 fish at an average weight of 3 kg."

NRC (2004) describes the co-evolution of these extraordinary fish populations with the lake ecosystems before disturbance: "The fluctuation in surface area of Tule Lake afforded by its connections to the Klamath River may have been critical in maintaining the high aquatic productivity of Tule Lake and its wetlands (ILM 2000)...The large fish populations in the lake supported what was probably the largest concentration of nesting osprey in North America (ILM 2000). Much of the historical variability in lake and marsh habitats has been lost as a result of management…After the Klamath Project drained most of Tule Lake for agriculture and diversion dams of the project blocked the access of suckers to spawning areas in the Lost River, sucker populations declined substantially (Scoppettone et al. 1995, USBR 2002).

Shively et al. (2000) found few suckers in the Lost River and most were concentrated in reservoirs (Figure 16). While two juvenile suckers were found below Anderson-Rose Dam just above Tule Lake in the USGS survey, there is little recruitment in the lower Lost River (Shively et al., 2000). This is troubling because the remnant Lost River sucker population in the Tule Sump 1A, which is the remnant deep water of Tule Lake, is considered significant by USFWS (1993; 2001) and NRC (2004). According to NRC (2004), Lower Klamath Lake has completely

lost its ability to support suckers: "Lower Klamath Lake has been reduced to a marshy remnant by dewatering. It has occasional connection to the Klamath River through which it appears to receive some recruitment of young suckers, but there is no adult population."

Response: EPA encourages the commenter to participate in the development of the sucker recovery plan, currently being developed (see response to comment A-14 regarding suckers).

Comment K-15: *Problem Statement should mention water quality standards for specific conductance or conductivity*. The Lost TMDL fails to mention the NCRWQCB Basin Plan standard for specific conductance or conductivity. A discussion of these standards is warranted here because the NCRWQCB (Figure 12) found that these standards are exceeded in the Straits Drain. The Basin Plan standards are: 90% lower limit 1000 micromhos for Lower Lost River, 90% lower limit 1300 micromhos for Tule Lake, and 90% lower limit 1150 micromhos for Lower Klamath Lake. The 1500 micromohs [sic] at the outlet of Lower Klamath Lake likely indicates a highly concentrated nutrient load.

Response: Please see response to comment K-12, regarding other parameters for section 303(d) list consideration.

Comment K-16: *Problem Statement: discussion of WQS violations; explain data used, and use other existing data (field nutrient samples, continuous multi-parameter probes)*. The information presented in figures 4,5,6, and 7 is helpful in understanding Lost River water quality dynamics, but it should be significantly improved. First, although annotation of general locations on nutrient charts were helpful, a table and map of sampling locations should be provided since river kilometers are essentially meaningless to most readers. Second, there is no information identifying the years in which the data were collected, nor who collected the data. We assume the data is from the Lost River Water Quality Database (updated version by Tetra Tech, 2004), but it should be cited as such. A final version of this database should be included as an appendix to the TMDL, so that it can be put to future use and maintained over time.

The lack of any presentation of data from field nutrient samples in a nutrient TMDL is unacceptable. It is difficult, if not impossible, to understand Lower Lost River nutrient and water quality dynamics without any field data. We recommend, therefore, that figures be added showing longitudinal variation in the major forms of nitrogen (ammonia, nitrate, organic). Preferably, phosphorus and chlorophyll data should also be presented. It is also disappointing that the TMDL apparently makes only very slight use of data from continuous multi-parameter water quality probes that have been deployed at various sites in the Lost River sub-basin over recent years. Given the highly variable nature of water quality in the Lost River, continuous data offer a means for understanding pH and D.O. far superior to that from grab samples. The Work Group recently received a copy of a February 17, 2005 version of the Lost River Water Quality Database (updated version of Tetra Tech, 2004) from the NCRWQCB. It includes approximately 40,000 records of continuous multiparameter data for the years 2000-2004. It appears that little use was made of this data in the development of the TMDL or its supporting documents (e.g. Tetra Tech, 2005), save for data concerning a brief period in 2004 used for model calibration.

Response: The referenced continuous probe data for dissolved oxygen and pH for the years 2000 to 2003, were available; however, they were not usable in the TMDL modeling analysis because there were no corresponding data (e.g., flow, temperature, and water quality concentrations from each tributary) necessary for modeling the boundary conditions. Thus, the agencies invested in an intensive data collection effort in 2004 in order to have the necessary data to use in the modeling analyses.

This TMDL and modeling analysis was based on the best data available at the time of the TMDL development. The TMDL model was calibrated using data from the year 1999, and confirmed using detailed in-stream data collected through a 2004 targeted study. Data for two different years (1999 and 2004) were used to increase model reliability. The 1999 year had the most concurrent data for model configuration. The monitoring data for this year also exhibit significant water quality impairment during the summer critical period, and thus provide an excellent basis for testing the model's capability of capturing extreme conditions, which are of concern for TMDL development. Year 2004 was selected because ODEQ, North Coast Regional Board, and EPA Regions 9 and 10 conducted an intensive summer sampling effort to support modeling. Thus, the model was corroborated using data similar to the types referenced in the comment.

The database used for this TMDL effort included over 100,000 sampling results at over 100 stations; a map presenting those sampling locations would not be readable and thus, a sampling location map was not generated for inclusion in the TMDL document. The database is maintained by the North Coast Regional Board, and is updated with new information.

Comment K-17: *Numeric targets: Nutrients, modeling analysis: phosphorous loads, light, temperature, DO, nitrogen fixation, denitrification, inorganic nutrients*. This section asserts that "Modeling analysis conducted for these TMDLs found that reductions in phosphorus loads would have little, if any, effect on algal growth rates or dissolved oxygen deficits; in contrast, reductions in nitrogen loads were found to be effective in reducing excess algal growth and maintaining acceptable dissolved oxygen levels." We suggest the following addition: "If TMDL implementation is successful and nitrogen concentrations are reduced, phosphorus may become a limiting, or co-limiting, factor in the future."

After the statement "The growth of attached algae can also be limited by available suitable substrate, light, and temperature", we suggest the following addition: "In addition, phytoplankton (free-floating algae) can also be limited by light and temperature." After "…due to the low levels of oxygen remaining in the water" we suggest the following addition: "Oxygen concentrations higher than lethal minimums can also cause chronic problems (stress, reduced growth, reduced fecundity, etc.) for aquatic organisms."

Response: The proposed language is helpful and these concepts are incorporated into the TMDL document as suggested.

The paragraph regarding nitrogen fixation focuses solely on nitrogen fixation in soil, neglecting water. Blue green algae (cyanobacteria) nitrogen fixing is a well-recognized problem in Upper

Klamath Lake. This species can be expected to thrive in nearby nitrogen-limited water with low-turbulence (e.g. lakes and impoundments). In fact *Aphanizomenon flos-aquae* was a dominant species in phytoplankton samples collected by Eilers (2005) in the Lost River at East-West Road, just upstream of Tule Lake. In a prior study, Scoppettone et al. (1995) found A. flos-aquae in Tule Lake, Sheepy Lake, Lower Klamath Lake, ADY canal, and Klamath Straits drain, which are all within the Lost TMDL geographic area.

Response: Please see responses to comment C-8 regarding the modeling framework being built around the dominant (non-nitrogen fixing) aquatic plant species present in the river.

The Lost TMDL section on denitrification is inadequate. It fails to note that this process occurs in the hyporheic zones beneath healthy rivers (Holmes 1996), especially in alluvial rivers with braided channels (Sjodin et al. 1997). Channelization and diking of the Lost River sub-basin has decreased the amount of the river's denitrification potential because it has reduced its channel sinuosity and eliminated its connecting wetlands (see discussion above regarding Historic Changes to Hydrology and Land Use). The Lost TMDL does not address this matter.

Response: Please see response to comment K-9 regarding denitrification capacity.

The Lost TMDL notes that "Although particulate forms of nitrogen and phosphorous are believed to be far less important influences on growth of aquatic plans, these TMDLs indirectly account for particulate nutrients by also targeting excess loads of organic materials that may contain particulate nutrients." The foregoing does not correctly characterize the role of inorganic nutrients. We would suggest that the following be included in the final Lost TMDL:

> Typically, most of the nitrogen in the Lost River and its tributaries is in organic (particulate) form. For example, averaging together all U.S. BOR samples from the year 1999 in the Lost River Water Quality Database shows that 65% of the nitrogen is in organic form, while only 35% is inorganic (ammonia and nitrate). It should also be noted that organic matter containing nitrogen decomposes to release dissolved inorganic nitrogen that is then available for uptake by algae and aquatic plants. As such, the EPA recognizes that reduced loads of all forms of nitrogen will benefit water quality.
>
> "Further, it should be noted here that the impact of the Lost River on the Klamath River downstream is primarily the total nitrogen load flowing from the Lost River sub-basin to the Klamath. As water flows down the Klamath River's miles of river and reservoirs, nitrogen will cycle (spiral) between organic and inorganic forms. The form of nitrogen discharged from the Lost River into the Klamath River is less important, therefore, than is its total amount."

Response: The proposed language is helpful and these concepts are incorporated into the TMDL document. The coordination of the Lost River and the Klamath River TMDLs is also address in response to comment B-6.

Comment K-18: *Include a summary of phytoplankton surveys*. A brief summary of information regarding phytoplankton surveys from Eilers (2005) should be added here, including the presence of *A. flos-aquae*.

Response: A brief summary of the Eilers (2005) study has been added to the TMDL document.

Comment K-19: *Targets for DIN and CBOD should be included*. Due to the format of the model, the TMDL selects dissolved inorganic nitrogen (DIN) and Carbonaceous Biochemical Oxygen Demand (CBOD) as the nutrients to be targeted for reduction despite the fact that it is total nitrogen (TN = organic nitrogen + inorganic nitrogen) that matters most to the Klamath River downstream. CBOD does contain an organic nitrogen component, so organic nitrogen is indirectly slated for reduction, but CBOD is measured in units of mg/L of oxygen consumption, not in units of nitrogen, so it is a less direct and less precise way to specify nitrogen load reductions.

This section of the Lost TMDL closes with the statement: "While it would be desirable to specify maximum DIN and CBOD targets to supplement the dissolved oxygen and pH targets, it was infeasible to do so for these TMDLs as there is substantial spatial and temporal variability in the manner in which oxygen and pH levels are affected by nitrogen and organic matter loads." This justification for failing to provide numeric targets for DIN and CBOD concentrations seems to lack logical consistency. If EPA believes that the model is accurate enough to determine confidently that a 50% reduction in external DIN and CBOD loads will result in the achievement of water quality standards, then why not present the DIN and CBOD concentrations predicted by the model as numeric targets? One way to provide numeric targets would be to add figures showing DIN and CBOD concentrations for the "Scenario 1D", similar to the Lost TMDL Figures 12-15 that show pH and D.O.

Targets for DIN and CBOD should be attempted. As noted in the quote above, the relationships between the parameters are spatially and temporally variable; thus, it is perhaps appropriate that targets would not have to be identical for all sites and time periods. For instance, unique targets could be set for a few key locations such as the Lost River at East/West Bridge (inflow to Tule Lake), Pump Station D (the outflow from Tule Lake), and the Klamath Straights Drain at the California/Oregon border. Targets could be also be temporally variable as well (e.g. with a different target for each day, week, or month).

Having numeric DIN and CBOD targets at a few key locations would make monitoring meaningful. Many of the input loads in the TMDL model were calculated by taking the difference in loads between two monitoring stations. It is challenging to measure all the input loads given the number of canals and drains, but it should be practical to measure concentrations/loads at a few key locations.

Response: TMDLs for the Klamath River in Oregon and California are being developed to address the parameters shown in response to comment B-6.

The TMDL model is capable of predicting DIN and CBOD concentrations throughout the modeling segments; however, designation of allocations on a loading basis for these

constituents is more appropriate. There is significant variability in DIN and CBOD concentrations not only spatially but also temporally. Thus, different DIN and CBOD concentrations may be necessary to achieve the dissolved oxygen and pH targets (which are the primary goal of these TMDLs) at different times of year and for different years. A loading based approach more appropriately accounts for temporal and spatial variability. Additionally, the model is more reliable for relative comparisons than for specific time and place DIN and CBOD concentration prediction, due to data limitations associated with the highly variable spatial and temporal nature of source inputs to the river. In addition to the figures presenting modeled predictions for dissolved oxygen and pH, figures for CBOD and DIN concentrations have been added to the TMDL document. This information is presented for three locations: LRSR – Lost River at Stateline, south of Anderson-Rose Dam; LREW – Lost River at East-West Road, slightly north of Tule Lake Refuge; and, KSDSR – Klamath Straits Drain at Stateline Road, at the northern end of the Lower Klamath Refuge in California.

EPA acknowledges and appreciates the complexities in designing an effective and meaningful monitoring program and encourages participation in the monitoring program's development.

Comment K-20: *Overview of Source Categories: Calculation of N and CBOD loading in Table versus Section 4.2*. Table 4 shows nitrogen and CBOD loading estimates, with section 4.2 describing the methods by which the various loads for each segment were calculated. We could be mistaken, but the magnitudes of the nitrogen and CBOD loadings in Table 4 do not appear to correspond with those described in section 4.2. In Table 4, the sum of all the loads listed for segment 1 (Lost River) equals the background load for segment 2 (Tule Lake). This would make sense because, as described in section 4.2, agricultural drain loads to Lost River between Stateline Road and Tule Lake were calculated by taking the difference between the loads at the California/Oregon border and the loads at Tule Lake. In contrast, the sum of all loads listed in segment 2 (Tule Lake) does not equal the background load for segment 3 (Lower Klamath Lake and Wildlife Refuge), despite a purported similar methodology of assigning agricultural and refuge drainage loads to Tule Lake by calculating the difference between Tule Lake inflow loads and outflow loads. As for segment 2, the sum of all the loads in segment 3 does not equal the background load for segment 4 (Klamath Straits Drain). These apparent contradictions need to be explained or corrected.

There is not enough information provided in Table 4 and section 4.2 to be able to quantitatively confirm the loading estimates. This could be remedied substantially by providing additional information (columns) to Table 4. For each row, the following information should be added: average flow (in units of cfs or cms), flow-weighted DIN concentration (in units of mg/L), and flow-weighted CBOD concentration (in units of mg/L). Also, adding rows for segment totals would also help readers to understand the table.

Response: Please see response to comment A-11 regarding calculation of loads from upstream segments.

Comment K-21: *Flow depletion as a source of pollution; include discussion of groundwater-surface flow interaction*. Although the U.S. EPA (2000b) appears not to recognize flow depletion as a source of pollution, per se, it does recognize that flow depletion increases concentrations of pollutants. Groundwater extraction has roughly tripled in BOR's Klamath Project area since 2001, driven largely by the BOR's Water Bank program (Gannet et al., 2007). The impact of this increased pumping on water quality is not addressed in the Lost TMDL.

The USGS (2005) study entitled Assessment of the Klamath Project Pilot Water Bank: a Review from a Hydrologic Perspective provides a clear picture of the potential for major problems with groundwater depletion as a result of increased well capacity following the 2001 drought and water supply crisis. The authors found an "eight-fold increase in ground-water pumpage in the lower Lost River sub-basin" and "seasonal declines of 10 to 20 feet near pumping centers, and year to year declines of 2 to 8 feet over broad areas surrounding large pumping centers."

USGS (2005) found that groundwater levels surrounding Tule Lake in 2004 were lower than in 2001, despite 2004 being a much wetter year. They concluded that "In the long term, the rate of ground-water pumping in 2004 may be difficult to maintain indefinitely." The failure of the Lost TMDL to address this issue is a substantial shortcoming. The TMDL should be revised to include a discussion of the interaction between groundwater and surface flow, and the implications for water quality and attainment of beneficial uses.

Response: Please see response to comment E-17.

Comment K-22: *Agricultural Drainage Discharges: Nitrogen fixation, denitrification in Lower Lost River (Oregon Border to Tule Lake); agricultural drainage, assumptions not conservative*. The Lost TMDL contends that assumptions regarding "pollutant levels are conservative." This is likely not the case considering the substantial biological productivity of the system. Phytoplankton and aquatic plants take up nutrients as they grow and they release them as they die, changing the temporal dynamics of nutrient availability. Nitrogen fixation (in reservoirs) and denitrification (in wetlands and hyporheic zones) are likely occurring in the Lower Lost River sub-basin as well.

Response: Biological productivity, including nutrient uptake and release by aquatic plants, is explicitly represented in the model. Additionally, as discussed in response to comment C-8, Eilers (2005) identified the dominant aquatic plant species in the Lost River as non-nitrogen fixing Ceratophyllum demersum (coontail). AFA was identified in significant amounts only at two of the ten sampling locations. To make best use of available data, the modeling framework was built around the dominant (non-nitrogen fixing) aquatic plant species present in the river. While AFA may have localized impacts, available data do not suggest that nitrogen fixation by AFA is a dominant factor. In the event that sufficient, quantitative data are collected and indicate otherwise, the model may be updated in the future to explicitly consider AFA. The denitrification rate in the Lost River model was set to the lower end of the potential range and thus represents diminished denitrification capacity.

Comment K-23: *Agriculture and refuge drainage discharges to Tule Lake and Tule Sump; role of blue-green algae in nitrogen loading*. The Lost TMDL states: "Internal nutrient loadings to

Tule Lake were not quantified in this analysis. Over the long run, however, internal loading rates will likely decrease as the amount of excessive nutrient loadings from external sources are decreased." This assumption is not likely because of the role of the blue-green algae *A. flos-aquae* in nitrogen fixation. Nitrogen loads exiting Upper Klamath Lake are 3.5 times higher than are incoming loads (ODEQ 2002) due to internal loading, including nitrogen fixation. The Lost TMDL provides no evidence that nitrogen fixing is not occurring in Lost River, Tule Lake, Lower Klamath Lake and the Straits Drain.

As noted above, *Aphanizomenon flos-aquae* was a dominant species in phytoplankton samples collected by Eilers (2005) in the Lost River at East-West Road, just upstream of Tule Lake. The low nitrogen: phosphorus ratios in the Lost River shown in the TMDLs' Figure 7 would provide a competitive advantage to nitrogen-fixing species. Because wetlands produce humic acids, decrease pH, and inhibit the production of *A. flos-aquae* (Geiger et al. 2005), nitrogen fixation in the entire Lost TMDL area could doubtlessly be addressed by expanding riparian wetlands and lakes, including an intact perimeter of functioning marshes and wetlands surrounding them.

Response: Please see responses to comment C-12 (regarding how internal loading is accounted for in the model) and comment C-8 (regarding dominant aquatic plant species and the role of AFA in the Lost River modeling). Additionally, as presented in comment A-8, the North Coast Regional Board may determine to include additional analysis (e.g., for nitrogen fixation) for these waters when they prepare to adopt these TMDLs into the Basin Plan in the future.

Comment K-24: *Agricultural and refuge N, P loadings to Lower Klamath Lake/Refuge*. Mayer (2005) constructed nutrient budgets for the Lower Klamath National Wildlife Refuge for the April-November period in 1999-2000 and found that the refuge was a net sink for both nitrogen and phosphorus. For 2000, 75-77 percent of the incoming nitrate, 56 percent of incoming ammonia, and 63 percent of the incoming TKN (Total Kjeldahl Nitrogen) was retained. Although Mayer (2005) is listed in the reference section of the Lost TMDL, there is no discussion whatsoever of his work or findings, another critical omission of the TMDL. Mayer's (2005) retention results should be compared to the TMDL model's predictions to determine if the model predicts the same patterns. Because of the issues that we point out in section 4.1, users of the Lost TMDL are unable to make such a determination. Instead the model continues to characterize refuge areas as sources of nutrients when, if they were flooded, they would become nutrient sinks.

Response: Consistent with Mayer's (2005) study, the TMDL model also demonstrated that Tule Lake and the Lower Klamath Refuge are nutrient sinks. In the TMDL model, approximately 70 percent of inorganic nitrogen was retained by Tule Lake and the Lower Klamath Refuge. This information is noted in the TMDL document.

Comment K-25: *Loading Capacity and Linkage Analysis: Additional information needed to determine whether the TMDL's water quality model adequately characterizes trends in nutrient concentrations*. This section of the Lost TMDL states that Tetra Tech (2005) contains "complete documentation of modeling configuration, model input, and calibration." While Tetra Tech (2005) provides abundant comparisons of model and field data, it does so only for single sites -- there are no longitudinal comparisons. Thus, it is not possible to determine whether the TMDL's

water quality model adequately characterizes the spatial trends in nutrient concentrations in the Lost River system. As noted above in our comments on section 2.2, the TMDL does not even present longitudinal patterns in nutrient field data, let alone compare them with model outputs. Without such comparisons, the TMDL is a black box that asks reviewers to take it on faith.

We are disappointed that the TMDL provides no insight into basic questions such as:

- Do nutrient concentrations in the Lost River generally increase or decrease as water flows downstream?
- Do sites with lower nutrient concentrations have better pH and D.O. conditions than sites with higher nutrient concentrations?

Response: Supplementing the longitudinal plots of model outputs for dissolved oxygen and pH, the TMDL document has been amended to include longitudinal plots for ammonia and chlorophyll *a.*

Comment K-26: *Model assumptions: assigning ambient Lost River water quality to distributed inflows; Tule Lake as a single mixed segment*. The key assumptions outlined in this section are potentially problematic, though we recognize that given data limitations these assumptions were necessary absent a delay in the TMDL's completion to collect the additional data.

Assigning ambient Lost River water quality to distributed inflows

A review of Lost River literature (Dileanis et al. 1996) shows that this is not a correct procedure. Relevant key findings of Dileanis et al. (1996) are:

- Elevated ammonia concentrations were common in the study area, especially downstream of drain inputs.
- Concentrations of ammonia in samples from small drains on the Tule Lake refuge lease lands were higher than those measured in the larger, integrating drains at primary monitoring sites.
- The mean ammonia concentration in leaseland drains [1.21 milligrams per liter (mg/L)] was significantly higher than the mean concentration in canals delivering water to the leaseland fields (0.065 mg/L) and higher than concentrations reported to be lethal to Daphnia magna (median lethal concentration of 0.66 mg/L).
- Dissolved-oxygen concentrations also were lower, and Daphnia survivability measured during in situ bioassays was correspondingly lower in the leaseland drains than in water delivery canals.

The potential effects of assigning all distributed inflows similar water quality to ambient Lost River water quality could be determined fairly easily by calculating the distributed inflow as a percent of total flow (summed over some period of time, and with each segment perhaps listed separately).

Tule Lake as a single mixed segment

The model's representation of Tule Lake as a single mixed segment is incorrect and it is clearly problematic from a biological perspective. Water quality in Tule Lake is not homogeneous. There is a well recognized area at the southern end of Tule Sump 1A known as the "donut hole" (USFWS 1993), where the last viable population of Lower Lost River suckers reside from June

through September. The "donut hole" is approximately 250 acres in size with a mean depth of 3 feet (USFWS 1993), it contains relatively little rooted aquatic plant material, the water is frequently turbid, and the bottom substrate is firmer and low in peat. One possible explanation for this anomaly is that the suckers are swimming in circles which scours a deep spot and counters deposition, which prevents aquatic plants from growing, and which creates turbidity that inhibits phytoplankton activity.

Examination of a high-resolution color aerial photo (Figure 17) shows substantial heterogeneity in Tule Sump 1A. Additionally, as noted in Tetra Tech (2005), the model's assumption of instant mixing of inflows leads to inaccurate predictions for the P Canal downstream of Tule Lake.

Additional assumption not mentioned in the TMDL
Given documented changes such as reduced water tables in the vicinity of Tule Lake due to the increased groundwater extraction in the intervening years (USGS, 2005)(See 4.1 above), the model's reliance on data from 1999 also raises the question of whether current water quality conditions are the same as those found in 1999.

Response: Other researchers (Danosky and Kaffka 2002) also found that water quality in agricultural tile drains was of worse quality than water in supply canals and in Tule Lake sump. A summary of these findings has been added to the TMDL document.

Regarding the assigning of ambient Lost River water quality to distributed inflows
The assumption stated in the TMDL document is "the water quality associated with the distributed flow is similar to the water quality in the Lost River where the distributed flow discharges". The in-stream concentration was used as a first-estimate of the distributed tributary concentration. The concentration was then fine-tuned depending on how well the model matched the observed data. Therefore, the distributed tributary concentration was actually based on model calibration process rather than by simply assigning it the in-stream concentration. It should be noted, however, that in some cases direct assignment of in-stream concentration was deemed appropriate based on the model's ability to mimic observed data.

Tule Lake as a single mixed segment
There are insufficient data to further discretize Tule Lake and Lower Klamath Lake. Due to this data limitation, the technical team decided at the beginning of the project a box representation would be used for this modeling for TMDL development. As additional data are collected, we encourage its incorporation into a more refined, higher resolution representation of both Tule and Lower Klamath Lakes.

Additional assumption not mentioned in the TMDL document
Insufficient data were available at the time the model was developed to accurately quantify and represent the impacts of groundwater conditions and the groundwater table on Lost River water quality. However, two separate years were used to configured (1999) and calibrate (2004) the model, providing broader applicability. Additionally, please see response to comment E-17.

Please also see comment A-8 (North Coast Regional Board may modify to account for new information when adopting TMDLs).

Comment K-27: *Evaluation of Load Reduction Scenarios: Add figures for CBOD and DIN*. We recommend that figures be added (for the same locations as existing figures) showing CBOD and DIN. Justification for this request is included in our comments on Chapter 3 above.

Response: Please see response to comment K-19 regarding DIN and CBOD plots added to the TMDL document.

Comment K-28: *Typographical error*. On page 29, this section is numbered 5.3, it should be 5.2

Response: The document has been changed to reflect the correct section numbering.

Comment K-29: *Relative contributions of Lost River through Straits Drain to Klamath River*. The TDML contains no quantitative analysis of the relative contribution of the Lost River, through its terminus at the Klamath Straits Drain, to Klamath River nutrient loads, as was conducted by Mayer (2001). Nor are the impacts of this contribution anywhere discussed in the Lost TMDL. Mayer (2001) found that the Straits Drain contributed "a significant percentage of the nitrate (25-75%) and soluble reactive P (25-50%) load" in the Keno reach of the Klamath River."

Deas and Vaughn (2006) point out that there is substantial flow from the Lost River to the Keno reach of the Klamath River occurring in winter and spring via the Lost River Canal that has the potential to deliver inorganic nutrients. This organic load may be inert at the time of delivery, but can contribute substantially to BOD and SOD in subsequent periods of warmer water and associated biological activity. An acceptable final Lost TMDL must have a target for reducing nutrient contributions sufficient enough to allow water quality recovery in the Keno reach of the Klamath River.

Response: Please see response to comments B-6 (coordinated effort for inter-related Klamath and Lost River TMDLs) and G-12 (relationship between these TMDLs and those being prepared by ODEQ).

Comment K-30: *Chapter 6: TMDL allocations; daily/annual basis*. We agree that the setting of the TMDLs on both a daily and annual basis is a good idea. Also, see comments on section 3.1 above regarding the importance of total nitrogen, rather than just DIN.

Response: Comment noted.

Comment K-31: *Margin of Safety analysis not valid; improper to "give credit" to biological consumption*. The following sentence should either be removed or clarified: "Third, the TMDL source analysis does not give 'credit' for biological consumption of DIN and CBOD following discharge for purposes of estimating loading capacity." This is not a valid margin of safety. Biological consumption of DIN and CBOD is incorporated into the model. Breakdown of CBOD releases ammonia (increasing DIN) and consumes oxygen. DIN could either be taken up by aquatic plants or algae, or nitrate (a component of DIN) could be permanently removed from the

system through denitrification. It would be improper to "give credit" (e.g. subtract internal consumption from external loads) to biological consumption since the fundamental purpose of the TMDL is to determine what level of external nutrient loads the river is able to accept without the pH and D.O. standards being violated. Violation of pH and D.O. standards is not caused directly by the nitrogen and organic matter; it is caused by the effects of the biological consumption of the nitrogen and organic matter. Hence, it is unclear why giving credit to biological consumption represents a "margin of safety".

Response: This was incorrectly included in the margin of safety list in the Draft TMDL document and has been removed from the Margin of Safety discussion in the TMDL document.

Comment K-32: *Implementation plan needed; include Tribes*. The TDML should lay out an effective vision of how to restore Lost River water quality. We recommend an approach that focuses on restoring natural hydrologic and ecological processes, and of protecting refugia. U.S. EPA (2000b) called for "a focused effort to identify polluted waters and enlist all those who enjoy, use, or depend on them in the restoration effort." The Lost TMDL implementation steps do not meet that standard because it does not include downstream Tribes, who are dependent on a healthy Klamath River

Response: EPA agrees that tribes should be included in the development of the implementation plan; the North Coast Regional Board, with responsibility for implementation (see comment A-1) supports this involvement. We have made additional modifications to Chapter 7 to add tribes to the list of parties who should be involved in an implementation working group.

Comment K-33: *Klamath Water Users Association should not play a leading role in implementation*. The U.S. EPA's recommendation that the Klamath Water Users Association (KWUA) play a leading role in defining restoration measures and in writing the Lost TMDL implementation plan makes success problematic. Regardless of their good intentions, it not reasonable to expect any group of people with a vested economic interest in the status quo to voluntarily make the significant changes in land- and water use necessary to restore the water quality of the Lost River. The KWUA and landowners will need to be active participants in TMDL implementation, but they should not be allowed to take the lead role in setting goals, priorities, and benchmarks.

Response: Please see response to comment E-10 regarding the recommendation for a working group led by a neutral third party.

Comment K-34: *Sucker recovery should be included in implementation*. In previous comments on other Klamath River Basin TMDLs, member Tribes of the Work Group have recommended that implementation be tied to existing, science-based restoration plans that also target fish recovery (i.e. Elder et al., 2001). The closest thing of that nature for the Lost River, Tule Lake, LKL and the Straits Drain are the available sucker recovery plans (USFWS, 1993; 2001) and the NRC (2004) report. The Lost River and short-nose suckers are indicator species and are specifically designated as beneficial uses by the Lost TMDL. Yet there is no mention of sucker recovery in the implementation section and key recovery recommendations of the USFWS (1993; 2001) and NRC (2004) are missing from the Lost TMDL. NRC (2004) noted that Lower Klamath Lake has completely lost its ability to support suckers adult suckers: "Lower Klamath Lake has been reduced to a marshy remnant by dewatering… Development of an adult population is unlikely unless the depth of water can be increased, which would involve incursion of the boundaries of the lake onto lands that are used for agriculture. If the lake were deepened, water quality might be adequate for support of suckers."

Suckers cannot be recovered without expanding the system's natural filtration capacity by restoring riparian zones, lakes of substantial depth, and surrounding open water marshes.

Response: Please see response to comment A-14. We have added a new topic to Table 7, Chapter 7 regarding a recommendation that the North Coast Regional Board and USFWS identify actions that will jointly improve water quality and facilitate sucker recovery in the basin.

Comment K-35: *Nutrient problems can't be solved without wetlands; consider constructed wetlands*. Similarly, pH and D.O. problems cannot be solved without the same such actions. While the Lost TMDL suggests restoring Lower Klamath Lake marshes be explored, it makes no such recommendation with regard to Tule Lake. Dileanis et al. (1996) pointed out that water quality coming off the lease lands surrounding Tule Sump were much worse than ambient water quality within the sump. This suggests that these public lands should be a high priority target for restoring to marsh or lake habitat.

We strongly support the use of wetlands to reduce nutrient loads in Lost River water before it is delivered into the Klamath. As described above, the Lower Klamath Wildlife Refuge is a substantial net sink for both nitrogen and phosphorus Mayer (2005). We agree with the TMDL's recommendation that USFWS explore how the refuges might be used as treatment wetlands. Using the existing wetlands on the refuges as treatment wetlands offers some substantial advantages over constructing new wetlands.

As described above, the Lower Klamath Wildlife Refuge is a substantial net sink for both nitrogen and phosphorus Mayer (2005). Currently, the refuges receive only enough water to keep them wet. If the refuges were to be used as treatment wetlands, an increased amount of water would be diverted from the Klamath River, through the Lost River diversion channel or Ady Canal, cycled through the refuges and returned to the Klamath River. It is highly likely that such operations would decrease nutrient loads to, and improve water quality in, the Klamath River.

Deas and Vaughn (2006) suggest that new wetland areas be constructed along Keno Reservoir to reduce organic matter load and improve dissolved oxygen levels in the reservoir. This approach

is attractive because constructed wetlands can be specifically designed to maximize desirable processes such as settling organic matter and denitrification, resulting in higher nutrient reductions per unit area than typical natural systems (U.S. EPA, 1993; 1999, 2000a). It is critically important, however, to note that while using constructed wetlands to treat Straits Drain and Link River, water could improve water quality in the Keno Reservoir and the Klamath River downstream, it would do little to improve Lost River water quality or assist endangered Lost River suckers. For this reason, we strongly support both 1) the use of wetlands (either newly constructed or in LKL refuges) to treat Straits Drain effluent, and 2) restoration actions within the Lost River system such as riparian restoration, lake expansion, and wetland restoration.

Response: Please see response to comments K-9 and K-26.

Comment K-36: *Changes in land and water management needed*. Remedying the complex and acute water quality problems in the Lost River, Lower Klamath Lake and Klamath Straits Drain will require major changes in land and water management. These are obviously difficult social issues, but they are a legitimate and necessary component of anything that purports to be a Lost River water quality improvement plan.

Response: EPA agrees that this is a complex system requiring coordinated efforts at many levels. Please see prior responses, including responses to comments B-6 (coordinated effort for inter-related Klamath and Lost River TMDLs), F-2 (management of the NWR and Lease Lands), G-12 (how KSD and KR are addressed in various TMDLs), and A-1 and A-10 regarding North Coast Regional Board responsibility for implementation and consideration of wetland treatment.

Comment K-37: *Monitoring discussion is vague, does not include DIN, CBOD targets, should include invertebrates, fish species, and sucker populations*. The Lost TMDL's discussion of monitoring is vague. As noted in our comments on section 3.2 above, we are disappointed that the TMDL does not provide numeric targets for DIN and CBOD. If they were in place, such targets would provide the means for practical monitoring, evaluation, and adaptive management of the TMDL's implementation. There is a wealth of baseline data that has been collected in the Lost TMDL area.

In addition to recommending monitoring of water quality, the final technical report should also recommend continued monitoring of aquatic invertebrates and fish species as indicators of restored water quality and attainment of beneficial uses. The trends in sucker numbers should also be regarded as an indicator of pollution abatement and the U.S. EPA should more directly acknowledge these fish as indicators of success. If the Lost River and short-nose suckers thrived in a restored Lower Klamath Lake, it is likely that there would be no problem with nutrient pollution at the Straits Drain.

Response: We have added language to Topic 9 (Monitoring) in Table 7-1, Chapter 7 regarding incorporation of targets and use of indicator species in the Monitoring Plan.

Comment K-38: *Adaptive management*. The U.S. EPA (2000) recognized that the "ultimate success in achieving water quality standards for non-point sources may depend upon an iterative approach" or adaptive management. National Research Council (2004) pointed out, however,

that USFWS, the U.S. BOR and other cooperating entities had failed to implement adaptive management in sucker recovery efforts in the Upper Klamath Basin. NRC was, therefore, unable to determine whether tens of million of dollars in restoration money spent over the last decade had any ecosystem benefit.

The use of the wildlife refuges as treatment wetlands is an excellent opportunity for adaptive management. For a year, more water should be cycled through the refuges, with intensive monitoring. The data can then be evaluated to determine the program's effectiveness, and adjustments may be made as necessary. If use of the existing refuge wetlands does not result in sufficient water quality improvements, then additional wetlands should be created.

Response: EPA appreciates these suggestions. Please see response to comment F-2 regarding the management of the NWR including the ongoing programs to increase wetlands (among other goals), and comments A-1 and A-10 regarding North Coast Regional Board responsibility for implementation and consideration of wetland treatment.

Comment K-39: *Lower Klamath Tribal culture*. The Tribes of the Lower Klamath River have harmony-based cultures, in which the people are inseparable from the natural environment. If the environment is treated well people will thrive.

Response: EPA appreciates the roles that the Lower Klamath River Tribes have played historically and will continue to play in the future of the water quality in the basin. We also acknowledge the trust relationship between the tribes and the federal government. Please see also response to comment K-32.

Comment K-40: *Tule Lake, Lower Klamath Lake*. The condition of the Lower Lost River, Tule Lake and Lower Klamath Lake are profoundly altered from their natural state, with the latter two water bodies comprising only 8 percent of their former area. It is not surprising to Tribes therefore that water quality in the sub-basin is abysmal and that almost nothing can live in these water bodies.

Response: Comment noted.

Comment K-41: *Flawed modeling, lack of historical context will not improve water quality*. The Lost TMDL is an artificial construct that is over-reliant on an obviously flawed modeling approach and is lacking totally in historical context. It simply will not work. It will not control pollution within the Lost River system, nor will it reduce nutrient contributions to Keno Reservoir and the Klamath River downstream sufficiently.

Response: We disagree with the assessment of the validity of the modeling effort. We have confidence in the modeling analysis and its sufficiency for deriving TMDL allocations. As stated in response to comment K-3, with any modeling study, the quantity and quality of available data is often a limiting factor in a modeling analysis. The Lost River TMDL modeling study is no exception. However, as shown in the TMDL and Model Configuration documents, despite the data limitations, the model provides a reasonable representation of the physical, chemical, and biological processes occurring

in the Lost River. For example, the model has reproduced the observed low dissolved oxygen concentrations (both in magnitude and timing) and trends for other parameters. Further, the model was developed based on the well-tested CE-QUAL-W2 modeling framework, which has a track record of successfully representing interaction between external forces and internal dynamics. Based upon the results of the model calibration, the use of best available data in the modeling, and the results of the peer review of the model, we determined that the model was acceptable for TMDL development.

Comment K-42: *NCRWQCB should implement the TMDL*. The U.S. EPA should do whatever its needs to do legally with the Lost TMDL, but it should be prepared to assist the State of California and its North Coast Regional Water Quality Control Board to do the substantial amount of work remaining to complete the necessary technical analyses, using the abundant available data missing from EPA's effort, and to craft an effective implementation plan.

The Lost TMDL, as its text makes clear, drew upon the interests of local land- and water users. There are many more communities affected by the quality of water of the Lost River and the Klamath River downstream. Further work to accomplish an adequate TMDL for the Lost River and an effective implementation plan for that TMDL must open up its process to recognize and include the larger Lost River stakeholder community.

Response: The North Coast Regional Board may modify TMDLs to account for new information when adopting TMDLs, and will be responsible for developing implementation plans utilizing implementation recommendations in Chapter 7 of the TMDL document (see comments A-1, A-3, A-8 and A-9). Further, EPA agrees that effective implementation must include the larger Lost River stakeholder community (see response to comment E-10 regarding working group with a neutral third party leader and equal participation by all stakeholders).

Comment Set L: Felice Pace, Klamath Forest Alliance

Comment L-1: *KFA background*. The Klamath Forest Alliance (KFA) is a community-based non-profit organization with offices and activists in both the Lower and Upper Basin, in the California and Oregon portions of the Klamath River Basin. While we are not just an environmental organization, we have a strong interest in the environment as essential to our mission: healthy ecosystems and healthy communities. It is likely that we will be the only non-governmental organization actually located in the Klamath River Basin advocating for an appropriate Lost River TMDL as an essential tool for restoring water quality and beneficial uses in the Lost and Klamath Rivers. KFA is a plaintiff in the lawsuit that resulted in this TMDL and we have been involved in the process. Our letters on the Lost River TMDL should be in the record you received from the NCRWQCB.

Response: Comment noted.

Comment L-2: *Environmental justice and locations of public meetings*. Attached is our letter to the NCWQCB dated 8/9/05 requesting that public meetings on Lost River TMDL be held in locations where those most affected by the pollution form the Lost River could participate. No such meetings have been held by the NCWQCB nor by EPA. This is a violation of the EPA, SWRCB and the relevant Presidential Executive Orders. The Lost River is pumped through Sheepy Ridge and then via the Klamath Straits to the Klamath River. In summer this highly polluted water comprises a major portion of the Klamath River flow from the Upper Basin. The Klamath River where the Lost River water enters, as well as that portion of the river below the Cascade Canyon where the mainstem dams are located, is subject to chronic and episodic fish kills including ESA endangered sucker species and ESA threatened Coho salmon. The people living downstream on the Klamath – and in particular the river and coastal communities both native and non-native – depend on river resources and ARE the groups most impacted by the failure of Lost River water users to meet water quality standards. These people – many of whom are low income – deserve the opportunity to understand the pollution problems that impact them and to have their voices heard when clean-up plans are developed. Recommendation: EPA should hold public meetings on the Lower River (Orleans) and on the Coast (Arcata) to inform those most affected how the EPA plans to fulfill its responsibility to clean up the Lost River.

Response: In February and March 2004, the North Coast Regional Board, ODEQ and EPA Regions 9 and 10 held joint public meetings at the beginning of the collaborative TMDL effort on the development of both the Klamath and Lost River TMDLS. Meetings were held in Yreka, CA; Klamath Falls, OR; and Fortuna, CA. In addition, the North Coast Regional Board held scoping sessions.

While additional public meetings are not anticipated for the Lower Lost River TMDLs in California, EPA has communicated to the North Coast Regional Board the request that public meetings be held on the Lower River (Orleans) and on the coast (Arcata) to inform interested parties in those areas of activities related to the Klamath River Basin.

Comment L-3: *Single Klamath/Lost River TMDL needed*. KFA has a long history of advocating for a single TMDL for the Oregon and California portions of the Lost River Basin and its human-engineered extension, the Lower Klamath Lake/Klamath Straits area. The Lost River

originates in California, flows into Oregon, gains flow diverted from Upper Klamath Lake, flows back into California, is pumped through Sheepy Ridge, flows into Oregon and enters the Klamath River after which it flows back into California.

Given that geography, it is virtually impossible to meet the intent of the TMDL program – cleaning up water bodies that do not meet Clean Water Act/state standards – through the balkanized approach that EPA is currently implementing. We believe this failure to meet CWA intent constitutes a violation of law and is likely to lead to further litigation unless it is corrected. Recommendation: In order to meet the intent of the Clean Water Act, EPA should develop one TMDL for the entire Lost River drainage area – including Lower Klamath Lake and the Klamath Straits. This is the only way to achieve a TMDL that can lead to remediation of the current violations of CWA standards.

Response: Please see the response to comment B-6 regarding the coordinated effort for developing TMDLs conducted for the Klamath and Lost Rivers; response to comment C-3 regarding the connection between the Lost and Klamath Rivers; and, comment D-3 regarding history of the Lost River Basin. Regarding alleged failure to meet the requirements of the Clean Water Act, please see responses to comment G-2, G-3, G-22 and G-25.

Comment L-4: *Technical TMDL flaws; TMDL lacks monitoring data; modeling is flawed*. Even setting aside the improper scale of what the EPA has proposed, the TMDL contains numerous technical and methodological flaws which render it next to useless. In this regard we defer to the comments of the tribal work group coordinated by the Yurok Tribe which we incorporate into our comments by reference. But we also want to emphasize the failure of EPA to use actual water quality monitoring data in development of the TMDL. Instead EPA has relied on modeling which is highly suspect and probably fatally flawed. Of special note in this regard are the inappropriate assumptions that have gone into this model. As they say in the trade: "Garbage in and garbage out." The modeling results can not serve as the basis for an adequate and legally sufficient TMDL. Recommendation: KFA urges EPA to adopt the recommendations and suggestions made by the Tribal TMDL Work Group concerning how to fix the many technical deficiencies of the Draft TMDL.

Response: Please see responses to comment set K, submitted by Kevin McKernan of the Yurok Tribe (representative of those submitted by other Tribal TMDL Work Group members). Regarding the portion of the comment addressing the use of water quality monitoring data in development of the TMDLs, the model and TMDLs do, in fact, use water quality monitoring data in their development. Please see response to comments K-3, K-16 and K-41.

Comment L-5: *Restoration and Recovery are ignored; TMDL should give specific guidance to landowners, regulators and land managers*. The Draft TMDL does not present or give adequate direction for developing a pathway to restoration of water quality (meeting water quality objectives) or for recovery of beneficial uses – including ESA listed species. While courts have ruled that TMDLs do not necessarily need to address implementation issues this does not relieve EPA from the responsibility for providing clear guidance on how water quality can be feasibly restored. The TMDL should give specific guidance to landowners, federal and state regulators

and federal and state managers concerning which technologies and techniques can be effective in restoring water quality in the Lost River and meeting water quality standards for the release of these waters into the Klamath River.

For example, simply running agricultural return flows through a settling pond has been demonstrated through research and experience to eliminated +/- 50% of suspended solids. It is these solids which constitute a substantial portion of the nutrient loads of the Lost River, Klamath Straits and the discharge-receiving waterbody, the Klamath River. Treatment wetlands have been demonstrated to be even more effective in removing nutrients. Recommendation: The TMDL should provide guidance and direction to landowners, land managers and regulators concerning how restoration of water quality can reasonably be achieved as well as identification and efficacy of applicable pollution reducing technologies in this specific situation.

Response: Please see responses to comments K-42 (North Coast Regional Board should implement the TMDLs) and K-32 (Implementation planning to include Tribes).

Comment L-6: *Impacts on the Klamath River*. We have noted above that during the Summer, the Klamath Straits – which carries the entire discharge of the Lost River – represents a substantial percentage of flows in the Lake Ewana stretch of the Klamath River where fish kills are common (the receiving waters). At times the Straits are so polluted that ammonia is formed resulting in a discharge that contains pure ammonia which is directly toxic to fish and other aquatic organisms.

The Klamath River in this section and below is also listed as "nutrient impaired" and a Klamath nutrient TMDL is being prepared. It is essential to the Klamath nutrient TMDL and to restoration of water quality in the Lake Ewana section of the river – the receiving waters – that the Lost River TMDL clearly identifies the objective for those releases as well as a time-line and benchmarks for achieving releases that comply with the CWA, i.e. that meet applicable water quality standards. Identification of a reasonable time-line and benchmarks – along with the technical guidance recommended in #4 above - is also important for those who allocate water quality clean-up and other restoration funds. In the absence of pollution reduction technical direction, time-lines and benchmarks, those responsible for abating the pollution and those who must decide how to allocate scarce abatement, remediation and restoration funds will be unable and unlikely to use those funds to best effect. A time-line and benchmarks are also important to those most impacted by the pollution – downstream interests. Those who live downstream and on the coast and whose livelihoods are directly impacted by the pollution produced in the Lost River have a right to a time-line which tells them when they can expect relief and benchmarks so they can assess whether progress is being made. Recommendation: The TMDL should provide a reasonable time-line and benchmarks which landowners, managers, regulators and those most affected by the pollution can use to assess whether the TMDL is working as intended to restore Lost River water quality. Benchmarks for releases to the Klamath River are particularly needed for the Klamath nutrient TMDL.

Response: Chapter 7 of the TMDL document presents recommended implementation actions and timelines; however, the North Coast Regional Board will be developing the implementation plan for the California portion of the Lost River. Please also see

responses to comments B-6 (coordinated effort for inter-related Klamath and Lost River TMDLs) and G-12 (relationship between these TMDLs and those being prepared by ODEQ).

Comment L-7: *Implementation should not be delegated to KWUA*. Those responsible for the pollution should not be awarded responsibility for monitoring their own compliance; compliance can not legally be delegated to a private entity. In the Draft TMDL the EPA proposes turning over implementation of the TMDL to the Klamath Water Users Association (KWUA) – a private, 501-c-4 political lobbying organization which represents the interests of Klamath Basin Irrigators and their business suppliers. The interest of these irrigators is to minimize cost and maximize profit. Therefore, they have an incentive not to implement the TMDL. Furthermore, KWUA has a public record that demonstrated hostility toward regulation. Putting KWUA in change will guarantee that the TMDL is only a paper exercise and that the practices causing the pollution continue.

We also question whether EPA can legally delegate its responsibility for implementing the Clean Water Act to a private entity. Recently KWUA on behalf of Klamath Basin Irrigators has been talking a lot in the media about its interest in collaborating with tribes and other interests. Implementation of the Lost River TMDL will provide a test of whether this is just propaganda, only applies to when others can provide KWUA's members with benefits, or is genuine. KWUA can demonstrate that it is serious about collaboration and working together by joining with KFA and others in calling for collaborative TMDL implementation under the direction of the NCWQCB and Oregon DEQ. Recommendation: Implementation of the TMDL should not be delegated to a private advocacy group that represents the interests of those individuals and corporations which are directly responsible for the majority of the pollution that the TMDL is supposed to abate.

Response: Please see response to comment E-10 regarding the recommendation for a working group led by a neutral third party.

Comment L-8: *Comment summary*. The DRAFT TMDL is technically inadequate and its development does not comply with Executive Orders and EPA policies for Environmental Justice. As pointed out above, the Draft TMDL is so flawed that it can not and will not lead to clean-up of pollution in the Lost River that results in fish kills – including killing ESA listed species – and contributes to "take" of Coho salmon and diminution of other public trust species and resources in both the Oregon and California portions of the Klamath River. Clean-up is further precluded by putting the polluters in charge of implementing the TMDL.

EPA needs to pull this TMDL, hold public meetings where those most affected by the pollution can participate and develop a TMDL that addresses both sides of the border and the receiving waters – the Klamath River - and which provides technical guidance, time-lines and benchmarks for achieving compliance with water quality standards. Finally, the EPA should not try to supercede the states when it comes to implementing the TMDL. Rather, the TMDL should give direction to the State of Oregon and the State of California on how to properly to implement the TMDL and recommend that the states utilize a collaborative process for implementation which includes both those generating the pollution and those affected by the pollution, i.e. all interest collaboration.

Response: Please see responses to comments L-1 through L-7.

Comment Set M: Christian Scheuring, California Farm Bureau Federation

Comment M-1: *Farm Bureau background and relationship to KWUA*. The California Farm Bureau Federation ("Farm Bureau") is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the State of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, comprised of 53 county Farm Bureaus currently representing over 33,000 farm families and 91,500 individual members in 56 counties. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

Farm Bureau appreciates the opportunity to provide comments on the March 2007 public review draft of the Total Maximum Daily Loads (generically "TMDLs") for nitrogen and biochemical oxygen demand to address dissolved oxygen and pH impairments in the Lost River, California (specifically the "Draft TMDLs"). Farm Bureau has substantial membership in the Lost River hydrologic areas who could be directly affected by preparation of the technical reports and the implementation of these TMDLs. On behalf of that membership, Farm Bureau provides both the following comments and incorporates by reference those more particularized comments developed and submitted separately by the Klamath Water Users Association on this date.

Response: Please see response to Klamath Water Users Association comments, in comment set B.

Comment M-2: *Implementation recommendations*. As an initial matter, Farm Bureau believes that implementation plans for TMDLs should be developed and approved by the State. As such, Farm Bureau believes that the Draft TMDLs should not include the proposed implementation plan in Chapter 7 of the Draft TMDLs. Farm Bureau believes that EPA has correctly recognized in the Draft TMDLs that implementation actions are strictly advisory and not required under federal law; however, their inclusion in the draft TMDLs is likely to have far greater effect than the "few recommended general strategies" which the Draft TMDLs represents them to be. In point of fact, the Clean Water Act commits the authority for developing implementation plans to the States, and Farm Bureau believes that this process should include stakeholder involvement and balance water quality improvement goals with the economic improvement goals in TMDL-affected watersheds.

Accordingly, Farm Bureau respectfully submits that EPA's implementation recommendations be submitted to the North Coast Regional Water Quality Control Board ("Regional Board") under separate cover, outside of the Draft TMDLs document. In addition, the specific timeframes for implementation in the Draft TMDLs should be removed, as they both suggest that the implementation recommendations are mandatory and are not underpinned by appropriate feasibility analyses. Farm Bureau generally supports self-determined regulatory measures that work towards attainment of water quality goals, and supports their inclusion in an implementation submission by EPA to the Regional Board. Finally, Farm Bureau believes it may be appropriate for a work group to be formed which includes local stakeholders for the purposes of considering workable solutions, and EPA may wish to suggest as much in a separate document.

Response: Please see responses to comment B-11 regarding proposed implementation recommendations, timeframes for those recommendations, and formation of a workgroup of stakeholders.

Comment M-3: *Lack of quantitative data; EPA should seek schedule extension*. As for the Draft TMDLs themselves, Farm Bureau acknowledges that EPA is operating under a consent decree which requires their development. Given the limitations in data, it may be most appropriate for EPA to seek an extension of the consent decree deadline for their development, so that fuller data gathering and analysis may occur. The Draft TMDLs document itself acknowledges "a lack of quantitative data to describe many aspects of the [Lost River] system", and that "insufficient data" exists relative to pollutant loading from some sources. It would seem most appropriate to remedy these defects before adopting the Draft TMDLs, and if this is not possible, the document should at least more readily acknowledge the shortcomings of the model used to support the load allocations in the Draft TMDLs.

Response: Please see responses to comments B-1, regarding the alleged inadequacy of the data, acknowledgement of limitations, and the recommendation for a time extension.

Comment M-4: *Source assessment is vague; Load allocations are guesswork*. Beyond this, the Draft TMDLs are insufficiently developed in several respects. First, the source identification is vague, leaving unclear the specific contributions various actual sources may have on water quality impairment. The consequent assignment of load allocations to special districts or other governmental agencies rather than actual sources makes implementation a matter of guesswork. Finally, the draft TMDLs must assure that background and upstream sources that exceed their assigned loading do not cause a failure to meet assigned downstream load requirements.

Response: Please see response to comment B-5 regarding "sources" and comment B-3 (Water Quality Objectives unattainable due to natural or historic conditions).

Comment M-5: *Understanding water quality issues for adequate Implementation*. Farm Bureau believes that water quality conditions within the Lost River hydrologic area should be properly understood as a precursor to any TMDL effort, and that implementation of any TMDL should be a matter of State concern as informed by appropriate stakeholder involvement.

Response: EPA believes that the analysis is adequate to develop TMDLs, using the best available data. The North Coast Regional Board is expected to implement the TMDLs. Please see response to comment A-1 regarding North Coast Regional Board's responsibility for implementation and data are adequate for TMDL process.

Comment Set N: Phil Smith, Resighini Rancheria

With minor exceptions, comment set N comments match those in comment set K.

Response: Please see responses to comment set K.

Comment Set P: Felicia Sobonya

Comment P-1: I am writing to stress the importance and necessity of preserving and improving the health of the Klamath River, for the health and sustainability of both the Salmon as well as the Native Peoples--whose culture, spiritual beliefs, and preservation depend on the annual Salmon runs. Obviously this means making sure that all of the tributaries that feed into the Klamath must be clean...which even more obviously means that the Lower Lost River TMDL, which is being prepared by the EPA, must include an implementation plan to clean up its contamination sources, and the ability to enforce the recommendations.

Response: Please see response to comment J-1.

Comment Set R: Sandi Tripp, Karuk Tribe of California

With minor exceptions, comment set R comments match those in comment set K.

Response: Please see responses to comment set K.

Comment Set S: Senator Doug Whitsett, Oregon State Legislature

Comment S-1: *Wetlands as water quality filters*. Statement, TMDL report p. 5: "Riparian and wetland areas historically helped to filter pollutants from runoff to these receiving waters." Where is the data to support this statement? The alkali lake beds resulting from evaporation scattered throughout the Klamath Basin, with wetland grasses on their perimeters, belies this assertion.

Response: Please see response to comment K-9 regarding restoring ecosystem function. Additionally, a discussion has been added to Chapter 7 summarizing USGS reports which speak to the absence of salinity accumulation in Tule Lake Refuge.

Comment S-2: *Modeling data*. Statement, TMDL report p.6: "The data and modeling analysis conducted to support this TMDL found that reductions in DIN and CBOD loadings of approximately 50% form the estimated baseline loads from 1999 would be sufficient to bring about attainment of the applicable pH and dissolved oxygen water quality standards in California." Is there enough field data from 1999 to produce an empirically generated model that reflects accurate pH and dissolved oxygen readings for a baseline? Shouldn't a baseline model be the mean of several years' worth of field data? Why is there more data in 1999 than other years?

Response: Please see responses to comments K-3, K-16, K-26, and K-41.

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